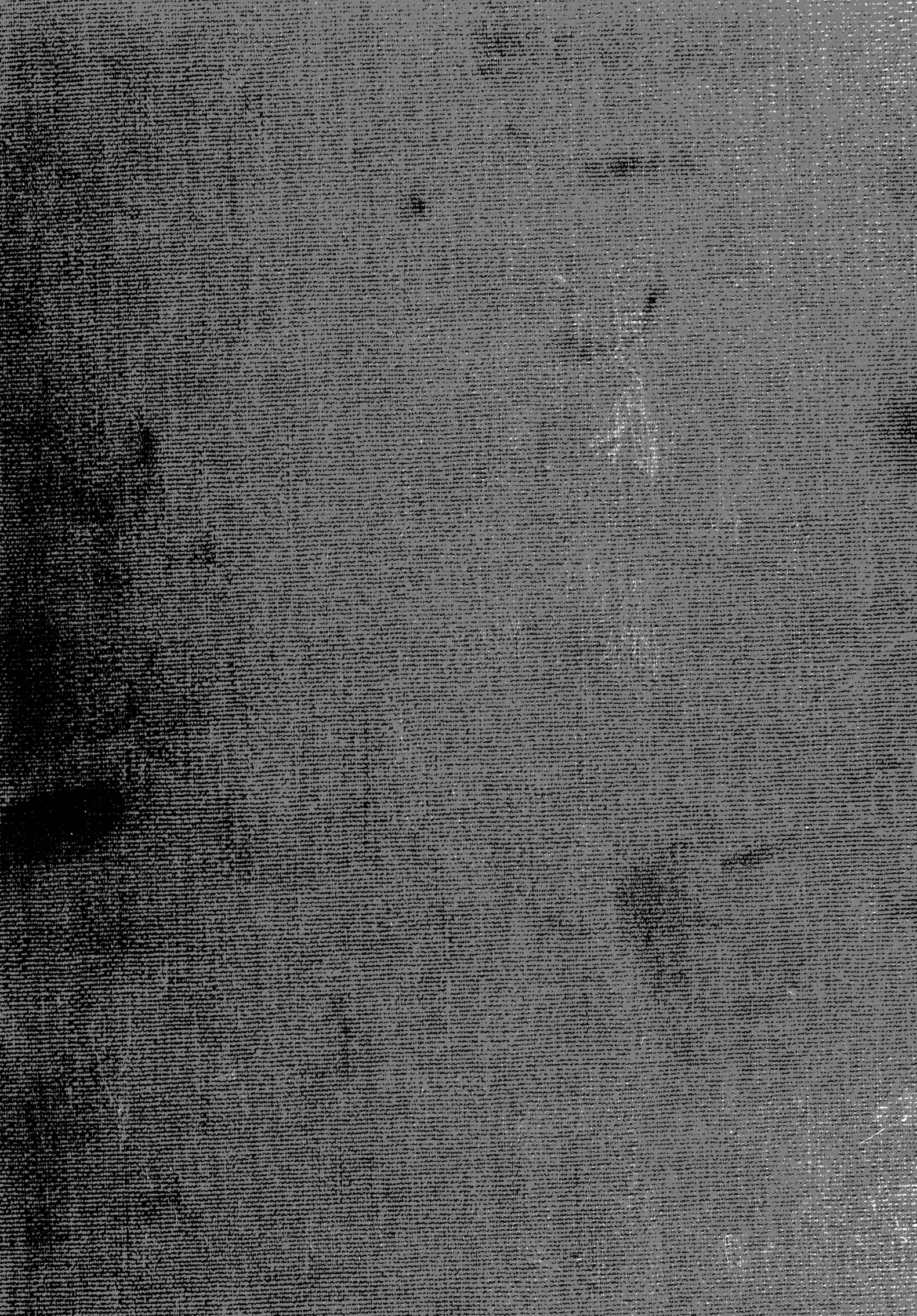


KONGLIGA SVENSKA

VETENSKAPS-AKADEMIENS

HANDLINGAR.

NY FÖLJD.

TJUGUSJETTE BANDET.

STOCKHOLM, 1894—1895.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

INNEHÅLL

AF TJUGUSJETTE BANDET.

KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N:o 1.

TELEGRAPHISCHE LÄNGENBESTIMMUNGEN

ZWISCHEN

LUND, GÖTEBORG, STOCKHOLM, HERNÖ UND TORNEÅ

AUSGEFÜHRT

VON

P. G. ROSÉN UND R. LARSSÉN

REDIGIRT

VON

P. G. ROSÉN.

DER KÖNIGL. SCHWEDISCHEN AKADEMIE DER WISSENSCHAFTEN VORGELEGT DEN 10. MAI 1893.

STOCKHOLM, 1894
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER

EINLEITUNG.

In den Jahren 1885, 1886, 1888 und 1889 wurden die Längenbestimmungen zwischen Lund, Göteborg, Stockholm, Hernösand und Torneå durch astronomische und telegraphische Operationen auf Veranlassung der topographischen Abtheilung des Generalstabes und der Königl. Akademie der Wissenschaften von Doktor R. Larssén und mir ausgeführt.

Diese Arbeiten haben sich seitens der Telegraphverwaltung, der Sternwarten, Navigationsschulen und mehrerer Privatpersonen der bereitwilligsten Unterstützung zu erfreuen gehabt, und ich halte es für eine angenehme Pflicht dafür in verbindlichster Weise zu danken.

Die Längenbestimmungen sind nach der Methode mit Austausch von Beobachtern und Instrumenten ausgeführt. Bei den Längenbestimmungen Hernösand—Stockholm—Göteborg—Lund hat ein zweimaliger Wechsel der Instrumente inmitten der Operationen stattgefunden, während bei der Längenbestimmung Hernösand—Haparanda nur ein solcher erfolgt ist. Eine direkte Bestimmung der absoluten persönlichen Gleichung fand nicht statt. Uebrigens wurden für jedes Paar von Stationen in der Regel dieselben Pol- und Zeitsterne angewandt und die Beobachtungen wurden in zwei meistens von einander unabhängige Gruppen getrennt, wie aus der Auseinandersetzung der Beobachtungen erhellt.

Das Programm des Beobachtens für jede der beiden Gruppen war folgendes:

Signalwechsel.
Passagen eines Polsterns in der einen Lage des Instruments.
Umlegung des Instruments.
Passagen desselben Polsterns in der andern Lage des Instruments.
Passagen von vier Zeitsternen.
Umlegung des Instruments.
Passagen von vier Zeitsternen.
Passagen eines Polsterns.
Umlegung des Instruments.
Passagen desselben Polsterns.
Signalwechsel.

Hierbei muss jedoch bemerkt werden, dass bei der Längenbestimmung Stockholm—Göteborg nur eine Reihe von Signalwechseln zwischen den beiden Sterngruppen geschehen ist, während bei den übrigen Längenbestimmungen zwei Reihen stattfanden.

Niveauablesung geschah in der Regel für jeden Zeitstern einmal und für die Polsterne mehrmals.

Instrumente.

Von den Instrumenten, welche zur Anwendung kamen, ist das von mir gebrauchte Passageninstrument in Geod. Astron. Arbeiten der top. Abtheilung des schwed. Generalstabes Band I, Heft 1, schon beschrieben. Zwischen den Beobachtungen in den Jahren 1885 und 1886 ist ein neues vom Mechaniker P. M. SÖRENSEN verfertigtes Ocularmikrometer angebracht, in Folge dessen ein neues Fadennetz von 17 Fäden angewandt wurde.

Bei den verschiedenen Systemen von Fäden waren die Abstände von mittleren Fäden die folgenden.

Die Fadendistanzen im Jahre 1885:

I	$44^s.796$	VIII	$4^s.286$
II	38 .389	IX	12 .863
III	31 .997	X	19 .164
IV	19 .217	XI	32 .137
V	12 .688	XII	38 .423
VI	4 .144	XIII	44 .877
VII	0 .000		

Diese Fadendistanzen beruhen auf einer grossen Zahl Durchgangsbeobachtungen von Polsternen und Zeitsternen und zwar von denselben, welche bei der Längenbestimmung selbst angewandt wurden.

Die angewandten Fadendistanzen waren in den Jahren:

	1886.	**1888—1889.**
I	$53^s.134$	$53^s.135$
II	48 .760	48 .677
III	44 .225	44 .224
IV	35 .445	35 .395
V	31 .083	31 .039
VI	26 .577	26 .561
VII	17 .792	17 .763
VIII	13 .373	13 .333
IX	0 .000	0 .000
X	13 .416	13 .392
XI	17 .761	17 .734
XII	26 .580	26 .602
XIII	30 .896	30 .927

	1886.	1888—89.
XIV	$35^s.444$	$35^s.437$
XV	44 .264	44 .247
XVI	48 .726	48 .724
XVII	53 .349	53 .375

Diese Bestimmungen der Fadendistanzen beruhen auf Durchgangsbeobachtungen derselben Polsterne, welche bei Längenbestimmung benutzt wurden.

Bei den Beobachtungen vom Jahre 1885 wurde Rücksicht auf die früher gefundene Ungleichheit[1] der Zapfen genommen, welche

$$V - O = + 0^s.068 \pm 0^s.003 \text{ beträgt.}$$

Im Winter 1885—1886 aber wurden die Zapfen etwas abgeschliffen, wonach keine Ungleichheit derselben bemerkt wurde.

Ein Scalatheil des Niveaues wird wie früher $= 0^s.0703$ angenommen.

Das von Dr. Larssén benutzte Passageninstrument, welches der Stockholmer Sternwarte gehört und von Repsold verfertigt ist, hat ein gebrochenes Fernrohr von 69 Millimeter freier Objectivöffnung. Das daran hängende Niveau stützt sich an drei Punkten des Instruments, nämlich an den beiden Achsenzapfen und unten bei dem niederen Theile des Instruments bei der Mitte des Niveaus. Bei der Umlegung geschah eine Gleitung der Niveaufassung gegen die festen Theile des Instruments, bei welchen ich Spuren einer kleinen Einwirkung auf den Nullpunkt des Niveaus bemerken konnte. Um diese nachtheilige Einwirkung wegzuschaffen oder wenigstens zu vermindern, wurde die bei der Gleitung entstehende Friction durch eine angebrachte Rolle vermindert. Die Ablesungen des Niveaus zeigten nach dieser Veränderung keine merkbare Nullpunktsveränderung bei der Umlegung.

Dies Instrument gestattet zwar eine Verschiebung von circa 6° in Azimuth für eventuelle Zeitbestimmungen im Verticale des Polarsterns, welche Beobachtungsmethode jedoch nicht angewandt wurde.

Die benutzten Fadendistanzen, welche durch die Polsterne der Längenbestimmungen evaluirt waren, sind folgende: für die Jahre

	1885.	1886.	1888—1889.
I	$50^s.644$	$50^s.415$	$50^s.402$
II	45 .511	45 .368	45 .480
III	42 .254	42 .163	42 .148
IV	38 .089	38 .025	37 .984
V	33 .903	33 .888	33 .860
VI	30 .845	30 .765	30 .738
VII	15 .443	15 .403	15 .372
VIII	0 .000	0 .000	0 .000

[1] »Bestämning af longitudsskilnaden mellan Stockholm och Upsala» siehe: Iakttagelser vid Stockholms observatorium, Band I.

	1885.	1886.	1888—1889.
IX	15^s.371	15^s.363	15^s.400
X	30 .762	30 .823	30 .873
XI	34 .449	34 .400	34 .468
XII	38 .544	38 .578	38 .664
XIII	42 .726	42 .730	42 .794
XIV	46 .257	46 .255	46 .344
XV	51 .329	51 .313	51 .414

Der Werth eines Theiles der Scala der Hängelibelle wurde im Mittel aus zahlreichen Bestimmungen = 0^s.0992 gefunden.

Der sehr kleine Werth des Zapfenunterschiedes ist in der Rechnung nicht berücksichtigt.

Die Schaltbrette sind nach dem Principe construirt, dass alle Ströme, sowohl die lokalen als die Linienströme, in gleicher Stärke und gleicher Richtung die Elektromagnete der Relaisen durchlaufen sollen. Nachdem der Normalstrom ermittelt worden, wurde meist für jede Reihe von Vergleichungen der beiderseitigen Uhren bei der einen Station (z. B. der östlich gelegenen) 20 abgehende Signale gesandt, wonach der Empfang von 40 ankommenden erfolgte und so endlich 20 Signale wieder gegeben.

Da übrigens die Construction der Schaltbretten in hauptsächlicher Uebereinstimmung mit der von dem preussischen geodätischen Bureau angewandt ist, halte ich es für überflüssig dieselbe zu beschreiben. Diese Construction hat sich auch meiner Erfahrung nach völlig bewährt.

Bei der Uhrvergleichung mit Hülfe des elektrischen Telegraphen sind sehr oft Störungen auf den Linien Stockholm—Göteborg und Hernösand—Haparanda entstanden. Die Ursachen dieser Störungen sind wahrscheinlich theils zufälligen Contacten, theils der Luftelectricität zuzuschreiben. Demzufolge war die Stromstärke bisweilen und sogar inmitten der Operationen sehr veränderlich, wodurch ein nachtheiliger Einfluss auf die Uhrvergleichung zu befürchten war, da die Schnelligkeit in der Action der Receptivapparate wesentlich von der Intensität des electrischen Stromes abhängt. Da indessen die Relaisen von einer vorzüglichen Construction waren und eine ausgezeichnete Constanz für Ströme von verschiedener Stärke besassen, war es zu vermuthen, dass die durch die Rheostaten regulirte Stromstärke für den beabsichtigten Zweck völlig genügend war.[1] Uebrigens ist es sehr wahrscheinlich, dass der von den Registrirsignalen herrührende Fehler der Längenbestimmung überhaupt viel kleiner ist, als der aus der Unsicherheit der Zeitbestimmung entstehende, was unmittelbar aus der geringen Veränderlichkeit der einfachen Stromzeit hervorgeht.

[1] Es soll auch bemerkt werden, dass die beinahe vollkommen identischen Relais vor dem Anfang der Beobachtungen genau gleich empfindlich justirt wurden, und in der Regel nachher während der ganzen Beobachtungszeit in unverändert gelassener Stellung geblieben sind.

Bestimmung der Längendifferenz zwischen Stockholm und Göteborg im Jahre 1885.

Diese Längenbestimmung zwischen Stockholm und Göteborg wurde in der Zeit vom 14. Mai bis 25. Juni unter ziemlich ungünstigen Witterungsverhältnissen ausgeführt.

In Stockholm war das bezügliche Instrument in dem Meridianzimmer der Sternwarte auf demselben Pfeiler, welcher bei den Längenbestimmungen zwischen Helsingfors und Stockholm benutzt wurde, aufgestellt, während sich in Göteborg das Instrument in einer in der Nähe der Navigationsschule errichteten Zelthütte befand. Für die Aufstellung des Passageninstruments in dieser Hütte war ein Pfeiler von Ziegelsteinen auf Felsen gebaut. Östlich davon in einer Entfernung von 22.44 Meter wurde ein kleines Kreuz in die Treppe des Gebäudes eingehauen und zwar in einer Azimuthrichtung vom 81° 5′ vom Nordpunkt ab über Ost gezählt. Ausserdem wurde beim Auseinandernehmen des Pfeilers die unterste Schicht der Ziegelsteine zurückgelassen, wodurch das Wiederfinden der Station des Instrumentes ermöglicht wird.

Da diese Station in unmittelbarer Nähe des Hafens gelegen war, wo sehr oft während des Beobachtens Eisenbahnzüge nahe vorübergingen, war es zu befürchten, dass die Beobachtungen durch die Erschütterungen des Bodens einen nachtheiligen Einfluss erleiden könnten. Um darüber eine klare und zuverlässige Einsicht zu gewinnen, wurde ein Pfeiler circa 2 Meter nördlich von dem Passageninstrument errichtet und auf demselben ein kleines Passageninstrument aufgestellt, dessen Mittelfaden als kontrollierende Meridianmire dienen sollte. Bei Einstellungen auf diese hat es sich aber erwiesen, dass ein solcher zu befürchtender Fehler nicht zu bemerken war.

Die Bilder der Sterne waren überhaupt viel besser in Göteborg als in Stockholm, was wohl zum grössten Theil der Verschiedenheit der Wände des Observatoriums zuzuschreiben war. Denn die Temperaturverhältnisse in der Zelthütte von Göteborg waren überaus günstiger als die in der Gebäudenmasse der Sternwarte von Stockholm.

Die Beschaffenheit der Bilder sind übrigens durch die Buchstaben *a*, *b*, *c*, *d* bezeichnet, wie folgt:

a = sehr gut,
b = gut,
c = weniger gut,
d = schlecht.

Als Normaluhren für Bestimmung der Zeitscala wurde in Stockholm die im Meridianzimmer befindliche Pendeluhr von KESSEL und in Göteborg ein KESSEL'sches Sternzeitchronometer N:o 1296 benutzt. Bei jeder Reihe von Signalwechseln zwischen den Beobachtern und bei jeder beobachteten Sternpassage wurden Coincidenzen von diesen Normaluhren auf den Registrirstreifen eingeführt.

Die Wechselung der Stationen für die Beobachter war folgende:

Mai 14, 15, 27	beobachtete	ROSÉN	in	Göteborg	und	LARSSÉN in Stockholm.
Mai 30, Juni 6, 10, 11, 13, 14	»	»	»	Stockholm	»	» » Göteborg,
Juni 18, 21, 25	»	»	»	Göteborg	»	» » Stockholm.

Positionen der beobachteten Sterne.

Die mittleren Oerter sind meistens dem Berliner Astronomischen Jahrbuche, den Sterncatalogen von Newcomb, British Association, Yarnall und Stockholm entnommen. Die Rectascensionen der übrigen sind aus Vergleichungen der Beobachtungen ermittelt. Die scheinbaren Oerter der Rectascensionen der Zeitsterne sind in der Zusammenstellung der Zeitbestimmungen mitgetheilt.

Positionen der beobachteten Sterne.

Polsterne: Mittlere Oerter. 1885.0.

Stern.	Grösse.	α	δ	Quelle.
5 Ursæ minoris	4,3	$14^h 27^m 46^s,74$	76° 12′ 26″	Newcomb.
β » »	2,0	14 51 3,01	74 37 32	Berl. Jahrb.
θ » »	5,0	15 34 50,43	77 43 55	B. A. C.
ξ » »	4,3	15 48 10,99	78 8 52	Berl. Jahrb.
ι » »	5,1	16 20 52,57	76 1 12	
ε » »	4,8	16 57 47,14	82 13 29	
27 Draconis	5,3	17 32 25,44	68 12 29	
35 »	5,0	17 54 35,90	76 58 38	
χ »	3,8	18 23 7,74	72 40 58	
B. A. C. 6469	5,5	18 48 38,57	73 57 10	Yarnall.
σ' Draconis	5,0	19 32 34,70	69 27 54	Stockholm.
$\varkappa$ Cephei	4,3	20 12 44,56	77 21 52	Berl. Jahrb.

Zeitsterne: Mittlere Oerter. 1885.0.

33 Bootis	5,6	$14^h 31^m 33^s,43$	44 54′ 4″	Berl. Jahrb.
39 »	5,5	14 45 46,59	49 11 31	Glasgow.
B. A. C. 4937	5,0	14 52 34,08	50 6 3	Beob.
β Bootis	3,0	14 57 36,86	40 50 41	Berl. Jahrb.
44 »	5,0	15 0 0,04	48 6 10	Stockh., Yarnall
δ »	3,0	15 10 52,01	33 44 40	Berl. Jahrb.

Die Positionen der beobachteten Sterne.

Sterne.	Grösse.	α	δ	Quelle.
50 Bootis	5,5	15h 17m 12s,33	33° 20′ 43″	Yarnall.
μ »	3,8	15 20 8,73	37 46 51	Berl. Jahrb.
ν' »	4,5	15 26 47,94	41 13 32	
μ Coronæ	5,0	15 31 1,59	39 23 32	Yarnall.
ζ »	4,3	15 35 2,81	37 0 35	Berl. Jahrb.
π »	6,0	15 39 27,45	32 52 52	Beob.
σ Herculis	4,1	16 30 23,76	42 40 29	Berl. Jahrb.
42 »	5,0	16 35 37,61	49 9 9	Yarnall.
η »	3,1	16 38 57,24	39 8 30	Berl. Jahrb.
52 »	5,0	16 45 52,26	46 11 4	Beob.
ε »	3,3	16 55 53,39	31 5 47	Berl. Jahrb.
B. A. C. 5788	5,0	17 3 57,42	36 5 7	Yarnall.
π Herculis	3,1	17 11 2,51	36 56 21	Berl. Jahrb.
69 »	4,5	17 13 42,27	37 24 43	Beob.
ϱ »	4,0	17 19 42,97	37 15 8	Yarnall.
77 »	5,8	17 23 41,31	48 21 25	Berl. Jahrb.
82 »	5,5	17 33 37,18	48 39 5	Beob.
85 »	3,3	17 36 13,16	46 4 5	Berl. Jahrb.
30 Draconis	5,5	17 46 19,59	50 48 23	Stockholm.
90 Herculis	5,5	17 49 33,37	40 1 43	Yarnall.
α Lyræ	1,0	18 33 2,70	38 40 38	Berl. Jahrb.
ε' »	4,5	18 40 31,71	39 33 1	»
β »	Var.	18 45 50,06	33 13 47	»
δ^2 »	5,0	18 50 28,96	36 45 12	Beob.
16 »	5,5	18 58 11,15	46 46 25	»
ι »	5,0	19 3 11,92	35 55 14	Berl. Jahrb.
η' »	5,0	19 9 50,58	38 56 55	Yarnall.
$\varkappa$ Cygni	4,0	19 14 26,71	53 9 24	Berl. Jahrb
10 »	4,1	19 26 48,41	51 29 6	»
θ »	4,6	19 33 21,46	49 57 19	»
15 »	5,3	19 40 7,78	37 4 37	»
B. A. C. 6817	5,0	19 46 40,43	40 18 27	Yarnall.

Instrumentfehler.

Die nächstfolgenden Tabellen enthalten die aus den Beobachtungen der Polsterne in beiden Instrumentlagen abgeleiteten Collimations- und Azimuthfehler der Instrumente.

Instrumentfehler.

Die Collimationen und Azimuthe

beim HERBST'schen Passageninstrumente sind:

Station.	Datum.	Stern.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Göteborg . .	1885 Mai 14	5 Ursæ minoris	5,4	*b*	+ 0ˢ,220		— 0ˢ,80	
		θ » »	3,5	*b*	+ 0,208	+ 0ˢ,228	— 0,54	— 0ˢ,727
		η » »	7,4	*b*	+ 0,256		— 0,84	
	» 15	5 » »	6,5	*b*	+ 0,255		— 0,91	
		θ » »	7,4	*a*	+ 0,204	+ 0,228	— 0,86	— 0,887
		ι » »	7,4	*b*	+ 0,219		— 0,93	
		27 Draconis	7,3	*ab*	+ 0,236		— 0,85	
	» 27	β Ursæ minoris	7,4	*b*	+ 0,157		— 1,12	
		ξ » »	6,5	*a*	+ 0,117	+ 0,133	— 1,04	— 1,025
		ε » »	5,5	*b*	+ 0,147		— 1,07	
		35 Draconis	5,3	*bc*	+ 0,109		— 0,87	
Stockholm .	» 30	β Ursæ minoris	5,3	*b*	— 0,088		+ 0,83	
		ξ » »	7,3	*b*	— 0,078	— 0,076	+ 0,69	+ 0,742
		ε » »	7,5	*b*	— 0,058		+ 0,67	
		35 Draconis	5,3	*a*	— 0,079		+ 0,78	
» . .	Juni 6	η Ursæ minoris	5,5	*b*	— 0,215		+ 0,37	
		27 Draconis	5,5	*b*	— 0,230	— 0,220	+ 0,20	+ 0,292
		χ »	5,5	*b*	— 0,244		+ 0,09	
		σ »	5,5	*ab*	— 0,189		+ 0,51	
. .	» 10	η Ursæ minoris	5,5	*a*	— 0,087		— 0,10	
		χ Draconis	5,5	*a*	— 0,077	— 0,064	— 0,16	— 0,063
		σ »	5,5	*a*	— 0,028		+ 0,07	
.	» 11	η Ursæ minoris	2,3	*b*	— 0,176		— 0,09	
		χ Draconis	1,2	*d*	— 0,176	— 0,192	+ 0,16	+ 0,007
		σ »	5,5	*a*	— 0,224		— 0,05	
. .	» 13	η Ursæ minoris	5,6	*ab*	— 0,202		— 0,17	
		27 Draconis	5,5	*a*	— 0,186	— 0,217	+ 0,07	+ 0,020
		χ »	5,5	*a*	— 0,245		+ 0,20	
		σ »	5,5	*bc*	— 0,235		— 0,02	
» . .	» 14	η Ursæ minoris	5,6	*a*	— 0,181		— 0,15	
		27 Draconis	5,5	*a*	— 0,167	— 0,221	+ 0,12	+ 0,045
		χ »	5,5	*a*	— 0,224		— 0,07	
		σ »	5,5	*d*	— 0,312		+ 0,28	
Göteborg . .	» 18	η Ursæ minoris	5,6	*a*	— 0,161		— 0,42	
		27 Draconis	5,5	*a*	— 0,149	— 0,167	— 0,31	— 0,365
		χ »	5,5	*a*	— 0,150		— 0,45	
		σ »	5,5	*a*	— 0,207		— 0,28	
» . .	» 21	ε Ursæ minoris	6,6	*a*	+ 0,591		— 0,41	
		35 Draconis	5,5	*a*	+ 0,586	+ 0,592	— 0,49	— 0,480
		B. A. C. 6469	3,5	*bc*	+ 0,600		— 0,54	
» . .	» 25	ε Ursæ minoris	6,5	*a*	+ 0,034		— 0,35	
		B. A. C. 6469	5,6	*a*	+ 0,066	+ 0,056	— 0,36	— 0,340
		$\varkappa$ Cephei	5,7	*a*	+ 0,069		— 0,31	

Die Collimationen und Azimuthe

beim REPSOLD'schen Passageninstrumente sind:

Station.	Datum.	Stern.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Stockholm	1885 Mai 14	5 Ursæ minoris	2,7	*b*	+ 0ˢ,136		— 0ˢ,10	
		θ »	7,7	*bc*	+ 0,050	+ 0ˢ,102	+ 0,04	— 0ˢ,020
		η »	6,7	*c*	+ 0,141		— 0,04	
		27 Draconis	7,6	*b*	+ 0,080		+ 0,02	
	» 15	*η* Ursæ minoris	4,7	*b*	+ 0,155	+ 0,178	— 0,07	+ 0,005
		27 Draconis	7,7	*b*	+ 0,200		+ 0,08	
	» 27	*β* Ursæ minoris	6,7	—	+ 0,086		+ 0,13	
		ξ »	2,2	—	+ 0,092	+ 0,114	+ 0,22	+ 0,147
		ε »	7,7	*b*	+ 0,140		+ 0,14	
		35 Draconis	3,4	*b*	+ 0,140		+ 0,06	
Göteborg	» 30	*β* Ursæ minoris	4,6	—	— 0,154		— 0,75	
		ξ »	3,6	—	— 0,099	— 0,092	— 0,70	— 0,620
		ε »	8,7	*b*	— 0,045		— 0,51	
		35 Draconis	3,7	*ab*	— 0,069		— 0,52	
	Juni 6	*η* Ursæ minoris	6,8	*b*	+ 0,454		— 0,84	
		27 Draconis	5,7	*b*	+ 0,429	+ 0,493	— 0,77	— 0,772
		χ »	7,6	*b*	+ 0,524		— 0,92	
		σ »	6,7	*b*	+ 0,567		— 0,56	
	» 10	*η* Ursæ minoris	6,8	*c*	— 0,326		— 0,91	
		χ Draconis	4,3	—	— 0,308	— 0,304	— 0,78	— 0,737
		σ »	4,4	—	— 0,277		— 0,52	
	» 11	*η* Ursæ minoris	7,6	*b*	— 0,157		— 0,87	
		27 Draaonis	6,7	*b*	— 0,147	— 0,171	— 0,79	— 0,772
		χ »	6,7	*b*	— 0,198		— 0,80	
		σ »	7,7	*b*	— 0,184		— 0,63	
	» 13	*η* Ursæ minoris	8,6	*b*	— 0,388		— 0,92	
		27 Draconis	6,8	*b*	— 0,414	— 0,416	— 0,76	— 0,817
		χ »	7,6	*b*	— 0,463		— 0,77	
	» 14	*η* Ursæ minoris	6,8	*b*	— 0,048		— 0,88	
		27 Draconis	8,6	*b*	— 0,051	0,073	— 0,74	— 0,778
		χ »	7,7	*b*	— 0,088		— 0,84	
		σ »	7,6	*a*	— 0,102		— 0,65	
Stockholm	» 18	27 Draconis	6,1	*c*	+ 0,512		——	
		χ »	3,6	*cd*	+ 0,414	+ 0,425	— 0,05	+ 0,035
		σ »	3,4	*b*	+ 0,350		+ 0,12	
	» 21	*ε* Ursæ minoris	7,8	*bc*	— 0,116		+ 0,38	
		35 Draconis	3,5	*c*	— 0,110	— 0,138	+ 0,31	+ 0,332
		B. A. C. 6469	3,5	*c*	— 0,199		+ 0,24	
		χ Cephei	7,7	*b*	— 0,127		+ 0,40	
	» 25	*ε* Ursæ minoris	7,7	*cd*	+ 0,416		+ 0,22	
		35 Draconis	3,6	*bc*	+ 0,410	+ 0,399	+ 0,26	+ 0,267
		B. A. C. 6469	7,7	*b*	+ 0,336		+ 0,27	
		κ Cephei	7,7	*b*	+ 0,433		+ 0,32	

Die Neigungen beim Herbst'schen Passageninstrumente sind:

Station.	Datum.	Gruppe I.		Gruppe II.	
		Ostlage.	Westlage.	Ostlage.	Westlage.
Göteborg	1885 Mai 14	+ 0ˢ,054	+ 0ˢ,020	— 0ˢ,014	+ 0ˢ,020
»	» 15	— 0,004	— 0,038	— 0,047	— 0,013
»	» 27	+ 0,093	+ 0,059	+ 0,040	+ 0,074
Stockholm	» 30	+ 0,074	+ 0,040	+ 0,099	+ 0,133
»	Juni 6	+ 0,129	+ 0,095	+ 0,133	+ 0,167
»	» 10	— 0,007	— 0,041	— 0,009	+ 0,025
»	» 11	— 0,032	— 0,066	— 0,064	— 0,030
»	» 13	— 0,029	— 0,063	— 0,060	— 0,016
»	» 14	— 0,023	— 0,057	— 0,075	— 0,041
Göteborg	» 18	+ 0,012	— 0,022	+ 0,013	+ 0,047
»	» 21	+ 0,034	0,000	+ 0,024	+ 0,058
»	» 25	+ 0,030	— 0,004	+ 0,007	+ 0,041

Die Neigungen beim Repsold'schen Passageninstrumente sind:

Station.	Datum.	Gruppe I.	Gruppe II.
Stockholm	1885 Mai 14	+ 0ˢ,098	+ 0ˢ,158
»	» 15	——	+ 0,172
»	» 27	+ 0,006	— 0,050
Göteborg	» 30	— 0,062	— 0,059
»	Juni 6	— 0,052	— 0,010
»	» 10	— 0,109	— 0,082
»	» 11	— 0,100	— 0,120
»	» 13	— 0,026	— 0,087
»	» 14	— 0,023	— 0,060
Stockholm	» 18	+ 0,053	+ 0,082
»	» 21	— 0,066	— 0,068
»	» 25	+ 0,001	— 0,024

Beobachtungen der Zeitsterne.

Die Beobachtungen der Zeitsterne und die aus den einzelnen Sternen resultirenden Uhrstände nebst den scheinbaren Rectascensionen sind in den folgenden Tabellen zusammengestellt.

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Göteborg.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Mai 14.									
		Ost.									
33 Bootis . .	$14^h34^m35^s,53$	$14^h29^m27^s,11$	12	$-0^s,01$	$+5^m8^s,43$	*c*	$14^h35^m39^s,83$	13	$-0^s,49$	$-1^m3^s,91$	*b*
39 Bootis . .	45 48,73						46 53,07	13	−0,43	(3,91)	*b*
B. A. C. 4937	52 36,25	47 27,77	8	−0,02	8,50	*b*	53 40,52	13	−0,42	3,85	*b*
β Bootis . . .	57 38,99	52 30,42	15	−0,01	8,58	*b*	58 43,34	13	−0,51	3,84	*b*
		West.									
δ Bootis . . .	15 10 54,17	15 5 45,43	15	+0,22	8,52	*ab*	15 11 57,89	12	−0,07	3,65	*b*
50 Bootis . .	17 14,49	12 5,78	15	+0,22	8,49	*a*	18 18,24	13	−0,07	3,68	*b*
u Bootis . . .	20 10,89	15 2,19	9	+0,24	8,46	*b*	21 14,65	13	0,00	3,76	*b*
ν' Bootis . . .	26 50,13	21 41,34	15	+0,26	8,53	*b*	27 53,74	13	+0,04	3,65	*b*
σ Herculis . .	16 30 26,00	16 25 17,11	15	+0,33	8,56	*b*	16 31 29,52	13	+0,05	3,57	*b*
42 Herculis .	35 39,92	30 31,00	15	+0,39	8,53	*b*	36 43,16	13	+0,16	3,40	*b*
η Herculis . .	38 59,47	33 50,77	9	+0,31	8,39	*c*	40 3,02	12	−0,02	3,53	*a*
52 Herculis .	45 54,53	40 45,73	15	+0,36	8,44	*c*	46 57,86	13	+0,10	3,43	*b*
		Ost.									
ε Herculis . .	16 55 55,59	16 50 47,13	15	+0,03	8,43	*c*	16 56 59,76	13	−0,63	3,54	*a*
B. A. C. 5788	17 3 59,62	58 51,11	10	+0,04	8,47		17 5 3,85	13	−0,59	3,64	*b*
π Herculis . .	11 4,70	17 5 56,18	15	+0,05	8,47	*c*	12 8,91	13	−0,57	3,64	*b*
69 Herculis .	13 44,47	8 35,97	11	+0,05	8,45	*c*	14 48,79	13	−0,58	3,74	*b*
		Mai 15.									
		West.									
σ Herculis . .	16 30 26,02	16 25 17,15	15	+0,46	+5 8,41	*a*	16 31 27,91	13	−0,06	−1 1,83	
42 Herculis .	35 39,93	30 30,90	15	+0,53	8,50	*b*	36 41,69	13	+0,07	1,83	
η Herculis . .	38 59,48	33 50,48	15	+0,44	8,56	*b*	40 1,48	13	−0,13	1,87	
52 Herculis .	45 54,55	40 45,61	15	+0,50	8,44	*b*	46 56,38	13	0,00	1,83	
		Ost.									
ε Herculis . .	16 55 55,60	16 50 47,13	15	−0,03	8,50	*c*	16 56 58,27	13	−0,74	1,93	*a*
B. A. C. 5788	17 3 59,64	58 51,26	15	−0,03	8,41	*b*	17 5 2,30	13	−0,70	1,96	*a*
π Herculis . .	11 4,72	17 5 56,24	14	−0,02	8,50	*c*	12 7,39	13	−0,68	1,99	
69 Herculis .	13 44,48	8 36,06	14	−0,02	8,44	*c*	14 47,16	13	−0,69	1,99	
		Mai 27.									
		Ost.									
β Bootis . . .	14 57 38,98	14 52 31,22	12	−0,08	+5 7,84	*c*	14 58 29,75	13	−0,45	−0 50,32	*a*
44 Bootis . .	15 0 2,18	54 54,39	7	−0,12	7,91	*c*	15 0 52,84	8	−0,33	50,33	*b*
δ Bootis . . .	10 54,19						11 45,08	13	−0,56	(50,33)	
μ Bootis . . .	20 10,92	15 15 3,23	15	−0,06	7,75	*b*	21 1,77	13	−0,50	50,35	*a*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Göteborg.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Mai 27.									
		West.									
ν' Bootis . .	$15^h 26^m 50^s,16$	$15^h 21^m 42^s,04$	8	$+0^s,22$	$+5^m 7^s,93$		$15^h 27^m 40^s,58$	13	$-0^s,14$	$-0^m 50^s,28$	*ab*
μ Coronæ . .	31 3,82						31 54,45	13	−0,17	(50,46)	
ξ Coronæ . .	35 5,05						35 55,60	13	−0,21	(50,34)	
π Coronæ . .	39 29,71	34 21,56	9	+0,23	7,92	*c*	40 20,28	13	−0,30	50,27	
π Herculis . .	17 11 4,89	17 5 56,90	4	+0,15	7,84		17 11 55,39	13	−0,26	50,24	
69 Herculis .	13 44,66	8 36,64	7	+0,15	7,87	*b*	14 35,10	13	−0,26	50,18	
ϱ Herculis . .	19 45,33	14 37,27	15	+0,15	7,91	*b*	20 35,76	13	−0,26	50,17	*c*
77 Herculis .	23 43,79	18 35,79	9	+0,14	7,86	*b*	24 34,10	11	−0,03	50,28	*d*
		Ost.									
82 Herculis .	17 33 39,69	17 28 31,99	14	−0,20	7,90	*b*	17 34 30,44	13	−0,30	50,45	
85 Herculis .	36 15,63	31 7,83	9	−0,19	7,99	*b*	37 6,27	13	−0,36	50,28	*c*
30 Draconis .	46 22,13	41 14,46	14	−0,23	7,90		47 12,76	13	−0,26	50,37	*c*
90 Herculis .	49 35,81	44 28,20	13	−0,15	7,76	*b*	50 26,71	13	−0,47	50,43	*c*
		Beobachter: ROSÉN.					LARSSÉN.				
		Mai 30.									
		Ost.									
β Bootis . . .	14 57 38,97	14 57 32,66	13	+0,50	+0 5,81		14 58 26,34	9	−0,20	−0 47,17	
44 Bootis . .	15 0 2,16	59 55,99	10	+0,43	5,74		15 0 49,44	5	−0,10	47,18	*c*
δ Bootis . . .	10 54,19	15 10 47,90	13	+0,56	5,73	*b*	11 41,65	15	−0,26	47,20	*a*
μ Bootis . . .	20 10,92	20 4,72	13	+0,53	5,67	*c*	20 58,42	7	−0,22	47,28	
		West.									
ν' Bootis . .	15 26 50,16						15 27 37,79	15	−0,44	47,19	*a*
μ Coronæ . .	31 3,82						31 51,62	9	−0,45	47,35	*b*
ξ Coronæ . .	35 5,05						35 52,79	9	−0,46	47,28	
π Coronæ . .	39 29,51						40 17,31	14	−0,49	47,34	
π Herculis . .	17 11 4,93	17 10 58,87	13	+0,41	5,65	*ab*	17 11 52,46	15	−0,46	47,07	*a*
69 Herculis .	13 44,70	13 38,68	13	+0,41	5,61	*a*	14 32,29	14	−0,46	47,13	*b*
ϱ Herculis . .	19 45,40	19 39,30	13	+0,40	5,70	*d*	20 32,89	15	−0,46	47,03	*a*
77 Herculis .	23 43,84	23 38,00	13	+0,30	5,54		24 31,43	15	−0,49	47,10	*a*
		Ost.									
82 Herculis .	17 33 39,72	17 33 33,56	13	+0,57	5,59	*a*	17 34 26,90	15	−0,09	47,09	*b*
85 Herculis .	36 15,68	36 9,47	11	+0,58	5,68	*b*	37 2,83	9	−0,16	46,99	*b*
30 Draconis .	46 22,18	46 16,08	13	+0,55	5,55		47 9,20	15	−0,07	46,95	*a*
90 Herculis .	49 35,83	49 29,81	13	+0,63	5,39		50 23,19	15	−0,20	47,16	

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtungen in Göteborg. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
Juni 6.											
Ost.											
σ Herculis . .	$16^h30^m26^s,17$	$16^h30^m26^s,62$	13	$+0^s,58$	$-0^m1^s,03$	*ab*	$16^h31^m5^s,32$	15	$-1^s,01$	$-0^m38^s,14$	*c*
42 Herculis .	35 40,09	35 40,49	13	+ 0,60	1,00	*ab*	36 19,25	15	- 1,01	38,15	*b*
η Herculis . .	38 59,67	39 0,14	13	+ 0,56	1,03	*a*	39 38,89	13	— 1,02	38,20	*c*
52 Herculis .	45 54,74	45 55,22	13	+ 0,60	1,08		46 33,98	14	— 1,00	38,24	*b*
West.											
ε Herculis . .	16 55 55,84	16 55 56,95	13	0,00	1,11	*b*	16 56 33,99	15	+ 0,13	38,28	*b*
B. A. C. 5788	17 3 59,90	17 4 1,08	13	— 0,02	1,16	*ab*	17 4 38,01	15	+ 0,19	38,30	*b*
π Herculis . .	11 4,99	11 6,11	13	— 0,02	1,10	*a*	11 43,06	15	+ 0,22	38,29	*b*
69 Herculis .	13 44,76	13 45,94	13	— 0,03	1,15	*b*	14 22,84	14	+ 0,22	38,30	*b*
α Lyræ . . .	18 33 5,27	18 33 6,32	13	+ 0,02	1,07	*c*	18 33 43,07	15	+ 0,30	38,10	*d*
ε' Lyræ . . .	40 34,30	40 35,53	13	0,00	1,23	*b*	41 12,15	15	+ 0,32	38,17	*c*
β Lyræ . . .	45 52,54	45 53,81	13	+ 0,03	1,30	*b*	46 30,41	15	+ 0,20	38,07	*b*
δ^2 Lyræ . . .	50 31,49	50 32,70	13	+ 0,02	1,23		51 9,35	12	+ 0,26	38,12	
Ost.											
16 Lyræ . . .	18 58 13,81	18 58 14,35	13	+ 0,66	1,20	*b*	18 58 52,81	5	— 0,94	38,06	*b*
ι Lyræ . . .	19 3 14,44	19 3 14,95	13	+ 0,60	1,11	*ab*	19 3 53,49	14	— 0,98	38,07	*b*
ν Lyræ . . .	9 53,12	9 53,75	12	+ 0,62	1,25	*b*	10 32,27	15	— 0,97	38,18	*a*
$\varkappa$ Cygni . . .	14 29,51	14 29,93	13	+ 0,70	1,12	*b*	15 8,46	12	— 0,94	38,61	*b*
Juni 10.											
Ost.											
σ Herculis . .	16 30 26,18	16 30 31,66	13	+ 0,06	— 05,54	*a*	16 30 57,87	15	+ 0,01	— 031,70	*c*
42 Herculis .	35 40,09	35 45,54	13	+ 0,07	5,52	*a*	36 11,66	15	+ 0,13	31,70	*c*
η Herculis . .	38 59,68	39 5,19	13	+ 0,04	5,55	*a*	39 31,50	10	— 0,04	31,78	*c*
52 Herculis .	45 54,75	46 0,25	13	+ 0,06	5,56	*a*	46 26,36	15	+ 0,08	31,69	*c*
West.											
ε Herculis . .	16 55 55,86	16 56 1,64	13	— 0,14	5,64	*a*	16 56 28,48	11	— 0,85	31,77	*b*
B. A. C. 5788	17 3 59,92	17 4 5,74	13	— 0,16	5,64		17 4 32,55	15	— 0,84	31,79	*c*
π Herculis . .	11 5,01	11 10,82	13	— 0,16	5,65		11 37,65	11	— 0,83	31,81	*c*
69 Herculis .	13 44,79	13 50,62	13	— 0,16	5,67		14 17,35	7	— 0,83	31,73	*c*
α Lyræ . . .	18 33 5,33	18 33 11,02	13	— 0,12	5,57		18 33 37,69	15	— 0,80	31,56	*d*
ε' Lyræ . . .	40 34,37	40 40,25	13	— 0,12	5,76		41 6,80	2	— 0,78	31,65	
β Lyræ . . .	45 52,63	45 58,51	13	— 0,11	5,77		46 25,02	3	— 0,81	31,58	
δ^2 Lyræ . . .	50 31,57	50 37,38	13	— 0,12	5,69	*a*	51 3,98	7	— 0,80	31,61	*c*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Göteborg.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: ROSÉN.					LARSSÉN.				
		Juni 10.									
		Ost.									
16 Lyræ . . .	$18^h58^m13^s,89$	$18^h58^m19^s,43$	13	$+0^s,11$	$-0^m5^s,65$	*a*	$18^h58^m45^s,23$	4	$+0^s,12$	$-0^m31^s,46$	
ι Lyræ . . .	19 3 14,51	19 3 20,06	13	+ 0,08	5,63	*a*	19 3 46,07	7	— 0,05	31,51	
η_1 Lyræ . . .	9 53,20	9 58,81	13	+ 0,08	5,69	*a*	10 24,78	6	— 0,02	31,56	
ϰ Cygni . . .	14 29,61	14 35,08	8	+ 0,14	(5,61)	*a*					
		Juni 11.									
		West.									
σ Herculis . .	16 30 26,18	16 30 32,35	12	— 0,30	— 0 5,87	*a*	16 30 56,17	14	— 0,63	— 0 29,36	*b*
42 Herculis .	35 40,09	35 46,28	13	— 0,34	5,85	*a*	36 9,92	13	— 0,59	29,24	*b*
η_1 Herculis . .	38 59,68	39 5,84	13	— 0,29	5,87	*b*	39 29,61	15	— 0,66	29,27	*b*
52 Herculis .	45 54,75	46 0,93	12	— 0,33	5,85	*c*	46 24,58	15	— 0,61	29,22	*a*
		Ost.									
ε Herculis . .	16 55 55,87	16 56 1,56	13	+ 0,15	5,84		16 56 25,45	15	— 0,30	29,28	*b*
B. A. C. 5788	17 3 59,92						17 4 29,52	15	— 0,26	(29,34)	*a*
π Herculis . .	11 5,02						11 34,56	15	— 0,25	(29,29)	*bc*
69 Herculis .	13 44,79						14 14,32	14	— 0,25	(29,28)	*bc*
α Lyræ . . .	18 33 5,35	18 33 10,95	13	+ 0,17	5,77	*a*	18 33 34,60	15	— 0,34	29,01	*c*
ε' Lyræ . . .	40 34,39	40 40,17	10	+ 0,17	5,95	*b*	41 3,73	15	— 0,24	29,10	*c*
β Lyræ . . .	45 52,65	45 58,39	13	+ 0,16	5,90	*b*	46 22,05	15	— 0,31	29,09	*b*
δ^2 Lyræ . . .	50 31,58	50 37,32	12	+ 0,17	5,91	*c*	51 0,92	15	— 0,28	29,06	*b*
		West.									
16 Lyræ . .	18 58 13,91	18 58 20,15	1	— 0,28	5,96		18 58 43,58	13	— 0,63	29,04	
ι Lyræ . . .	19 3 14,53						19 3 44,18	15	— 0,71	(28,91)	*b*
η_1 Lyræ . . .	9 53,22	19 10 59,61	13	— 0,29	6,10	*a*	10 22,95	15	— 0,68	29,05	*a*
ϰ Cygni . . .	14 29,63	14 35,78	13	— 0,37	5,78	*a*	14 59,09	9	— 0,59	28,87	*c*
		Juni 13.									
		West.									
σ Herculis . .	16 30 26,17	16 30 32,66	13	— 0,33	— 0 6,16	*b*	16 30 52,56	15	— 0,88	— 0 25,51	*b*
42 Herculis .	35 40,09	35 46,58	13	— 0,36	6,13	*b*	36 6,40	15	— 0,86	25,45	*b*
η_1 Herculis . .	38 59,68	39 6,21	13	— 0,30	6,23	*c*	39 26,05	15	— 0,92	25,45	*b*
52 Herculis .	45 54,76	46 1,33	13	— 0,34	6,23	*b*	46 21,09	15	— 0,88	25,45	*a*
		Ost.									
ε Herculis . .	16 55 55,87	16 56 1,91	13	+ 0,20	6,24	*a*	16 56 21,25	15	+ 0,04	25,42	*a*
B. A. C. 5788	17 3 59,93	17 4 6,00	13	+ 0,21	6,28	*a*	17 4 25,28	15	+ 0,11	25,46	*b*
π Herculis . .	11 5,03	11 11,06	13	+ 0,21	6,24	*a*	11 30,30	15	+ 0,13	25,36	*b*
69 Herculis .	13 44,81	13 50,84	13	+ 0,21	6,25	*a*	14 10,13	15	+ 0,13	25,46	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtungen in Göteborg. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		Juni 13.									
		Ost.									
α Lyræ . . .	$18^h 33^m 5^s,37$	$18^h 33^m 11^s,35$	13	$+0^s,22$	$-0^m 6^s,20$	*a*	$18^h 33^m 30^s,41$	15	$+0^s,09$	$-0^m 25^s,13$	*c*
ε' Lyræ . . .	40 34,42	40 40,41	13	+ 0,22	6,21	*a*	40 59,51	15	+ 0,10	25,19	*c*
β Lyræ . . .	45 52,68	45 58,69	13	+ 0,21	6,22		46 17,90	15	+ 0,01	25,23	*b*
δ^2 Lyræ . . .	50 31,62	50 37,63	13	+ 0,21	6,22		50 56,76	15	+ 0,05	25,29	*b*
		West.									
16 Lyræ . . .	18 58 13,91	18 58 20,61	13	— 0,33	6,37	*a*	18 58 40,22	5	— 0,95	25,36	*c*
ι Lyræ . . .	19 3 14,57	19 3 21,14	13	— 0,28	6,29	*a*	19 3 40,88	9	— 1,00	25,31	*c*
η Lyræ . . .	9 53,26	10 0,00	13	— 0,29	6,45	*a*	10 19,56	8	— 0,98	25,32	*c*
$\varkappa$ Cygni . . .	14 29,67	14 36,31	13	— 0,39	6,25	*a*	14 55,79	13	— 0,94	25,18	*c*
		Juni 14.									
		West.									
σ Herculis . .	16 30 26,17	16 30 33,15	13	— 0,31	−0 6,67	*b*	16 30 50,46	15	— 0,40	−0 23,89	*b*
42 Herculis .	35 40,08	35 47,23	13	— 0,36	6,79	*b*	36 4,14	15	— 0,32	23,74	*b*
η Herculis . .	38 59,68	39 6,69	13	— 0,30	6,71	*b*	39 23,93	9	— 0,44	23,81	*b*
52 Herculis .	45 54,76	46 1,77	13	— 0,34	6,67	*b*	46 18,93	15	— 0,36	23,81	*b*
		Ost.									
ε Herculis . .	16 55 55,87	16 56 2,39	13	+ 0,22	6,74		16 56 20,03	15	— 0,34	23,82	*b*
B. A. C. 5788	17 3 59,94	17 4 6,50	13	+ 0,23	6,79		17 4 24,06	15	— 0,30	23,82	*bc*
π Herculis . .	11 5,03	11 11,58	13	+ 0,23	6,78		11 29,09	15	— 0,28	23,78	*c*
69 Herculis .	13 44,81	13 51,34	13	+ 0,23	6,76		14 8,89	15	— 0,28	23,80	*c*
α Lyræ . . .	18 33 5,38	18 33 11,86	13	+ 0,21	6,69	*b*	18 33 29,33	15	— 0,31	23,64	*bc*
ε' Lyræ . . .	40 34,44	40 41,09	13	+ 0,22	6,87	*a*	40 58,52	15	— 0,26	23,82	*b*
β Lyræ . . .	45 52,69	45 59,34	13	+ 0,23	6,88	*a*	46 16,80	15	— 0,33	23,78	
δ^2 Lyræ . . .	50 31,63	50 38,24	13	+ 0,21	6,82		50 55,68	15	— 0,33	23,72	*b*
		West.									
16 Lyræ . . .	18 58 13,96	18 58 21,19	13	— 0,37	6,86	*b*	18 58 37,98	15	— 0,41	23,61	*a*
ι Lyræ . . .	19 3 14,58	19 3 21,74	13	— 0,30	6,86	*c*	19 3 38,74	15	— 0,55	23,61	*a*
η' Lyræ . . .	9 53,21	10 0,46	13	— 0,32	6,93	*c*	10 17,46	15	— 0,49	23,76	*ab*
$\varkappa$ Cygni . . .	14 29,68	14 36,84	13	— 0,43	6,73	*b*	14 53,62	14	— 0,32	23,62	*b*
		Beobachter: Larssén.					Rosén.				
		Juni 18.									
		Ost.									
α Lyræ . . .	18 33 5,44	18 33 15,55	15	— 0,42	−0 9,69	*c*	18 33 20,31	13	+ 0,08	−0 14,95	
ε' Lyræ . . .	40 34,48	40 44,74	15	— 0,43	9,83	*bc*	40 49,43	13	+ 0,09	15,04	
β Lyræ . . .	45 52,76	46 2,90	10	— 0,40	9,74	*bc*	46 7,74	13	+ 0,03	15,01	
δ^2 Lyræ . . .	50 31,69	50 41,85	15	— 0,42	9,74	*b*	50 46,63	13	+ 0,06	15,00	

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Göteborg.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Juni 18.									
		West.									
16 Lyræ . . .	$18^h58^m14^s,02$	$18^h58^m23^s,05$	12	$+0^s,75$	$-0^m9^s,78$	*bc*	$18^h58^m29^s,21$	13	$-0^s,27$	$-0^m14^s,92$	*a*
ι Lyræ . . .	19 3 14,65	19 3 23,78	15	+ 0,64	9,77	*bc*	19 3 29,90	13	− 0,33	14,92	*a*
η' Lyræ . . .	9 53,27	10 2,49	15	+ 0,67	9,89	*bc*	10 8,65	13	− 0,31	15,07	*a*
ϰ Cygni . . .	14 29,76	14 38,68	8	+ 0,79	9,71	*bc*	14 44,86	13	− 0,25	14,85	*a*
		Juni 21.									
		West.									
π Herculis . .	17 11 5,05	17 11 17,48	15	− 0,09	−0 12,34	*bc*	17 11 11,79	13	+ 0,57	−0 7,31	*a*
69 Herculis .	13 44,83	13 57,24	15	− 0,09	12,32	*b*	13 51,65	13	+ 0,57	7,39	*a*
ϱ Herculis . .	19 45,55	19 57,92	15	− 0,09	12,28	*bc*	19 52,25	13	+ 0,57	7,27	*b*
77 Herculis .	23 43,97	23 56,54	15	− 0,21	12,36	*b*	23 50,54	13	+ 0,74	7,31	*b*
		Ost.									
82 Herculis .	17 33 39,89	17 33 51,95	13	+ 0,21	12,27	*bc*	17 33 48,15	13	− 1,00	7,26	*a*
85 Herculis .	36 15,84						36 23,90	12	− 0,99	(7,07)	*a*
30 Draconis .	46 22,37	46 34,23	2	+ 0,16	12,02	*d*	46 30,57	13	− 1,02	7,18	*a*
90 Herculis .	49 36,05	49 48,19	3	+ 0,24	12,38	*d*	49 44,25	13	− 0,96	7,24	*a*
16 Lyræ . . .	18 58 14,12	18 58 26,01	9	+ 0,21	12,10	*bc*	18 58 22,15	10	− 0,96	7,07	*a*
ι Lyræ . . .	19 3 14,69	19 3 26,71	15	+ 0,25	12,27	*b*	19 3 22,69	11	− 0,93	7,07	*b*
η' Lyræ . . .	9 53,32	10 5,43	15	+ 0,25	12,36	*b*	10 1,53	5	0,93	7,28	*a*
ϰ Cygni . . .	14 29,81	14 41,81	15	+ 0,18	12,18	*bc*	14 37,90	12	− 1,01	7,08	*a*
		West.									
10 Cygni . .	19 26 51,48	19 27 4,01	15	− 0,26	12,27	*bc*	19 26 57,68	8	+ 0,96	7,16	*b*
θ Cygni . . .	33 24,48	33 37,08	15	− 0,23	12,37	*b*	33 30,74	11	+ 0,90	7,16	
15 Cygni . .	40 10,56	40 22,99	15	− 0,09	(12,34)	*a*					
B. A. C. 6817	46 43,26	46 55,84	15	− 0,12	(12,46)	*ab*					
		Juni 25.									
		West.									
π Herculis . .	17 11 5,05	17 11 19,59	15	+ 0,63	−0 15,17	*c*	17 11 3,71	13	− 0,06	+0 1,40	*a*
69 Herculis .	13 44,83	13 59,45	15	+ 0,63	15,25	*b*	13 43,55	13	0,05	1,33	*a*
ϱ Herculis . .	19 45,55	20 0,07	15	+ 0,63	15,15	*bc*	19 44,17	13	− 0,05	1,43	*b*
77 Herculis	23 43,96	23 58,53	15	+ 0,67	15,24	*b*	23 42,56	13	− 0,02	1,42	*b*
		Ost.									
82 Herculis .	17 33 39,89	17 33 55,49	14	− 0,52	15,08	*c*	17 33 38,59	13	− 0,15	1,45	*a*
85 Herculis .	36 15,84	36 31,32	9	− 0,49	14,99	*c*	36 14,55	13	− 0,17	1,46	*a*
30 Draconis .	46 22,37	46 37,93	15	− 0,57	14,99	*bc*	46 21,20	9	0,14	1,31	
90 Herculis .	49 36,07	49 51,70	15	− 0,41	15,22	*bc*	49 34,95	2	− 0,21	1,33	

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Göteborg.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Juni 25.									
		Ost.									
16 Lyræ . . .	$18^h58^m14^s,11$	$18^h58^m29^s,75$	15	$-0^s,52$	$-0^m15^s,12$	*b*	$18^h58^m12^s,78$	13	$-0^s,16$	$+0^m1^s,49$	*a*
ι Lyræ . . .	19 3 14,74	19 3 30,25	15	−0,40	15,11	*b*	19 3 13,42	13	−0,22	1,54	*a*
η' Lyræ . . .	9 53,37	10 9,09	15	−0,43	15,29	*b*	9 52,16	13	−0,20	1,41	*a*
$\varkappa$ Cygni . . .	14 29,86	14 45,60	15	−0,66	15,08	*c*	14 28,39	13	−0,12	1,59	
		West.									
10 Cygni . .	19 26 51,54	19 27 6,09	15	+0,66	15,21	*c*	19 26 49,79	13	+0,10	1,65	*a*
θ Cygni . . .	33 24,55	33 39,12	15	+0,65	15,22	*bc*	33 22,94	13	+0,08	1,53	*a*
15 Cygni . .	40 10,64	40 25,24	15	+0,60	15,20	*bc*	40 9,06	13	−0,03	1,61	*a*
B. A. C. 6817	46 43,34	46 58,06	15	+0,60	15,32	*bc*	46 41,80	13	−0,02	1,56	*a*

Um die definitiven Uhrstände für die Zeit der Telegraphensignale zwischen den Stationen abzuleiten, sind die Mittelwerthe aus den einzelnen Sterngruppen in den folgenden Tabellen zusammengestellt und daraus die stündlichen Gänge der Uhren ermittelt. Für diejenigen Tage, an denen nur eine Sterngruppe beobachtet wurde, wurde für die Uhrgänge aus dem vorhergehenden und nachfolgenden Tage ein Mittelwerth genommen.

Endresultate der Zeitbestimmungen in Stockholm.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1885 Mai 14 . . .	I	O	3	14^h43^m	$+5^m8^s,50$	14^h58^m	$+5^m8^s,50$	$-0^s,017$
		W	4	15 14	8,50			
	II	W	4	16 33	8,48	16 47	8,47	
		O	3	17 1	8,46			
» 15 . . .	II	W	4	16 33	8,48	16 47	8,47	(−0,008)
		O	4	17 1	8,46			
» 27 . . .	I	O	3	15 1	7,83	15 14	7,88	0,000
		W	2	15 28	7,93			
	II	W	4	17 12	7,87	17 24	7,88	
		O	4	17 36	7,89			

Endresultate der Zeitbestimmungen in Stockholm.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1885 Mai 30 . . .	I	O	4	$15^h\ 7^m$	$+0^m\ 5^s,74$	$15^h\ 7^m$	$+0^m\ 5^s,72$	$-0^s,058$
		W	—	—	——			
	II	W	4	17 17	+ 5,62	17 29	+ 5,58	
		O	4	17 41	+ 5,54			
Juni 6 . . .	I	O	4	16 38	— 1,04	16 52	— 1,08	$-0,054$
		W	4	17 6	— 1,13			
	II	W	4	18 43	— 1,21	18 54	— 1,19	
		O	4	19 6	— 1,17			
» 10 . . .	I	O	4	16 38	— 5,54	16 52	— 5,60	$-0,039$
		W	4	17 6	— 5,65			
	II	W	4	18 43	— 5,70	18 54	— 5,68	
		O	3	19 5	— 5,66			
» 11 . . .	I	W	4	16 38	— 5,86	16 47	— 5,85	$-0,028$
		O	1	16 56	— 5,84			
	II	O	4	18 43	— 5,88	18 55	— 5,91	
		W	3	19 8	— 5,95			
» 13 . . .	I	W	4	16 38	— 6,19	16 52	— 6,22	$-0,029$
		O	4	17 6	— 6,25			
	II	O	4	18 43	— 6,22	18 55	— 6,28	
		W	4	19 8	— 6,34			
» 14 . . .	I	W	4	16 38	— 6,71	16 52	— 6,74	$-0,044$
		O	4	17 6	— 6,77			
	II	O	4	18 43	— 6,81	18 55	— 6,83	
		W	4	19 8	— 6,85			
» 18 . . .	II	O	4	18 43	— 9,75	18 55	— 9,77	$(-0,022)$
		W	4	19 8	— 9,79			
» 21 . . .	I	W	4	17 17	— 12,32	17 30	— 12,27	0,000
		O	3	17 43	— 12,22			
	II	O	4	19 8	— 12,23	19 19	— 12,27	
		W	2	19 30	— 12,32			
» 25 . . .	I	W	4	17 17	— 15,20	17 29	— 15,14	$-0,027$
		O	4	17 41	— 15,07			
	II	O	4	19 8	— 15,15	19 22	— 15,19	
		W	4	19 37	— 15,24			

Endresultate der Zeitbestimmungen in Göteborg.

Datum.	Stern-gruppe.	Kreis-lage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1885 Mai 14 . . .	I	O	3	14^h49^m	$-1^m\ 3^s,87$	$15^h\ 4^m$	$-1^m\ 3^s,78$	
		W	4	15 19	3,68			$+0^s,121$
	II	W	4	16 39	3,48	16 53	3,56	
		O	4	17 7	3,64			
» 15 . . .	II	W	4	16 39	1,84	16 53	1,90	(+ 0,060)
		O	4	17 7	1,97			
» 27 . . .	I	O	3	15 7	— 0 50,33	15 20	— 0 50,30	
		W	2	15 34	— 50,28			0,000
	II	W	4	17 18	— 50,22	17 30	— 50,30	
		O	4	17 42	— 50,38			
» 30 . . .	I	O	4	15 8	— 47,21	15 21	— 47,25	
		W	4	15 34	— 47,29			+ 0,084
	II	W	4	17 18	— 47,08	17 30	— 47,07	
		O	4	17 42	— 47,05			
Juni 6 . . .	I	O	4	16 38	— 38,19	16 52	— 38,24	
		W	4	17 7	— 38,29			+ 0,068
	II	W	4	18 43	— 38,12	18 55	— 38,10	
		O	4	19 7	— 38,08			
» 10 . . .	I	O	4	16 38	— 31,72	16 52	— 31,75	
		W	4	17 7	— 31,78			+ 0,099
	II	W	4	18 43	— 31,60	18 53	— 31,55	
		O	3	19 4	— 31,51			
» 11 . . .	I	W	4	16 38	— 29,27	16 47	— 29,28	
		O	1	16 56	— 29,28			+ 0,122
	II	O	4	18 43	— 29,06	18 55	— 29,02	
		W	3	19 8	— 28,99			
» 13 . . .	I	W	4	16 38	— 25,47	16 52	— 25,44	
		O	4	17 7	— 25,42			+ 0,098
	II	O	4	18 43	— 25,19	18 55	— 25,24	
		W	4	19 7	— 25,29			
» 14 . . .	I	W	4	16 38	— 23,81	16 52	— 23,80	
		O	4	17 7	— 23,80			+ 0,049
	II	O	4	18 43	— 23,74	18 55	— 23,70	
		W	4	19 7	— 23,65			
» 18 . . .	II	O	4	18 43	— 15,00	18 55	— 14,97	(+ 0,046)
		W	4	19 7	— 14,94			

Endresultate der Zeitbestimmungen in Göteborg.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1885 Juni 21 . . .	I	W	4	17^h17^m	$-0^m\ 7^s,32$	17^h30^m	$-0^m\ 7^s,27$	$+0^s,044$
		O	3	17 43	— 7,23			
	II	O	4	19 7	— 7,13	19 18	— 7,15	
		W	2	19 30	— 7,16			
25 . . .	I	W	4	17 17	+ 1,39	17 29	+ 1,39	$+0,085$
		O	4	17 41	+ 1,39			
	II	O	4	19 7	+ 1,51	19 22	+ 1,55	
		W	4	19 37	+ 1,59			

Die Unterschiede zwischen den Uhrständen in beiden Kreislagen derjenigen Zeitbestimmungen, bei denen zwei Gruppen von Sternen vorkommen, betragen im Mittel

		Stockholm	Göteborg
für das HERBST'sche Instrument	O—W =	$+0^s,041$	$-0^s,065$
» » REPSOLD'sche »	O—W =	+0 ,039	+0 ,032

Die Ursache dieser Differenzen ist wahrscheinlich vorwiegend theils in der Unsicherheit der Rectascensionen und theils in einer Seitenbiegung des Instrumentes zu suchen. Bei Ableitung der Uhrstände ist indessen nur bei der unvollständigen Beobachtung vom 30 Mai 1885 hierauf Rücksicht genommen.

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.	Bemerkungen.
		Stockholm.	Göteborg.			
1885 Mai 14 . . .	14^h12^m	$18^m10^s,39$	$18^m10^s,32$	$18^m10^s,35$.	$-0^s,035$	
	16 8	10,53	10,52	10,52.	−0,005	
	18 6	10,81	10,74	10,77.	−0,035	
» 15 . . .	16 8	18 12,24	18 (12,20)	18 12,22		Zufolge Fehler auf der Linie wurde die erste Gruppe von Signalen verunglückt.
	18 6	12,43	12,39	12,41	−0,020	
27 . . .	14 37	18 24,37	18 24,37	18 24,37	0,000	
	16 27	24,41	24,43	24,42	+0,010	Störung auf der Linie.
	18 27	24,53	24,51	24,52	−0,010	
» 30 . . .	16 32	23 29,88	23 29,87	23 29,87.	−0,005	
	18 32	30,12	30,12	30,12	0,000	Störung auf der Linie.

Anmerkung. Ein Punkt hinter den Werthen bedeutet, dass die dritte Decimale eine 5 ist.

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.	Bemerkungen.
		Stockholm.	Göteborg.			
1885 Juni 6 . . .	16h 11m	23m45s,60 .	18m45s,61	23m45s,60 .	+ 0s,005	
	18 12	45,79	45,84	45,81 .	+ 0,025	
	20 11	46,05	46,09	46,07	+ 0,020	
» 10 . . .	16 12	23 56,57	23 56,54	23 56,55 .	— 0,015	Störung durch Luftelektricität in Göteborg.
	18 12	56,80	56,79	56,79 .	— 0,005	
	20 10	57,14	57,18	57,16	+ 0,020	
» 11 . . .	18 12	23 59,49	23 59,51	23 59,50	+ 0,010	Störungen auf der Linie bei der ersten Gruppe von Signalen.
	20 10	59,71	59,72	59,71 .	+ 0,005	
» 13 . . .	16 11	24 3,54	24 3,58	24 3,56	+ 0,020	
	18 11	3,75	3,78	3,76 .	+ 0,015	
	20 12	3,99	4,03	4,01	+ 0,020	
» 14 . . .	18 11	24 5,85*	24 5,91	24 5,88	+ 0,030	Störung auf der Linie.
» 18 . . .	16 11	24 17,19	24 17,17	24 17,18	— 0,010	Starke Störungen auf der Linie.
	18 12	17,44	17,48	17,46	+ 0,020	
	20 12	17,74	17,77	17,75 .	+ 0,015	
21 . . .	16 46	24 27,52	24 27,53	24 27,52 .	+ 0,005	
	18 46	27,79	27,80	27,79 .	+ 0,005	Störung auf der Linie.
	20 54	28,14	28,11	28,12 .	— 0,015	
» 25 . . .	16 46	24 39,07	24 39,16	39,11 .	+ 0,045	Starke Störungen durch Luftelektricität.
	18 41	39,40	39,46	39,43	+ 0,030	
	20 53	39,62	39,67	39,64 .	+ 0,025	

* Es wurde nur eine Reihe von anwendbaren Signalen bekommen.

Ableitung der Endresultate.

Aus den vorhergehenden Daten wird man jetzt alles erhalten was für die Ermittelung des Endresultates nöthig ist.

In folgender Zusammenstellung sind sowohl die ermittelten Uhrdifferenzen aus den Signalen als auch die Uhrstände bei den beiden Stationen auf die Uhrzeit in Stockholm bezogen.

Um den Resultaten der Längenunterschiede die wahrscheinlichsten Gewichte zu ertheilen, sollte man, streng genommen, sowohl die Genauigkeit der Zeitbestimmung und diejenige des Signalirens als auch die Veränderlichkeit der persönlichen Gleichung nebst andern Umständen in Betracht ziehen, aber der Gewinn eines solchen umständlichen Verfahrens würde unzweifelhaft sehr illusorisch sein.

Von den Fehlerquellen sind die von der Zeitbestimmung und der Veränderlichkeit der persönlichen Gleichung herrührenden in der Regel vom grössten Einfluss. Die per-

sönliche Gleichung verändert sich von Tage zu Tage und die Genauigkeit der Zeitbestimmung hängt hauptsächlich von der Zahl der beobachteten Zeitsterne ab. Bei der Ermittelung des Endresultates sind also nur diese Fehlerquellen berücksichtigt worden und zwar einfach so, dass die Zahl der angewandten Zeitsterne für die Bildung der Tagesresultate und für das Tagesgewicht die Zahl der Sterne für jeden Tag + 16, d. h. die Zahl von Sternen für eine vollständige Zeitbestimmung, angenommen werde.

Datum.	Sternengruppe.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen.	Uhrstand in Stockholm.	Uhrstand in Göteborg.	Zahl der Zeitsterne.	Längendifferenzen aus den Gruppen.	Längendifferenzen aus den Tagesresultaten.	Persönliche Gleichung.	Definitive Längendifferenz.	Gewicht.
1885 Mai 14	I	$15^h 10^m$	$+18^m 10^s,44$	$+5^m 8^s,50$	$-1^m 3^s,80$	7	$24^m 22^s,74$	$24^m 22^s,71$.	+ 0,041	$24^m 22^s,76$	30
	II	17 7	10,65	8,46	3,58	7	22,69				
15	II	17 7	18 12,31	+ 5 8,47	— 1 1,91	8	22,69	22,69	+ 0,041	22,73	24
» 27	I	15 32	18 24,39	+ 5 7,88	— 0 50,30	5	22,57	22,62	+ 0,041	22,66	29
	II	17 27	24,47	7,88	50,30	8	22,65				
» 30	I	16 32	23 29,87	+ 5 5,64	— 0 47,18	4	22,69	22,67	— 0,041	22,63	28
	II	18 32	30,12	5,52	47,02	8	22,66				
Juni 6	I	17 11	23 45,71	— 0 1,10	— 0 38,25	8	22,86	22,85	— 0,041	22,81	32
	II	19 11	45,94	1,21	38,11	8	22,84				
» 10	I	17 12	23 56,67	— 0 5,61	— 0 31,76	8	22,82	22,83	— 0,041	22,79	31
	II	19 11	56,98	5,69	31,56	7	22,85				
» 11	I	18 12	23 59,50	— 0 5,88	— 0 29,16	5	22,78	22,73	— 0,041	22,69	28
	II	20 10	59,71	5,94	28,92	7	22,69				
» 13	I	17 11	24 3,66	— 0 6,23	— 0 25,45	8	22,88	22,86.	— 0,041	22,82	32
	II	19 11	3,89	6,29	25,25	8	22,85				
» 14	I	18 11	24 5,88	— 0 6,79	— 0 23,76	8	22,85	22,84.	— 0,041	22,80	32
	II	18 11	5,88	6,80	23,76	8	22,84				
18	II	19 12	24 17,61	— 0 9,78	— 0 14,97	8	22,80	22,80	+ 0,041	22,84	24
21	I	17 46	24 27,66	— 0 12,27	— 0 7,28	7	22,67	22,74	+ 0,041	22,78	29
	II	19 50	27,96	12,27	7,14	6	22,83				
» 25	I	17 44	24 39,27	— 0 15,15	+ 0 1,40	8	22,72	22,75.	+ 0,041	22,80	32
	II	19 47	39,54	15,20	1,55	8	22,79				

Wenn man die obigen Tagesresultate nach Maassgabe ihrer Gewichte zu einem Mittelwerth vereinigt, bekommt man für die Längendifferenz der Beobachtungspfeiler in Stockholm und Göteborg den Mittelwerth nebst dessen wahrscheinlichen Fehler:

$$24^m 22^s,761 \pm 0^s,013 .$$

Für den Unterschied der persönlichen Gleichung der beiden Beobachter wird aus denselben Tagesresultaten herauskommen:

$$\text{Rosén} - \text{Larssén} = + 0^s,081 .$$

Da der Beobachtungspfeiler in Stockholm $0^s,010$ östlich vom Meridiankreise der Sternwarte und derjenige in Göteborg $0^s,089$ westlich von der Marke in der Treppe des Navigationsgebäudes gelegen ist, so erhält man also für die bezüglichen Punkte das Endresultat des Längenunterschiedes:

Stockholm (Meridiankreis) — **Göteborg** (Marke) = $\mathbf{24^m 22^s,662 \pm 0^s,013}$.

Bestimmung der Längendifferenz zwischen Göteborg und Lund im Jahre 1886.

Diese Längenbestimmung wurde in der Zeit vom 19 Juni bis 17 Juli unter im Ganzen günstigen Umständen ausgeführt.

In Göteborg wurde derselbe Instrumentpfeiler wie voriges Jahr benutzt und in Lund derjenige im östlichen Meridiansaale befintliche Pfeiler, auf welchen die zwischen Lund und Berlin im Jahre 1868 ausgeführte Längenbestimmung sich bezieht.

Als Normaluhren für die Bestimmung der Zeitscala wurde in Göteborg wie vorher das KESSEL'sche Sternzeit-Chronometer N:o 1296 und in Lund der Registrirpendel der Sternwarte benutzt.

Die Wechselung der Stationen für die Beobachter war folgende:

Juni 19, 26, 27	beobachtete	ROSÉN	in	Lund	und	LARSSÉN	in	Göteborg,
Juni 29, 30, Juli 1, 3, 5, 9	»	»	»	Göteborg	und	»	»	Lund,
Juli 11, 13, 17	»	»	»	Lund	»	»	»	Göteborg,

Positionen der beobachteten Sterne.

Polsterne: Mittlere Oerter. 1886,0.

Sterne.	Grösse.	α	δ	Quelle.
η Ursæ minoris	5,1	$16^h20^m50^s,75$	76° 1′ 4″	Berl. Jahrb.
ε » »	4,3	16 57 40,79	82 13 24	
27 Draconis	5,3	17 32 25,19	68 12 27	
ψ' »	4,6	17 43 57,97	72 12 16	»
35 »	5,0	17 54 33,21	76 58 38	»
χ »	3,8	18 23 6,66	72 40 59	»
B. A. C. 6469	5,5	18 48 37,00	73 57 11	Beob.
50 Draconis	5,0	18 50 2,70	75 17 56	
σ »	5,0	19 32 34,77	69 28 21	»
$\varkappa$ Cephei	4,3	20 12 42,64	77 22 3	Berl. Jahrb.
73 Draconis	5,3	20 33 0,13	74 33 49	»

Positionen der beobachteten Sterne.

Zeitsterne: Mittlere Oerter. 1886,0.

Sterne.	Grösse.	α	δ	Quelle.
σ Herculis	4,1	16h30m25s,69	42° 40′ 21″	Berl. Jahrb.
42 »	5,0	16 35 39,26	49 9 5	Beob.
η »	3,1	16 38 59,30	39 8 23	Berl. Jahrb.
52 »	5,0	16 45 53,95	46 10 58	Beob.
ε »	3,3	16 55 55,68	31 5 41	Berl. Jahrb.
B. A. C. 5788	5,0	17 3 59,62	36 5 2	Beob.
π Herculis	3,1	17 11 4,60	36 56 17	Berl. Jahrb.
69 »	4,5	17 13 44,36	37 24 38	Beob.
ϱ »	4,0	17 19 44,97	37 15 3	»
x »	5,8	17 23 42,89	48 21 21	Berl. Jahrb.
82 »	5,5	17 33 38,77	48 39 7	Beob.
85 »	3,3	17 36 14,85	46 4 2	Berl. Jahrb.
30 Draconis	5,5	17 46 20,92	50 48 22	Beob.
90 Herculis	5,5	17 49 35,39	40 1 45	»
ϑ »	4,0	17 52 20,57	37 15 58	Berl. Jahrb.
o »	3,8	18 3 5,74	28 44 51	
A »	5,0	18 7 36,76	31 22 37	Beob.
Gr. 2533	5,4	18 12 5,92	42 7 15	Berl. Jahrb.
109 Herculis	4,0	18 18 50,41	21 43 6	
B. A. C. 6300	6,0	18 24 52,17	23 47 26	Beob.
» 6341	6,0	18 30 45,76	23 30 48	
α Lyræ	1,0	18 33 4,73	38 40 41	Berl. Jahrb.
ε' »	4,5	18 40 33,72	39 33 5	»
β »	var.	18 45 52,27	33 13 51	»
δ^2 »	5,0	18 50 31,08	36 45 14	Beob.
16 »	5,5	18 58 12,91	46 46 31	»
ι »	5,0	19 3 14,06	35 55 19	Berl. Jahrb.
η' »	5,0	19 9 52,75	38 57 0	Beob.
$\varkappa$ Cygni	4,0	19 14 28,10	53 9 30	Berl. Jahrb.
ι »	4,1	19 26 49,93	51 29 14	»
θ »	4,6	19 33 23,07	49 57 27	»
15 »	5,3	19 40 9,95	37 4 46	
δ	2,8	19 41 24,74	44 51 10	
B. A. C. 6817	5,0	19 46 42,58	40 18 35	Beob.
η Cygni	5,0	19 52 1,83	34 46 51	
25 »	5,5	19 55 44,42	36 43 50	»
Yarnall 8872	6,8	19 57 4,04	36 46 53	
b^2 Cygni	5,0	20 5 11,66	36 30 15	»
o »	4,5	20 10 2,53	46 23 45	Berl. Jahrb.
γ »	2,4	20 18 8,25	39 53 32	
41 »	5,0	20 24 44,30	29 59 18	Beob.

Instrumentfehler.

Die Collimationen und Azimuthe

beim HERBST'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Lund . . .	1886 Juni 19	η Ursæ minoris	16	*b*	+ 0^s,13		+ 0^s,33	
		27 Draconis	15	*b*	+ 0,15	+ 0^s,142	+ 0,39	+ 0^s,250
		χ »	15	*b*	+ 0,15		+ 0,13	
		σ »	16	*b*	+ 0,14		+ 0,09	
. . . .	26	η Ursæ minoris	14	*c*	+ 0,09		(+ 0,06)	
		27 Draconis	14	*b*	+ 0,10	+ 0,125	+ 0,09	+ 0,062
		χ »	16	*b*	+ 0,18		+ 0,11	
		σ »	15	*ab*	+ 0,13		— 0,04	
» . . .	» 27	η Ursæ minoris	14	*a*	+ 0,12		+ 0,03	
		27 Draconis	16	*ba*	+ 0,13	+ 0,172	— 0,03	+ 0,028
		χ »	16	*d*	+ 0,19		+ 0,35	
		σ »	15	*d*	+ 0,25		— 0,14	
Göteborg . .	» 29	B. A. C. 6469	16	*a*	— 0,56	— 0,555	+ 2,63	+ 2,670
		$\varkappa$ Cephei	16	*a*	— 0,55		+ 2,71	
. .	30	ε Ursæ minoris	17	*a*	+ 0,10		+ 0,68	
		35 Draconis	11	*a*	+ 0,11	+ 0,090	+ 0,56	+ 0,617
		B. A. C. 6469	16	*a*	+ 0,07		+ 0,59	
		$\varkappa$ Cephei	16	*a*	+ 0,08		+ 0,64	
» . .	Juli 1	ε Ursæ minoris	10	*a*	+ 0,31		+ 0,72	
		35 Draconis	12	*ba*	+ 0,26	+ 0,270	+ 0,67	+ 0,697
		$\varkappa$ Cephei	17	*a*	+ 0,24		+ 0,70	
» . .	» 3	ε Ursæ minoris	16	*a*	+ 0,21	+ 0,225	+ 0,39	+ 0,305
		35 Draconis	12	*a*	+ 0,24		+ 0,22	
» . .	» 5	ε Ursæ minoris	16	*a*	+ 0,25		+ 0,32	
		35 Draconis	13	*a*	+ 0,27	+ 0,237	+ 0,27	+ 0,330
		B. A. C. 6469	16	*b*	+ 0,23		+ 0,32	
		$\varkappa$ Cephei	16		+ 0,20		+ 0,41	
» . .	» 9	ε Ursæ minoris	17	*b*	+ 0,25		+ 0,36	
		35 Draconis	13	*a*	+ 0,23	+ 0,215	+ 0,22	+ 0,367
		B. A. C. 6469	15	*b*	+ 0,19		+ 0,34	
		$\varkappa$ Cephei	17	*a*	+ 0,19		+ 0,55	
Lund . . .	» 11	ψ' Draconis	16	*c*	+ 0,19		+ 2,14	
		50 »	16	*b*	+ 0,19	+ 0,207	+ 2,10	+ 2,155
		σ »	15	*cd*	+ 0,24		+ 2,19	
. . . .	13	ψ' Draconis	16	*b*	— 0,01		+ 1,97	
		50 »	16		0,00	+ 0,020	+ 2,04	+ 2,065
		σ »	15	*b*	+ 0,05		+ 2,14	
		73 »	16	*c*	+ 0,04		+ 2,11	
» . . .	. 17	ψ' Draconis	15	*b*	+ 0,10		+ 2,07	
		50 »	16	*b*	+ 0,17	+ 0,157	+ 2,02	+ 2,035
		σ »	16	*b*	+ 0,18		+ 2,18	
		73 »	15	*b*	+ 0,18		+ 1,87	

Die Collimationen und Azimuthe
beim REPSOLD'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Göteborg . .	1886 Juni 19	27 Draconis	12	*b*	+ 0',30		+ 0',08	
		χ »	14	*b*	+ 0,34	+ 0',327	— 0,14	— 0',010
		σ »	14	*b*	+ 0,34		— 0,06	
. .	» 26	27 Draconis	13	*b*	— 0,26		— 0,16	
		χ »	10		— 0,26	— 0,253	— 0,10	— 0,132
		σ »	14	*b*	— 0,24		— 0,11	
.	» 27	η Ursæ minoris	11	*b*	+ 0,20		— 0,24	
		27 Draconis	14	*b*	+ 0,23	+ 0,225	— 0,11	— 0,187
		χ »	14	*b*	+ 0,25		— 0,17	
		σ »	14	*b*	+ 0,22		— 0,23	
Lund . . .	» 29	B. A. C. 6469	13	*d*	— 0,30	— 0,270	+ 4,30	+ 4,335
		$\varkappa$ Cephei	14	*d*	— 0,24		+ 4,37	
. . . .	» 30	ε Ursæ minoris	15	*c*	+ 0,01		+ 4,26	
		35 Draconis	7	*cd*	+ 0,07	+ 0,045	+ 4,19	+ 4,312
		B. A. C. 6469	14	*d*	+ 0,05		+ 4,37	
		$\varkappa$ Cephei	14	*d*	+ 0,05		+ 4,43	
» . . .	Juli 1	ε Ursæ minoris	14	*d*	— 0,01		+ 4,26	
		35 Draconis	11	*c*	+ 0,05	+ 0,040	+ 4,31	+ 4,377
		$\varkappa$ Cephei	13	*d*	+ 0,08		+ 4,47	
. . .	» 3	ε Ursæ minoris	12	*ab*	+ 0,06		+ 4,40	
		35 Draconis	3	*d*	——	+ 0,090	+ 4,17	+ 4,285
		$\varkappa$ Cephei	13	*d*	+ 0,12		——	
» . . .	» 5	ε Ursæ minoris	15	*ba*	+ 0,09		+ 4,31	
		35 Draconis	12	*b*	+ 0,08	+ 0,087	+ 4,24	+ 4,297
		B. A. C. 6469	13	*b*	+ 0,09		+ 4,32	
» . . .	» 9	ε Ursæ minoris	14	*c*	+ 0,03		+ 4,28	
		35 Draconis	13	*c*	+ 0,09	+ 0,075	+ 4,34	+ 4,348
		B. A. C. 6469	13	*b*	+ 0,11		+ 4,27	
		$\varkappa$ Cephei	13	*c*	+ 0,07		+ 4,50	
Göteborg . .	» 11	ψ' Draconis	14	*a*	+ 0,64		— 0,80	
		50 »	12	*b*	+ 0,67	+ 0,663	— 0,75	— 0,773
		σ »	14	*a*	+ 0,68		— 0,77	
. .	» 13	ψ' Draconis	14	*b*	+ 0,61		— 0,86	
		50 »	14	*a*	+ 0,55	+ 0,585	— 0,81	— 0,830
		σ »	13	*b*	+ 0,58		— 0,81	
		73 »	7		+ 0,60		— 0,84	
. .	» 17	ψ' Draconis	14	*a*	+ 0,58		— 0,76	
		50 »	14	*a*	+ 0,59	+ 0,607	— 0,65	— 0,740
		σ »	13	*ab*	+ 0,63		— 0,72	
		73	14	*a*	+ 0,63		— 0,83	

Neigungen beim Herbst'schen Passageninstrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Lund	1886 Juni 19	— 0″,012	— 0″,082
»	» 26	+ 0,050	+ 0,061
»	» 27	+ 0,039	+ 0,065
Göteborg . .	» 29	——	+ 0,078
. .	» 30	— 0,032	— 0,023
. .	Juli 1	— 0,063	— 0,052
.	» 3	+ 0,063	——
. .	5	+ 0,060	+ 0,062
. .	9	+ 0,101	+ 0,118
Lund	11	+ 0,018	+ 0,064
. . . .	13	+ 0,129	+ 0,152
»	» 17	+ 0,132	+ 0,165

Neigungen beim Repsold'schen Passageninstrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Göteborg . .	1886 Juni 19	— 0″,101	— 0″,127
» . .	» 26	— 0,087	— 0,123
» . .	» 27	— 0,056	— 0,092
Lund	29	——	0,000
. . . .	» 30	— 0,018	— 0,002
»	Juli 1	— 0,087	— 0,072
»	» 3	— 0,025	——
»	» 5	+ 0,053	+ 0,085
. . . .	» 9	+ 0,038	+ 0,116
Göteborg . .	11	— 0,002	— 0,028
» . .	13	+ 0,018	+ 0,019
» . .	» 17	+ 0,062	+ 0,040

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Larssén.					Rosén.				
		Juni 19.									
		West.									
σ Herculis . .	$16^h30^m27^s,88$						$16^h31^m\ 6^s,24$	17	— 0″,15	(— 38″,25)	*b*
42 Herculis .	35 41,34	$16^h36^m41^s,89$	15	— 0″,65	— 59″,90	*b*	36 19,88	17	— 0,20	38,34	*b*
η Herculis .	39 1,51	40 1,80	9	— 0,54	59,75	*b*	39 39,79	4	— 0,12	38,16	
52 Herculis .	45 56,24	46 56,74	15	— 0,61	59,89	*c*	46 34,66	17	— 0,17	38,25	*b*
		Ost.									
ε Herculis . .	16 55 57,92	16 56 57,53	15	+ 0,27	59,88	*b*	16 56 35,81	17	+ 0,27	38,16	*b*
B. A. C. 5788 .	17 4 1,89	17 5 1,45	15	+ 0,28	59,84	*b*	17 4 39,81	16	+ 0,27	38,19	*b*
π Herculis . .	11 6,90	12 6,50	15	+ 0,29	59,89	*b*	11 44,89	17	+ 0,26	38,25	*b*
69 Herculis .	13 46,70	14 46,27	15	+ 0,29	59,86	*b*	14 24,72	15	+ 0,26	38,28	*b*
α Lyræ . . .	18 33 7,24	18 34 6,76	15	+ 0,27	59,79	*c*	18 33 45,37	17	+ 0,17	38,30	*c*
ε' Lyræ . . .	40 36,24	41 35,24	15	+ 0,26	59,86	*b*	41 14,44	17	+ 0,17	38,37	*b c*
β Lyræ . . .	45 54,72	46 54,30	15	+ 0,25	59,83	*b*	46 32,87	17	+ 0,19	38,34	*b*
δ^2 Lyræ . . .	50 33,56	51 33,12	12	+ 0,26	59,82	*b*	51 11,75	17	+ 0,17	38,36	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtungen in Lund. Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Juni 19.									
		West.									
16 Lyræ . . .	18h58m15s,58	18h59m16s,01	15	−0s,65	−59s,78	a	18h58m54s,04	17	−0s,28	−38s,18	a
ι Lyræ . . .	19 3 16,54	19 4 16,78	15	−0,55	59,69	b	19 3 54,98	17	−0,17	38,27	a
η Lyræ . . .	9 55,28	10 55,62	15	−0,58	59,76	b	10 33,65	17	−0,20	38,17	b
ϰ Cygni . . .	14 30,99	15 31,47	15	−0,75	59,73	d	15 9,54	17	−0,36	38,19	c
		Juni 26.									
		West.									
σ Herculis . .	16 30 27,84	16 31 17,82	15	+0,20	−50,18	b	16 31 5,29	17	−0,08	−37,37	b
42 Herculis .	35 41,42	36 31,41	15	+0,23	50,22	c	36 18,88	17	−0,10	37,36	b
η Herculis . .	39 1,48	39 51,48	15	+0,17	50,17	c	39 38,85	14	−0,08	37,29	a
52 Herculis .	45 56,20	46 46,19	15	+0,21	50,20	b	46 33,68	17	−0,09	37,39	b
		Ost.									
ε Herculis . .	16 55 57,92	16 56 48,59	15	−0,46	50,21	b	16 56 34,96	16	+0,23	37,27	a
B. A. C. 5788	17 4 1,89	17 4 52,59	15	−0,47	50,23	b	17 4 38,93	16	+0,24	37,28	b
π Herculis . .	11 6,90	11 57,65	15	−0,48	50,27	b	11 44,01	17	+0,25	37,36	b
69 Herculis .	13 46,70	14 37,40	15	−0,48	50,22	b	14 23,77	16	+0,24	37,31	b
α Lyræ . . .	18 33 7,30	18 33 57,91	15	−0,53	50,08	d	18 33 44,29	15	+0,26	37,25	
ε′ Lyræ . . .	40 36,30	41 27,02	15	−0,53	50,19	b	41 13,42	15	+0,26	37,38	b
β Lyræ . . .	45 54,79	46 45,44	15	−0,49	50,16	b	46 31,92	15	+0,25	37,38	c
δ^2 Lyræ . .	50 33,64	51 24,28	14	−0,52	50,12	b	51 10,75	11	+0,25	37,36	c
		West.									
16 Lyræ . . .	18 58 15,66	18 59 5,62	14	+0,15	50,11	b	18 58 53,01	10	−0,08	37,27	b
ι Lyræ . . .	19 3 16,62	19 4 6,67	15	+0,11	50,16	b	19 3 54,15	3	−0,05	37,48	c
η Lyræ . . .	9 55,36	10 45,30	15	+0,13	50,07	b	10 32,74	17	−0,06	37,32	ab
ϰ Cygni . . .	14 31,08	15 20,92	11	+0,20	50,10	d	15 8,51	17	−0,11	37,32	a
		Juni 27.									
		West.									
σ Herculis . .	16 30 27,83	16 31 17,92	15	−0,45	−49,64	b	16 31 5,03	16	−0,17	−37,03	a
42 Herculis .	35 41,44	36 31,51	15	−0,48	49,59	b	36 18,59	17	−0,19	36,96	b
η Herculis . .	39 1,48	39 51,48	15	−0,44	49,56	b	39 38,62	15	−0,16	36,98	b
52 Herculis .	45 56,19	46 46,26	15	−0,46	49,61	b	46 33,41	16	−0,17	37,05	b
		Ost.									
ε Herculis . .	16 55 57,92	16 56 47,43	15	+0,10	49,61	b	16 56 34,78	17	+0,26	37,12	b
B. A. C. 5788	17 4 1,89	17 4 51,38	14	+0,13	49,62	b	17 4 38,77	14	+0,27	37,15	b
π Herculis . .	11 6,90	11 56,46	10	+0,13	49,69	b	11 43,81	17	+0,27	37,18	
69 Herculis .	13 46,70	14 36,23	15	+0,13	49,66	b	14 23,60	17	+0,27	37,17	

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Larssén.					Rosén.				
		Juni 27.									
		Ost.									
α Lyræ . . .	$18^h 33^m 7^s,31$	$18^h 33^m 56^s,78$	15	$+0^s,10$	$-49^s,57$	*c*	$18^h 33^m 44^s,13$	17	$+0^s,31$	$-37^s,13$	*d*
ε' Lyræ . . .	40 36,31	41 25,85	7	+ 0,10	49,64	*b*	41 13,22	16	+ 0,31	37,22	*b*
β Lyræ . . .	45 54,80	46 44,35	15	+ 0,08	49,63		46 31,60	13	+ 0,29	37,09	*b*
δ^2 Lyræ . . .	50 33,65	51 23,16	10	+ 0,08	49,60	*b*	51 10,43	15	+ 0,30	37,08	*c*
		West.									
16 Lyræ . . .	18 58 15,68	18 59 5,82	15	— 0,51	49,63	*a*	18 58 52,90	16	— 0,15	37,07	*c*
ι Lyræ . . .	19 3 16,64	19 4 6,74	14	— 0,48	49,62	*b*	19 3 53,88	16	— 0,12	37,12	*c*
η' Lyræ . . .	9 55,38	10 45,42	15	— 0,48	49,56	*b*	10 32,66	15	— 0,13	37,15	*b*
$\varkappa$ Cygni . . .	14 31,09	15 21,24	12	— 0,55	49,60	*c*	15 8,48	16	— 0,17	37,22	*d*
		Beobachter: Rosén.					Larssén.				
		Juni 29.									
		West.									
16 Lyræ . . .	18 58 15,70	18 59 1,11	17	+ 1,65	— 47,06	*a*	18 58 51,00	6	+ 1,36	— 36,66	*d*
ι Lyræ . . .	19 3 16,66	19 4 1,73	16	+ 2,00	47,07	*a*	19 3 51,23	14	+ 2,14	36,71	*d*
η Lyræ . . .	9 55,40	10 40,52	17	+ 1,92	47,04	*a*	10 30,10	15	+ 1,95	36,65	*d*
$\varkappa$ Cygni . . .	14 31,12	15 16,65	17	+ 1,40	46,93	*a*	15 7,12	13	+ 0,76	36,76	*d*
		Ost.									
ι Cygni . . .	19 26 52,91	19 27 40,22	17	— 0,28	47,03	*a*	19 27 29,40	11	+ 0,09	36,58	*d*
θ Cygni . . .	33 26,01	34 13,28	17	— 0,18	47,09	*a*	34 2,34	15	+ 0,27	36,60	*d*
15 Cygni . .	40 12,60	40 59,05	17	+ 0,58	47,03	*a*	40 47,83	14	+ 1,41	36,64	*d*
B. A. C. 6817	46 45,30	47 31,81	17	+ 0,43	46,94	*a*	47 20,76	13	+ 1,17	36,63	*c*
		Juni 30.									
		Ost.									
π Herculis . .	17 11 6,89	17 11 51,23	17	+ 0,35	— 44,69	*a*	17 11 41,56	14	+ 1,78	— 36,45	*c*
69 Herculis .	13 46,69	14 31,00	17	+ 0,34	44,65	*a*	14 21,42	11	+ 1,75	36,48	*c*
ϱ Herculis . .	19 47,31	20 31,65	15	+ 0,35	44,69	*a*	20 22,04	14	+ 1,76	36,49	*c*
x Herculis . .	23 45,34	24 29,86	17	+ 0,24	44,76	*a*	24 21,03	15	+ 0,87	36,56	*c*
		West.									
82 Herculis .	17 34 41,29	17 34 25,96	17	— 0,04	44,63	*a*	17 34 17,07	13	+ 0,70	36,48	*c*
85 Herculis .	36 17,34	37 1,92	13	+ 0,01	44,59	*a*	36 52,88	8	+ 0,95	36,49	*c*
30 Draconis .	46 23,53	47 8,24	17	— 0,07	44,64		46 59,52	15	+ 0,48	36,47	*c*
90 Herculis .	49 37,86	50 22,38	17	+ 0,09	44,61	*a*	50 12,93	15	+ 1,44	36,51	*c*
16 Lyræ . . .	18 58 15,71	18 59 0,13	17	+ 0,01	44,43	*a*	18 58 51,28	15	+ 0,91	36,48	*d*
ι Lyræ . . .	19 3 16,67	19 4 1,00	17	+ 0,15	44,48	*a*	19 3 51,41	14	+ 1,74	36,48	*c*
η Lyræ . . .	9 55,41	10 39,75	17	+ 0,11	44,45	*a*	10 30,33	15	+ 1,54	36,46	*c*
$\varkappa$ Cygni . . .	14 31,13	15 15,66	17	— 0,11	44,42		15 7,45	15	+ 0,25	36,57	*cd*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild
		Beobachter: Rosén.					Larssén.				
Juni 30.											
Ost.											
ι Cygni . . .	$19^h\,26^m\,52^s,92$	$19^h\,27^m\,37^s,15$	17	$+0^s,21$	$-44^s,44$	a	$19^h\,27^m\,28^s,73$	14	$+0^s,58$	$-36^s,39$	c
θ Cygni . . .	33 26,02	34 10,25	17	+ 0,23	44,46	a	34 1,65	15	+ 0,74	36,37	c
15 Cygni . .	40 12,61	40 56,68	17	+ 0,36	44,43	a	40 47,24	15	+ 1,79	36,42	b
B. A. C. 6817	46 45,31	47 29,39	17	+ 0,34	44,42	a	47 20,18	15	+ 1,56	36,43	b
Juli 1.											
Ost.											
π Herculis . .	17 11 6,89	17 11 49,05	17	+ 0,59	−42,75	a	17 11 41,42	15	+ 1,71	−36,24	b
69 Herculis .	13 46,69	14 28,86	17	+ 0,59	42,76	a	14 21,24	12	+ 1,68	36,23	b
ϱ Herculis . .	19 47,30	20 29,50	14	+ 0,59	42,79	b	20 21,89	14	+ 1,69	36,28	b
x Herculis . .	23 45,34	24 27,80	15	+ 0,49	42,95	b	24 20,91	15	+ 0,77	36,34	b
West.											
82 Herculis .	17 34 41,29	17 34 24,33	17	− 0,32	42,72	a	17 34 16,95	12	+ 0,62	36,28	b
ι Herculis . .	36 17,33	37 0,25	14	− 0,27	42,65	a	36 52,69	8	+ 0,87	36,23	c
30 Draconis .	46 23,53	47 6,61	17	− 0,38	42,70		46 59,40	15	+ 0,39	36,26	b
90 Herculis .	49 37,86	50 20,75	17	− 0,14	42,75		50 12,82	13	+ 1,38	36,34	
η Lyræ . . .	19 9 55,42	19 10 38,11	6	− 0,10	42,59	ab	19 10 30,17	10	+ 1,48	36,23	c
$\varkappa$ Cygni . . .	14 31,13	15 14,00	17	− 0,44	42,43	a	15 7,31	11	+ 0,13	36,31	c
Ost.											
ι Cygni . . .	19 26 52,93	19 27 34,97	16	+ 0,48	42,52	a	19 27 28,58	14	+ 0,46	36,11	c
θ Cygni . . .	33 26,03	34 8,14	17	+ 0,49	42,60	a	34 1,60	13	+ 0,63	36,20	c
15 Cygni . .	40 12,62	40 54,63	17	+ 0,60	42,61	a	40 47,09	10	+ 1,71	36,18	b
B. A. C. 6817	46 45,32	47 27,32	17	+ 0,52	42,57	a	47 20,02	15	+ 1,48	36,18	b
Juli 3.											
Ost.											
π Herculis . .	17 11 6,88	17 11 46,57	17	+ 0,47	−40,16	a	17 11 41,60	15	+ 1,82	−36,54	ab
69 Herculis .	13 46,64	14 26,37	17	+ 0,47	40,20	a	14 21,36	15	+ 1,79	36,51	ab
ϱ Herculis . .	21 47,36	20 27,02	16	+ 0,47	40,13	a	20 22,01	15	+ 1,80	36,45	b
x Herculis . .	23 45,32	24 25,07	16	+ 0,48	40,23	a	24 20,96	15	+ 0,93	36,57	a
West.											
82 Herculis .	17 33 41,18	17 34 21,44	16	− 0,15	40,11	a	17 34 17,16	15	+ 0,62	36,60	b
ι Herculis . .	36 17,32	36 57,47	14	− 0,12	40,03	a	36 52,87	11	+ 0,87	36,42	b
30 Draconis .	46 23,61	47 3,84	17	− 0,17	40,06	a	46 59,67	15	+ 0,40	36,46	a
90 Herculis .	49 37,79	50 18,06	17	− 0,07	40,20	a	50 12,98	15	+ 1,37	36,56	a

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		Juli 5.									
		Ost.									
π Herculis . .	$17^h11^m\ 6^s,87$	$17^h11^m42^s,83$	17	$+0^s,52$	$-36^s,48$	*a*	$17^h11^m42^s,09$	15	$+1^s,90$	$-37^s,12$	*b*
69 Herculis .	13 46,67	14 22,63	17	+ 0,51	36,47	*a*	14 21,90	14	+ 1,87	37,10	*a*
ϱ Herculis . .	19 47,29	20 23,26	17	+ 0,51	36,48	*a*	20 22,56	15	+ 1,88	37,15	*b*
x Herculis . .	23 45,31	24 21,34	17	+ 0,53	36,56	*a*	24 21,49	15	+ 1,04	37,22	*b*
		West.									
82 Herculis .	17 33 41,26	17 34 18,00	17	— 0,19	36,55	*a*	17 34 17,77	15	+ 0,75	37,26	*a*
ι Herculis . .	36 17,32	36 53,96	14	— 0,16	36,48	*a*	36 53,48	11	+ 0,99	37,15	*b*
30 Draconis .	46 23,51	47 0,20	6	— 0,23	36,46	*a*	47 0,26	14	+ 0,52	37,27	
90 Herculis .	49 37,85	50 14,43	12	— 0,11	36,47	*a*	50 13,65	14	+ 1,48	37,28	
16 Lyræ . .	18 58 15,73	18 58 52,18	17	— 0,17	36,28	*a*	18 58 52,01	14	+ 0,96	37,24	*b*
ι Lyræ . . .	19 3 16,71	19 3 53,12	17	— 0,07	36,34	*a*	19 3 52,13	14	+ 1,79	37,21	*b*
η Lyræ . . .	9 55,45	10 31,86	17	— 0,08	36,33	*a*	10 31,02	15	+ 1,58	37,15	*a*
$\varkappa$ Cygni . . .	14 31,16	15 7,74	17	— 0,26	36,32	*a*	15 8,07	13	+ 0,31	37,22	*b*
		Ost.									
ι Cygni . . .	19 26 52,96	19 27 28,76	17	+ 0,54	36,34	*a*	19 27 29,23	14	+ 0,79	37,06	*a*
θ Cygni . . .	33 26,07	34 1,90	17	+ 0,54	36,37	*a*	34 2,22	14	+ 0,94	37,09	*a*
15 Cygni . .	40 12,67	40 48,46	17	+ 0,51	36,30		40 47,81	15	+ 1,93	37,07	*a*
B. A. C. 6817	46 45,37	47 21,18	17	+ 0,52	36,33		47 20,76	15	+ 1,73	37,12	*b*
		Juli 9.									
		Ost.									
π Herculis . .	17 11 6,85	17 11 34,06	17	+ 0,56	— 27,77	*b*	17 11 44,12	15	+ 1,88	— 39,15	*c*
69 Herculis .	13 46,65	14 13,87	17	+ 0,55	27,77	*b*	14 23,99	14	+ 1,85	39,19	*b*
ϱ Herculis . .	19 47,27	20 14,49	17	+ 0,55	27,77	*a*	20 24,55	15	+ 1,86	39,14	*b*
x Herculis . .	23 45,28	24 12,53	16	+ 0,56	27,81	*a*	24 23,52	15	+ 1,01	39,25	*bc*
		West.									
82 Herculis .	17 33 41,24	17 34 9,08	15	— 0,08	27,76	*a*	17 34 19,74	15	+ 0,76	39,26	*bc*
ι Herculis . .	36 17,30	36 45,11	15	— 0,06	27,75	*a*	36 55,51	9	+ 0,99	39,20	*bc*
30 Draconis .	46 23,49	46 51,35	16	— 0,11	27,75	*a*	47 2,18	15	+ 0,53	39,22	*b*
90 Herculis .	49 37,85	50 5,62	14	0,00	27,77	*b*	50 15,52	14	+ 1,48	39,15	*b*
16 Lyræ . . .	18 58 15,75	18 58 43,28	17	— 0,04	27,49	*b*	18 58 53,94	12	+ 1,05	39,24	*b*
ι Lyræ . . .	19 3 16,74	19 3 44,21	16	+ 0,05	27,52	*a*	19 3 54,08	15	+ 1,87	39,21	*c*
η Lyræ . . .	9 55,48	10 22,93	16	+ 0,03	27,48	*b*	10 33,04	15	+ 1,65	39,21	*c*
$\varkappa$ Cygni . . .	14 31,19	14 58,78	17	— 0,11	27,48	*a*	15 9,95	14	+ 0,89	39,15	*d*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		Juli 9.									
		Ost.									
ι Cygni . . .	$19^h26^m53^s,00$	$19^h27^m19^s,88$	17	$+0^s,60$	$-27^s,48$	*a*	$19^h27^m31^s,31$	14	$+0^s,82$	$-39^s,13$	*bc*
θ Cygni . . .	33 26,11	33 53,03	17	+ 0,59	27,51	*a*	34 4,30	15	+ 0,98	39,17	*b*
15 Cygni . .	40 12,71	40 39,63	17	+ 0,58	27,50	*a*	40 49,86	15	+ 1,97	39,12	*b*
B. A. C. 6817	46 45,42	47 12,34	17	+ 0,58	27,50	*a*	47 22,81	15	+ 1,76	39,15	*b*
		Beobachter: Larssén.					Rosén.				
		Juli 11.									
		West.									
ϑ Herculis . .	17 52 23,01	17 52 48,00	15	− 1,18	− 23,81	*a*	17 53 1,30	17	+ 0,62	− 38,91	*c*
o Herculis . .	18 3 8,20	18 3 33,14	15	− 1,18	23,76	*b*	18 3 46,15	17	+ 0,89	38,84	*cd*
A Herculis . .	7 39,24	8 4,21	15	− 1,18	23,79	*a*	8 17,32	17	+ 0,82	38,90	*d*
Gr. 2533 . .	12 8,49	12 33,52	15	− 1,18	23,85	*a*	12 46,93	17	+ 0,42	38,86	*c*
		Ost.									
109 Herculis .	18 18 52,92	18 19 16,52	15	+ 0,23	23,83	*b*	18 19 30,15	17	+ 1,54	38,77	*b*
B. A. C. 6300	24 54,69	25 18,24	15	+ 0,26	23,83	*b*	25 31,98	17	+ 1,49	38,78	*b*
B. A. C. 6341	30 48,28	31 11,87	15	+ 0,26	23,85	*a*	31 25,56	16	+ 1,50	38,78	*b*
ε' Lyræ . . .	40 36,38	40 59,59	15	+ 0,54	23,76	*b*	41 14,10	17	+ 1,07	38,79	*b*
δ Cygni . . .	19 41 27,67	19 41 50,61	15	+ 0,66	23,60	*b*	19 42 5,51	11	+ 0,95	38,79	*d*
B. A. C. 6817	46 45,43	47 8,57	15	+ 0,53	23,67	*a*	47 23,15	10	+ 1,10	38,82	*d*
η Cygni . . .	52 4,61	52 27,84	15	+ 0,42	23,65	*a*	52 42,11	17	+ 1,26	38,76	
Yarnall 8872 .	57 6,84	57 30,07	8	+ 0,46	23,69	*b*	57 44,40	17	+ 1,21	38,77	*b*
		West.									
b^2 Cygni . .	20 5 14,46	20 5 39,31	15	− 1,21	23,64	*b*	20 5 52,52	17	+ 0,69	38,75	*c*
o Cygni . . .	10 5,56	10 30,42	15	− 1,22	23,64	*b*	10 44,04	17	+ 0,29	38,77	*c*
γ Cygni . . .	18 11,12	18 35,92	15	− 1,22	23,58	*b*	18 49,40	16	+ 0,57	38,85	*b*
41 Cygni . .	24 47,01	25 11,85	15	− 1,21	23,63		25 24,84	17	+ 0,90	38,73	
		Juli 13.									
		West.									
ϑ Herculis .	17 52 23,00	17 52 44,49	15	− 1,08	− 20,41	*b*	17 53 0,74	17	+ 0,95	− 38,69	*b*
o Herculis . .	18 3 8,19	18 3 29,62	15	− 1,11	20,32	*b*	18 3 45,65	17	+ 1,14	38,64	*c*
A Herculis . .	7 39,23	8 0,70	15	− 1,10	20,37	*a*	8 16,77	17	+ 1,12	38,66	*c*
Gr. 2533 . .	12 8,48	12 29,96	9	1,07	20,41	*a*	12 46,41	11	+ 0,79	38,72	
		Ost.									
109 Herculis .	18 18 52,92	18 19 13,26	14	+ 0,12	20,46	*b*	18 19 30,10	17	+ 1,38	38,56	*b*
B. A. C. 6300	24 54,69	25 14,97	15	+ 0,15	20,43	*a*	25 31,95	17	+ 1,33	38,59	*b*
B. A. C. 6341	30 48,28	31 8,57	15	+ 0,15	20,44	*a*	31 25,52	17	+ 1,34	38,58	*b*
ε' Lyræ . . .	40 36,38	40 56,39	15	+ 0,44	20,45		41 14,03	17	+ 0,92	38,56	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Göteborg.					Beobachtungen in Lund.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		Juli 13.									
		Ost.									
δ Cygni . . .	$19^h\,41^m\,27^s,68$	$19^h\,41^m\,47^s,44$	15	$+0^s,60$	$-20^s,36$	*b*	$19^h\,42^m\,5^s,42$	16	$+0^s,79$	$-38^s,52$	*b*
B. A. C. 6817	46 45,45	47 5,39	15	+ 0,46	20,40	*a*	47 23,03	17	+ 0,93	38,51	*b*
η Cygni . . .	52 4,62	52 24,62	15	+ 0,34	20,34	*b*	52 42,05	17	+ 1,09	38,52	*b*
Yarnall 8872 .	57 6,85	57 26,82	15	+ 0,38	20,35	*a*	57 44,33	16	+ 1,04	38,52	*b*
		West.									
b^2 Cygni . . .	20 5 14,48	20 5 35,90	11	— 1,08	20,34	*a*	20 5 51,99	16	+ 1,00	38,51	*b*
o Cygni . . .	10 5,58	10 27,02	9	— 1,06	20,38	*b*	10 43,47	17	+ 0,67	38,56	*b*
γ Cygni . . .	18 11,14	18 32,54	15	— 1,07	20,33	*b*	18 48,76	17	+ 0,89	38,52	*b*
41 Cygni . .	24 47,04	25 8,45	15	— 1,11	20,30	*b*	25 24,42	17	+ 1,18	38,56	*b*
		Juli 17.									
		West.									
ϑ Herculis . .	17 52 22,97	17 52 39,50	15	— 1,02	— 15,51	*a*	17 53 1,34	17	+ 0,77	— 39,14	*b*
o Herculis . .	18 3 8,18	18 3 24,64	15	— 1,04	15,42	*a*	18 3 46,19	15	+ 1,00	39,01	*c*
A Herculis . .	7 39,22	7 55,73	15	— 1,03	15,48	*a*	8 17,40	17	+ 0,93	39,11	*b*
Gr. 2533 . .	12 8,46	12 25,00	15	— 1,01	15,53	*a*	12 47,08	14	+ 0,60	39,22	*b*
		Ost.									
109 Herculis .	18 18 52,92	18 19 8,20	15	+ 0,24	15,52	*b*	18 19 30,52	17	+ 1,51	39,11	*b*
B. A. C. 6300	24 54,69	25 9,95	15	+ 0,27	15,53	*a*	25 32,35	17	+ 1,46	39,12	*b*
B. A. C. 6341	30 48,29	31 3,57	15	+ 0,26	15,54	*b*	31 25,92	17	+ 1,47	39,10	*b*
ε' Lyræ . . .	40 36,37	40 51,30	15	+ 0,57	15,50	*b*	41 14,38	17	+ 1,09	39,10	
δ Cygni . . .	19 41 27,71	19 41 42,32	15	+ 0,67	15,28	*b*	19 42 5,71	17	+ 0,99	38,99	
B. A. C. 6817	46 45,48	47 0,27	15	+ 0,56	15,35	*a*	47 23,39	16	+ 1,13	39,04	*b*
η Cygni . . .	52 4,65	52 19,53	15	+ 0,42	15,30	*b*	52 42,46	17	+ 1,26	39,07	*b*
25 Cygni . .	55 47,26	56 2,10	15	+ 0,47	15,31	*a*	56 25,12	14	+ 1,21	39,07	*b*
		West.									
b^2 Cygni . . .	20 5 14,52	20 5 30,88	15	— 1,05	15,31	*a*	20 5 52,79	17	+ 0,82	39,09	*b*
o Cygni . . .	10 5,61	10 22,01	15	— 1,03	15,37	*bc*	10 44,24	17	+ 0,49	39,12	*b*
γ Cygni . . .	18 11,19	18 27,56	15	— 1,04	15,33	*b*	18 49,51	17	+ 0,72	39,04	*b*
41 Cygni . .	24 47,09	25 3,48	15	— 1,06	15,33	*b*	25 25,17	17	+ 1,01	39,09	*a*

Endresultate der Zeitbestimmungen in Göteborg.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1886 Juni 19	I	W	3	$16^h 41^m$	$-59^s,85$	$16^h 54^m$	$-59^s,86$	$+0^s,039$
		O	4	17 7	$-59,87$			
	II	O	4	18 43	$-59,82$	18 55	$-59,78$	
		W	4	19 7	$-59,74$			
» 26	I	W	4	16 39	$-50,19$	16 53	$-50,21$	$+0,044$
		O	4	17 7	$-50,23$			
	II	O	4	18 43	$-50,14$	18 55	$-50,12$	
		W	4	19 7	$-50,11$			
» 27	I	W	4	16 39	$-49,60$	16 53	$-49,62$	$+0,010$
		O	4	17 7	$-49,64$			
	II	O	4	18 43	$-49,61$	18 55	$-49,60$	
		W	4	19 7	$-49,60$			
29	II	W	4	19 7	$-47,02$	19 22	$-47,02$	$(+0,064)$
		O	4	19 38	$-47,02$			
» 30	I	O	4	17 18	$-44,70$	17 30	$-44,66$	$+0,119$
		W	4	17 42	$-44,62$			
	II	W	4	19 6	$-44,44$	19 21	$-44,44$	
		O	4	19 37	$-44,44$			
Juli 1	I	O	4	17 18	$-42,81$	17 30	$-42,76$	$+0,114$
		W	4	17 42	$-42,71$			
	II	W	2	19 13	$-42,51$	19 25	$-42,54$	
		O	4	19 37	$-42,57$			
» 3	I	O	4	17 18	$-40,18$	17 30	$-40,14$	$(+0,102)$
		W	4	17 42	$-40,10$			
» 5	I	O	4	17 18	$-36,50$	17 30	$-36,49$	$+0,090$
		W	4	17 42	$-36,49$			
	II	W	4	19 7	$-36,32$	19 22	$-36,33$	
		O	4	19 37	$-36,34$			
» 9	I	O	4	17 18	$-27,78$	17 30	$-27,77$	$+0,144$
		W	4	17 42	$-27,76$			
	II	W	4	19 7	$-27,49$	19 22	$-27,50$	
		O	4	19 37	$-27,50$			
11	I	W	4	18 4	$-23,80$	18 16	$-23,81$	$+0,101$
		O	4	18 29	$-23,82$			
	II	O	4	19 50	$-23,65$	20 3	$-23,68$	
		W	4	20 15	$-23,62$			

Endresultate der Zeitbestimmungen in Göteborg.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1886 Juli 13	I	W	4	$18^h\ 4^m$	$-20^s,38$	$18^h\ 16^m$	$-20^s,41$	$+0^s,033$
		O	4	18 29	$-20,44$			
	II	O	4	19 50	$-20,36$	20 3	$-20,35$	
		W	4	20 15	$-20,34$			
» 17	I	W	4	18 4	$-15,48$	18 16	$-15,50$	$+0,102$
		O	4	18 29	$-15,52$			
	II	O	4	19 49	$-15,31$	20 2	$-15,32$	
		W	4	20 15	$-15,33$			

Endresultate der Zeitbestimmungen in Lund.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1886 Juni 19	I	W	3	$16^h\ 41^m$	$-38^s,25$	$16^h\ 54^m$	$-38^s,23$	$-0^s,020$
		O	4	17 7	$-38,22$			
	II	O	4	18 43	$-38,34$	18 55	$-38,27$	
		W	4	19 7	$-38,20$			
» 26	I	W	4	16 39	$-37,35$	16 53	$-37,33$	$-0,010$
		O	4	17 7	$-37,31$			
	II	O	4	18 43	$-37,34$	18 55	$-37,35$	
		W	4	19 7	$-37,35$			
» 27	I	W	4	16 39	$-37,01$	16 53	$-37,08$	$-0,025$
		O	4	17 7	$-37,15$			
	II	O	4	18 43	$-37,13$	18 55	$-37,13$	
		W	4	19 7	$-37,14$			
» 29	II	W	4	19 7	$-36,69$	19 22	$-36,65$	$(-0,002)$
		O	4	19 37	$-36,61$			
» 30	I	O	4	17 18	$-36,49$	17 30	$-36,49$	$+0,021$
		W	4	17 42	$-36,49$			
	II	W	4	19 7	$-36,50$	19 22	$-36,45$	
		O	4	19 37	$-36,40$			
Juli 1	I	O	4	17 18	$-36,27$	17 30	$-36,28$	$+0,031$
		W	4	17 42	$-36,28$			
	II	W	2	19 13	$-36,27$	19 25	$-36,22$	
		O	4	19 37	$-36,17$			

Endresultate der Zeitbestimmungen in Lund.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1886 Juli 3	I	O	4	$17^h 18^m$	— 36',52	$17^h 30^m$	— 36',51	(+ 0',031)
		W	4	17 42	— 36,51			
» 5	I	O	4	17 18	— 37,15	17 30	— 37,20	+ 0,032
		W	4	17 42	— 37,24			
	II	W	4	19 7	— 37,20	19 22	— 37,14	
		O	4	19 37	— 37,08			
» 9	I	O	4	17 18	— 39,18	17 30	— 39,19	+ 0,011
		W	4	17 42	— 39,21			
	II	W	4	19 7	— 39,20	19 22	— 39,17	
		O	4	19 37	— 39,14			
» 11	I	W	4	18 4	— 38,88	18 16	— 38,83	+ 0,028
		O	4	18 29	— 38,78			
	II	O	4	19 50	— 38,79	20 2	— 38,78	
		W	4	20 15	— 38,77			
» 13	I	W	4	18 4	— 38,68	18 16	— 38,63	+ 0,056
		O	4	18 29	— 38,57			
	II	O	4	19 50	— 38,52	20 3	— 38,53	
		W	4	20 15	— 38,54			
» 17	I	W	4	18 4	— 39,12	18 16	— 39,12	+ 0,033
		O	4	18 29	— 39,11			
	II	O	4	19 50	— 39,04	20 3	— 39,06	
		W	4	20 15	— 39,08			

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Lund.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.	Bemerkungen.
		Lund.	Göteborg.			
1886 Juni 19	$17^h 57^m$	$1^m 32',32$	$4^m 32',32$	$4^m 32',32$	0',000	Störung auf der Linie bei der ersten Gruppe, welche dadurch verloren ging.
	18 15	32,31	32,33	32,32	+ 0,010	
	19 53	32,34	32,35	32,34	+ 0,005	
» 26	16 12	4 40,99	4 41,01	4 41,00	+ 0,010	
	17 56	41,03	41,04	41,04	+ 0,005	
	18 14	41,05	41,06	41,05	+ 0,005	
	19 53	41,05	41,06	41,06	+ 0,005	

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Lund.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.	Bemerkungen.
		Lund.	Göteborg.			
1886 Juni 27	16h 12m	4m 41s,31	4m 41s,33	4m 41s,32	+ 0s,010	
	17 53	41,29	41,31	41,30	+ 0,010	
	18 14	41,29	41,30	41,30	+ 0,005	
	19 53	41,32	41,34	41,33	+ 0,010	
» 29	18 41	4 43,09	4 43,11	4 43,10	+ 0,010	
	19 41	43,32	43,34	43,33	+ 0,010	
» 30	16 47	4 45,35	4 45,36	4 45,35	+ 0,005	
	18 19	45,52	45,51	45,52	— 0,005	
	18 40	45,54	45,55	45,54	+ 0,005	
	20 37	45,79	45,82	45,81	+ 0,015	
Juli 1	16 48	4 47,16	4 47,16	4 47,16	0,000	
	18 20	47,25	47,25	47,25	0,000	
	18 40	47,31	47,32	47,31	+ 0,005	
	20 36	47,38	47,41	47,40	+ 0,015	
» 3	16 48	4 49,87	4 49,94	4 49,90	+ 0,035	Grosse Störungen auf der Linie.
	18 28	50,09	50,08	50,09	— 0,005	
5	16 46	4 54,28	4 54,30	4 54,29	+ 0,010	
	18 22	54,41	54,43	54,42	+ 0,010	
	18 40	54,42	54,44	54,43	+ 0,010	
	20 38	54,66	54,66	54,66	0,000	
» 9	16 44	5 5,01	5 5,03	5 5,02	+ 0,010	
	18 16	5,17	5,19	5,18	+ 0,010	
	18 40	5,20	5,21	5,20	+ 0,005	
	20 35	5,39	5,40	5,40	+ 0,005	
» 11	17 34	5 8,79	5 8 82	5 8,80	+ 0,015	
	19 10	8,87	8,90	8,89	+ 0,015	
	19 19	8,87	8,88	8,87	+ 0,005	
	20 54	8,95	8,99	8,97	+ 0,020	
» 13	17 32	5 11,94	5 11,96	5 11,95	+ 0,010	
	19 7	11,97	12,00	11,99	+ 0,015	
	19 18	11,97	11,99	11,98	+ 0,010	
	20 54	11,99	12,02	12,00	+ 0,015	
» 17	17 33	5 17,33	5 17,36	5 17,35	+ 0,015	
	19 10	17,58	17,59	17,58	+ 0,005	
	19 22	17,58	17,60	17,59	+ 0,010	
	20 56	17,62	17,63	17,62	+ 0,010	

Ableitung des Endresultates.

Datum.	Steuergruppe.	Uhrzeit in Lund.	Uhrdifferenzen aus den Signalen.	Uhrstand in Lund.	Uhrstand in Göteborg.	Zahl der Zeitsterne.	Längendifferenzen aus den Gruppen.	Längendifferenzen aus den Tagesresultaten.	Persönliche Gleichung.	Definitive Längendifferenz.	Gewicht.
1886 Juni 19	I	17^h57^m	$+4^m32^s,32$	$-38^s,25$	$-59^s,82$	7	$4^m53^s,89$	$4^m53^s,86$	$-0,09$	$4^m53^s,77$	31
	II	19 4	32,33	−38,27	−59,78	8	53,84				
» 26	I	17 4	4 41,02	−37,33	−50,20	8	53,89	53,85	−0,09	53,76	32
	II	19 4	41,05	−37,35	−50,12	8	53,82				
» 27	I	17 3	4 41,31	−37,08	−49,62	8	53,85	53,82	−0,09	53,73	32
	II	19 3	41,32	−37,13	−49,60	8	53,79				
» 29	II	19 11	4 43,21	−36,65	−47,04	8	53,60	53,60	+0,09	53,69	24
» 30	I	17 33	4 45,44	−36,49	−44,66	8	53,61	53,62	+0,09	53,71	32
	II	19 39	45,67	−36,45	−44,41	8	53,63				
Juli 1	I	17 34	4 47,20	−36,28	−42,76	8	53,68	53,67	+0,09	53,76	30
	II	19 38	47,36	−36,22	−42,52	6	53,66				
» 3	I	17 38	4 50,00	−36,51	−40,14	8	53,63	53,63	+0,09	53,72	24
» 5	I	17 34	4 54,35	−37,20	−36,49	8	53,64	53,68	+0,09	53,77	32
	II	19 39	54,55	−37,14	−36,31	8	53,72				
» 9	I	17 30	5 5,10	−39,19	−27,78	8	53,69	53,64	+0,09	53,74	32
	II	19 38	5,30	−39,17	−27,47	8	53,60				
» 11	I	18 22	5 8,85	−38,83	−23,81	8	53,83	53,80	−0,09	53,71	32
	II	20 6	8,92	−38,78	−23,63	8	53,77				
» 13	I	18 20	5 11,97	−38,63	−20,41	8	53,75	53,78	−0,09	53,69	32
	II	20 6	11,99	−38,53	−20,35	8	53,81				
» 17	I	18 21	5 17,46	−39,12	−15,50	8	53,84	53,85	−0,09	53,76	32
	II	20 9	17,60	−39,06	−15,32	8	53,86				

Wenn die obigen Tagesresultate nach Maassgabe ihrer Gewichte zu einem Mittelwerthe vereinigt werden, so ergiebt sich für die Längendifferenz der Beobachtungspfeiler in Göteborg und Lund folgender Werth nebst dessen wahrscheinlichem Fehler:

$$4^m53^s,732 \pm 0^s,006 .$$

Für den Unterschied der persönlichen Gleichung der beiden Beobachter ergiebt sich aus den Tagesresultaten:

$$\text{Rosén} - \text{Larssén} = +0^s,184 .$$

Da der Beobachtungspfeiler in Göteborg $0^s,089$ westlich von der obengenannten Marke und derjenige in Lund $0^s,028$ östlich vom Centrum der Kuppel der Sternwarte steht, so ergiebt sich also das Endresultat des fraglichen Längenunterschiedes:

Lund (Centrum) — **Göteborg** (Marke) $= \mathbf{4^m53^s,615 \pm 0^s,006}$.

Bestimmung der Längendifferenz zwischen Stockholm und Hernö in den Jahren 1888 und 1889.

Diese Längenbestimmung wurde in der Zeit vom 31 August bis 28 September 1888 und vom 25 Juni bis 14 Juli 1889 unter ziemlich ungünstigen Verhältnissen ausgeführt.

In Stockholm wurde derselbe Instrumentpfeiler wie vorher gebraucht. In Hernösand wurde ganz nahe der Navigationsschule ein kleines Observatorium aus dünnen Brettern gebaut und in demselben ein Pfeiler aus Ziegelsteinen für das Passageninstrument errichtet. Durch eine besondere Triangulation wurde der Instrumentpfeiler sowohl mit dem Centrum des Navigationsgebäudes wie auch mit dem in der Meridiankette gelegenen Dreieckspunkte Hernö verbunden, bei welchen vorher im Jahre 1882 schon Polhöhe- und Azimuthbestimmungen ausgeführt worden waren.

Die Lage des Instrumentpfeilers gegen das Navigationsgebäude und den Dreieckspunkt Hernö bekommt man durch folgende Entfernungen und Azimuthe, welche vom Dreieckspunkte aus gerechnet werden:

	Entfernung:	Azimuth:
Instrumentpfeiler	2294,1 Meter	355° 1′ 40″
Centrum des Navigationsgebäudes . .	2304,2 »	355 22 47

In Stockholm wurde die KESSEL'sche Pendeluhr wie vorher als Normaluhr benutzt und in Hernösand wurde zu diesem Zweck eine von KULLBERG verfertigte Pendeluhr, welche der Navigationsschule gehört, angewandt.

Die Wechselung der Stationen für die Beobachter war folgende:

1888 Aug. 31, Sept. 5, 7 beobachtete ROSÉN in Hernösand und LARSSÉN in Stockholm,
1888 Sept. 14, 27, 28 » LARSSÉN » » ROSÉN » »
1889 Juni 25, 27, 30 » » » » » » »
1889 Juli 9, 14 » ROSÉN » » LARSSÉN » »

Positionen der beobachteten Sterne.

Sterne.	Grösse.	α	δ	Quelle.
Polsterne: Mittlere Oerter. 1888.0.				
77 Draconis	5,8	$21^h\ 7^m43^s,53$	77° 40′19″	Berl. Jahrb.
31 Cephei	5,1	22 33 0,21	73 3 43	»
π »	4,6	23 4 20,21	74 46 55	»
154 »	6,0	0 31 20,53	81 52 29	Beob.
44 *H* »	5,6	1 2 37,31	79 4 38	Berl. Jahrb.
36 *H* Cassiopejæ	5,6	2 27 23,96	72 19 39	»

Positionen der beobachteten Sterne.

Sterne.	Grösse.	α	δ	Quelle.
Zeitsterne: Mittlere Oerter. 1888,0.				
70 Cygni	6,0	$21^h22^m47^s,40$	36° 37′ 48″	Beob.
74 »	5,0	21 32 27,60	39 54 38	Berl. Jahrb.
π' »	5,0	21 38 7,09	50 40 33	Beob.
π^2 »	4,3	21 42 39,37	48 47 29	Berl. Jahrb.
μ Cephei	5,7	21 51 7,27	56 4 52	Yarnall.
B. A. C. 7679	6,0	21 58 8,52	42 16 22	Beob.
π^2 Pegasi	4,2	22 5 0,81	32 37 44	Berl. Jahrb.
3 Lacertæ	4,4	22 19 9,35	51 40 5	»
τ Pegasi	4,6	23 15 5,61	23 7 38	»
ν »	4,6	23 19 47,33	22 47 15	»
72 »	5,6	23 28 23,79	30 42 26	»
ι Andromedæ	4,0	23 32 38,66	42 38 53	»
ψ »	5,0	23 40 29,05	45 47 55	Beob.
ϱ Cassiopejæ	4,8	23 48 47,37	56 52 34	Berl. Jahrb.
α Andromedæ	2,0	0 2 35,92	28 28 19	»
θ »	5,5	0 11 14,48	38 3 36	Beob.
υ Piscium	4,1	1 13 18,64	26 40 30	Berl. Jahrb.
δ Cassiopejæ	2,8	1 18 29,61	59 39 11	»
A Andromedæ	5,0	1 23 23,15	46 19 30	Beob.
υ Persei	3,6	1 31 7,16	48 3 38	Berl. Jahrb.
φ »	4,0	1 36 38,55	50 7 27	»
α Trianguli	3,6	1 46 41,87	29 1 58	
γ Andromedæ	2,4	1 57 1,52	41 47 30	»
β Trianguli	3,0	2 2 52,81	34 27 25	»
Polsterne: Mittlere Oerter. 1889,0.				
ψ Draconis	4,6	17 43 54,72	72 12 11	Berl. Jahrb.
υ »	5,1	18 55 45,36	71 8 55	
σ »	5,0	19 32 34,38	69 29 0	Sthlm., Yarn.
76 »	6,0	20 50 35,03	82 7 10	Berl. Jahrb.
Zeitsterne: Mittlere Oerter. 1889,0.				
θ Herculis	4,0	17 52 26,73	37 15 56	Berl. Jahrb.
B. A. C. 6129	5,0	18 0 14,94	48 27 30	Beob.
A Herculis	5,0	18 7 43,41	31 22 39	»
Gr. 2533	5,4	18 12 11,49	42 7 19	Berl. Jahrb.
b Draconis	5,1	18 22 17,34	58 44 11	
α Lyræ	1,0	18 33 10,82	38 40 51	»
ε' »	4,5	18 40 39,67	39 33 16	
β »	Var.	18 45 58,91	33 14 3	»
δ Cygni	2,8	19 41 30,37	44 51 36	»
B. A. C. 6817	5,0	19 46 48,81	40 19 2	Beob.
η Cygni	5,0	19 52 8,61	34 47 19	
25 »	5,5	19 55 50,95	36 44 19	
o' sequ. Cygni	4,5	20 10 8,19	46 24 18	Berl. Jahrb.
γ Cygni	2,4	20 18 14,71	39 54 6	
α	1,6	20 37 38,89	44 53 2	

Instrumentfehler.

Die Collimationen und Azimuthe

beim REPSOLD'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Stockholm .	1888 Aug. 31	77 Draconis	14	*b*	—0ˢ,54		—1ˢ,13	
		31 Cephei	14	*cb*	—0,49	—0ˢ,505	—1,13	—1ˢ,090
		π »	14	*b*	—0,52		—1,06	
		B. A. C. 154	15	*b*	—0,47		—1,04	
. .	Sept. 5	31 Cephei	14	*b*	—0,55		—1,19	
		π »	14	*b*	—0,56	—0,543	—1,03	—1,105
		B. A. C. 154	15	*b*	—0,52		—1,01	
» . .	» 7	77 Draconis	14	*b*	—0,48		—1,07	
		31 Cephei	13	*a*	—0,50	—0,500	—1,08	—1,018
		π »	14	*a*	—0,51		—0,99	
		B. A. C. 154	15	*b*	—0,51		—0,93	
Hernösand .	» 14	π Cephei	14	*c*	—0,60		+1,20	
		B. A. C. 154	15	*b*	—0,53	—0,580	+1,35	+1,202
		44 *H* Cephei	14	*b*	—0,58		+1,14	
		36 *H* Cassiopejæ	14	*b*	—0,61		+1,12	
» . .	» 27	44 *H* Cephei	13	*b*	—0,59	—0,615	+1,38	+1,270
		36 *H* Cassiopejæ	14	*b*	—0,64		+1,16	
» . .	» 28	π Cephei	13	*b*	—0,65	—0,625	+1,13	+1,250
		B. A. C. 154	14	*c*	—0,60		+1,37	
» . .	1889 Juni 25	υ Draconis	14	*b*	—0,37	—0,370	+0,10	+0,165
		σ »	14	*b*	—0,37		+0,23	
» . .	» 27	ψ Draconis	14	*b*	—0,36		—0,20	
		υ »	13	*a*	—0,38	—0,363	—0,14	—0,097
		σ »	13	*a*	—0,35		+0,05	
. .	» 30	ψ Draconis	14	*b*	—0,23		—0,25	
		υ »	13	*b*	—0,33	—0,287	—0,28	—0,183
		σ »	14	*b*	—0,30		—0,02	
Stockholm .	Juli 9	ψ Draconis	10	*b*	—0,28		—0,11	
		υ »	14	*b*	—0,25	—0,255	—0,17	—0,025
		σ »	14	*b*	—0,25		+0,01	
		76 »	15	*a*	—0,24		+0,17	
» . .	» 14	ψ Draconis	2	*d*	——		+0,18	
		υ »	14	*d*	—0,20	—0,240	+0,03	—0,057
		σ »	10	*c*	—0,25		—0,38	
		76 »	14	*c*	—0,27		—0,06	

Die Collimationen und Azimuthe
beim HERBST'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**
Hernösand .	1888 Aug. 31	77 Draconis	16	*b*	— 2',50		+ 2',40	
		31 Cephei	15	*b*	— 2,47	— 2',505	+ 2,24	+ 2',318
		π »	14	*a*	— 2,53		+ 2,31	
		B. A. C. 154	14	*a*	— 2,52		+ 2,32	
» . .	Sept. 5	31 Cephei	15	*a*	— 2,17		+ 2,26	
		π »	14	*a*	— 2,22	— 2,200	+ 2,36	+ 2,313
		B. A. C. 154	16	*b*	— 2,21		+ 2,32	
» . .	» 7	77 Draconis	17	*a*	— 2,12		+ 2,24	
		31 Cephei	15	*a*	— 2,10	— 2,122	+ 2,17	+ 2,213
		π »	15	*b*	— 2,14		+ 2,24	
		B. A. C. 154	16	*b*	— 2,13		+ 2,20	
Stockholm .	» 14	π Cephei	16	*a*	— 2,24		— 4,53	
		B. A. C. 154	17	*bc*	— 2,24	— 2,267	— 4,29	— 4,490
		44 *H* Cephei	12	*bc*	— 2,29		— 4,44	
		36 *H* Cassiopejæ	13	*c*	— 2,30		— 4,70	
» . .	» 27	44 *H* Cephei	6	*a*	— 2,41	— 2,430	— 10,20	— 10,280
		36 *H* Cassiopejæ	14	*ba*	— 2,45		— 10,36	
» . .	» 28	π Cephei	14	*d*	— 2,48	— 2,425	— 10,15	— 10,230
		B. A. C. 154	16	*cd*	— 2,37		— 10,31	
» . .	1889 Juni 25	υ Draconis	12	*b*	+ 0,09	+ 0,095	— 2,35	— 2,210
		σ »	12	*c*	+ 0,10		— 2,07	
» . .	» 27	ψ Draconis	14	*c*	+ 0,05		— 2,41	
		υ »	14	*b*	+ 0,05	+ 0,057	— 2,27	— 2,350
		σ »	14	*cb*	+ 0,07		— 2,37	
» . .	» 30	ψ Draconis	4	*b*	—(0,15)		— 2,51	
		υ »	14	*c*	— 0,12	— 0,105	— 2,33	— 2,350
		σ »	14	*b*	— 0,09		— 2,28	
Hernösand .	Juli 9	ψ Draconis	16	*b*	— 0,55		— 6,08	
		υ »	15	*a*	— 0,57	— 0,555	— 6,04	— 6,097
		σ »	15	*a*	— 0,55		— 6,09	
		76 »	11	*b*	— 0,55		— 6,23	
» . .	» 14	ψ Draconis	7	*b*	+(0,51)		— 6,07	
		υ »	15	*a*	+ 0,57	+ 0,567	— 5,87	— 6,013
		σ »	15	*a*	+ 0,57		— 6,02	
		76 »	17	*a*	+ 0,56		— 6,09	

Neigungen beim Herbst'schen Passagen-instrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Hernösand . .	1888 Aug. 31	+ 0ˢ,036	+ 0ˢ,052
» . .	Sept. 5	——	+ 0,121
» . .	» 7	+ 0,211	+ 0,201
Stockholm . .	» 14	+ 0,007	— 0,044
» . . .	» 27	——	— 0,013
» . . .	» 28	+ 0,162	——
» . . .	1889 Juni 25	+ 0,046	+ 0,063
» . . .	» 27	— 0,092	— 0,108
» . . .	» 30	— 0,045	— 0,096
Hernösand . .	Juli 9	+ 0,017	+ 0,006
» . . .	» 14	— 0,047	— 0,123

Neigungen beim Repsold'schen Passagen-instrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Stockholm . .	1888 Aug. 31	— 0ˢ,040	— 0ˢ,065
» . . .	Sept. 5	——	— 0,148
» . . .	» 7	— 0,129	— 0,108
Hernösand . .	» 14	+ 0,091	+ 0,012
» . .	» 27	——	+ 0,059
» . .	» 28	— 0,045	——
» . .	1889 Juni 25	+ 0,125	+ 0,063
» . .	» 27	— 0,017	— 0,062
» . .	» 30	+ 0,109	+ 0,022
Stockholm . .	Juli 9	— 0,001	— 0,013
» . . .	» 14	+ 0,134	+ 0,030

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Larssén.					Rosén.				
		1888. August 31.									
		West.									
70 Cygni . .	21ʰ22ᵐ49ˢ,98	21ʰ25ᵐ42ˢ,05	8	— 1ˢ,20	−2ᵐ50ˢ,87	*c*	21ʰ23ᵐ30ˢ,94	17	— 1ˢ,81	—0ᵐ39ˢ,15	*b*
74 Cygni . .	32 30,27	35 22,21	15	— 1,18	50,76	*b*	33 11,54	17	— 2,05	39,22	*b*
π' Cygni . .	38 10,10	41 2,01	15	— 1,12	50,79	*b*	38 52,44	17	— 3,13	39,21	*b*
π^2 Cygni . .	42 42,33	45 34,24	15	— 1,13	50,78	*c*	43 24,48	16	— 2,91	39,24	*c*
		Ost.									
μ Cephei . .	21 51 10,59	21 54 0,62	11	+ 0,72	50,75	*b*	21 51 44,76	17	+ 5,02	39,19	*c*
π^2 Pegasi . .	5 3,45	22 7 54,31	15	— 0,02	50,84	*b*	22 5 38,38	17	+ 4,39	39,32	*c*
3 Lacertæ . .	19 12,57	22 2,97	13	+ 0,52	50,92	*c*	19 47,14	17	+ 4,81	39,38	*b*
τ Pegasi . .	23 15 8,18	23 17 59,29	3	— 0,21	50,90	*c*	23 15 43,39	17	+ 4,37	39,58	*b*
v Pegasi . . .	19 49,90	22 40,98	14	— 0,21	50,87	*c*	20 25,20	17	+ 4,37	39,67	*b*
72 Pegasi . .	28 26,49	31 17,46	9	— 0,09	50,88	*c*	29 1,72	17	+ 4,39	39,62	*b*
ι Andromedæ .	32 41,65	35 32,24	15	+ 0,17	50,76	*d*	33 16,69	17	+ 4,55	39,59	*a*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		1888. August 31.									
		West.									
ψ Andromedæ	$23^h40^m32^s,16$	$23^h43^m24^s,21$	15	$-1^s,18$	$-2^m50^s,87$	*b*	$23^h41^m14^s,40$	17	$-2^s,56$	$-0^m39^s,68$	
α Andromedæ	0 2 38,54	0 5 30,69	15	−1,27	50,88	*cd*	0 3 19,60	17	−1,32	39,74	*a*
θ Andromedæ	11 17,31	14 9,35	15	−1,22	50,82	*c*	11 58,94	17	−1,89	39,74	
		1888. September 5.									
		Ost.									
τ Pegasi . . .	23 15 8,22	23 18 3,28	9	−0,25	−2 54,81	*b*	23 16 9,07	17	+4,10	−1 4,95	*b*
υ Pegasi . . .	19 49,97	22 45,04	15	−0,26	54,81	*b*	20 50,83	16	+4,10	4,96	*b*
72 Pegasi . .	28 26,54	31 21,55	9	−0,14	54,87	*b*	29 27,45	17	+4,10	5,01	*b*
ι Andromedæ .	32 41,70	35 36,37	12	+0,12	54,79	*b*	33 42,47	16	+4,23	5,00	*a*
		West.									
ψ Andromedæ	23 40 32,21	23 43 28,42	15	−1,36	54,85	*b*	23 41 39,29	17	−2,03	5,05	*b*
ϱ Cassiopejæ .	48 51,14	51 47,26	15	−1,35	54,77	*a*	49 59,53	17	−3,39	5,00	*b*
α Andromedæ	0 2 38,61	0 5 34,78	15	−1,41	54,76	*b*	0 3 44,58	17	−0,92	5,05	*a*
θ Andromedæ	11 17,38	14 13,51	15	−1,37	54,76	*b*	12 23,90	16	−1,44	5,08	*b*
		1888. September 7.									
		West.									
70 Cygni . .	21 22 49,92	21 25 46,65	15	−1,26	−2 55,47	*b*	21 24 6,05	17	−1,20	−1 14,93	*b*
74 Cygni . .	32 30,23	35 26,97	15	−1,25	55,49	*c*	33 46,60	17	−1,40	14,97	*b*
π' Cygni . .	38 10,03	41 6,72	15	−1,23	55,46	*b*	39 27,30	17	−2,29	14,98	*b*
π^2 Cygni . .	42 42,28	45 38,94	15	−1,23	55,43	*b*	43 59,37	17	−2,10	14,99	*b*
		Ost.									
μ Cephei . .	21 51 10,52	21 54 5,34	14	+0,56	55,38	*b*	21 52 20,89	17	+4,64	15,01	*a*
B. A. C. 7679	58 11,31	22 1 6,67	15	+0,10	55,46	*b*	59 22,23	17	+4,19	15,11	*b*
π^2 Pegasi . .	22 5 3,44	7 59,06	15	−0,09	55,53	*c*	22 6 14,46	17	+4,07	15,07	
3 Lacertæ . .	19 12,56	22 7,62	15	+0,38	55,44	*b*	20 23,21	17	+4,43	15,08	
τ Pegasi . . .	23 15 8,24	23 18 3,96	15	−0,20	55,52	*b*	23 16 19,56	17	+4,02	15,34	
υ Pegasi . . .	19 49,94	22 45,78	15	−0,21	55,63	*b*	21 1,36	17	+4,02	15,44	*a*
72 Pegasi . .	28 26,54	31 22,23	15	−0,10	55,59	*b*	29 37,93	16	+4,04	15,43	*a*
ι Andromedæ .	32 41,72	35 37,15	12	+0,14	55,57	*b*	33 52,90	17	+4,18	15,36	*a*
		West.									
ψ Andromedæ	23 40 32,23	23 43 29,14	15	−1,22	55,69		23 41 49,53	17	−1,85	15,45	*a*
ϱ Cassiopejæ .	48 51,14	51 48,01	15	−1,20	55,67	*b*	50 9,79	17	−3,11	15,54	*b*
α Andromedæ	0 2 38,64	0 5 35,51	15	−1,27	55,60	*c*	0 3 54,91	17	−0,81	15,46	*b*
θ Andromedæ	11 17,42	14 14,28	15	−1,24	55,62	*b*	12 34,24	17	−1,29	15,53	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		1888. September 14.									
		West.									
τ Pegasi . . .	$23^h 15^m 8^s,27$	$23^h 18^m 10^s,80$	17	$-5^s,35$	$-2^m 57^s,18$	*b*	$23^h 16^m 57^s,38$	9	$+0^s,28$	$-1^m 49^s,39$	*b*
υ Pegasi . . .	19 50,00	22 52,59	17	−5,35	57,24	*b*	21 39,15	15	+0,28	49,43	*b*
72 Pegasi . .	28 26,60	31 28,94	17	−5,14	57,20	*a*	30 15,91	15	+0,16	49,47	*b*
ι Andromedæ .	32 41,75	35 43,76	17	−4,83	57,18	*a*	34 31,35	15	−0,11	49,49	*b*
		Ost.									
ψ Andromedæ	23 40 32,30	23 43 27,81	17	+1,74	57,25		23 42 20,41	15	+1,46	49,57	*b*
ϱ Cassiopejæ .	48 51,25	51 44,73	17	+3,80	57,28	*a*	50 39,36	15	+1,45	49,56	*b*
α Andromedæ	0 2 38,70	0 5 36,00	17	−0,02	57,28	*a*	0 4 26,88	15	+1,51	49,69	*c*
θ Andromedæ	11 17,50	14 13,91	17	+0,82	57,23	*b*	13 5,68	15	+1,48	49,66	*b*
ν Piscium . .	1 13 21,33	1 16 18,83	15	−0,22	57,28		1 15 9,76	15	+1,43	49,88	*b*
δ Cassiopejæ .	18 33,76	21 26,67	17	+4,45	57,36		20 22,30	15	+1,29	49,83	*c*
A Andromedæ	23 26,39	26 22,02	16	+1,76	57,39		25 15,00	15	+1,33	49,96	*b*
υ Persei . . .	31 10,49	34 5,84	16	+2,01	57,36	*b*	32 59,10	15	+1,33	49,96	*b*
		West.									
φ Persei . . .	1 36 41,96	1 39 44,08	17	−4,74	57,38	*c*	1 38 32,41	15	−0,49	49,98	*b*
α Trianguli .	46 44,53	49 47,13	17	−5,23	57,37	*c*	48 34,30	15	+0,09	49,88	*c*
γ Andromedæ	57 4,51	2 0 6,78	17	−4,93	57,34	*c*	58 54,76	15	−0,21	50,06	*c*
β Trianguli .	2 2 55,57	5 58,00	17	−5,10	57,33	*d*	2 4 45,48	15	−0,02	49,91	*c*
		1888. September 27.									
		Ost.									
ν Piscium . .	1 13 21,52	1 16 26,03	17	−3,49	−3 1,02	*b*	1 16 15,83	15	+1,58	−2 55,89	*b*
δ Cassiopejæ .	18 34,06	21 30,21	17	+4,88	1,03	*a*	21 28,50	15	+1,48	55,92	*b*
A Andromedæ	23 26,77	26 27,59	11	+0,17	0,99	*a*	26 21,10	15	+1,49	55,82	*b*
		West.									
φ Persei . . .	1 36 42,24	1 39 49,57	17	−6,38	0,95	*a*	1 39 38,53	15	−0,45	55,84	*b*
α Trianguli .	46 44,77	49 54,44	17	−8,72	0,95	*a*	49 40,48	15	+0,15	55,86	*b*
γ Andromedæ	57 4,80	2 0 13,19	17	−7,43	0,96	*b*	2 0 0,96	15	−0,16	56,00	*c*
β Trianguli .	2 2 55,84	6 4,98	17	−8,19	0,95	*b*	5 51,68	15	+0,03	55,87	*c*
		1888. September 28.									
		Ost.									
τ Pegasi . . .	23 15 8,28	23 18 13,11	6	−3,79	−3 1,04	*b*	23 18 7,19	15	+1,50	−3 0,41	*c*
υ Pegasi . . .	19 50,00	22 54,93	16	−3,84	1,09	*b*	22 49,04	15	+1,50	0,54	*c*
72 Pegasi . .	28 26,61	31 30,35	17	−2,72	1,02	*b*	31 25,68	15	+1,45	0,52	*b*
ι Andromedæ .	32 41,78	35 43,25	17	−0,48	0,99	*b*	35 40,89	15	+1,37	0,48	*c*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		1888. September 28.									
		West.									
ψ Andromedæ	$23^h 40^m 32^s,32$	$23^h 43^m 40^s,12$	17	$-6^s,69$	$-3^m 1^s,11$	*b*	$23^h 43^m 33^s,26$	15	$-0^s,43$	$3^m 0^s,51$	*c*
ϱ Cassiopejæ	48 51,28	51 57,19	17	−4,94	0,97		51 52,96	14	−0,99	0,75	*c*
α Andromedæ	0 2 38,78	0 5 48,55	17	−8,57	1,20	*a*	0 5 39,27	15	+0,05	0,54	*b*
θ Andromedæ	11 17,55	14 26,40	17	−7,61	1,24	*c*	14 18,35	15	−0,18	0,62	*b*
		1889. Juni 25.									
		Ost.									
θ Herculis	17 52 28,74	17 53 43,47	14	−1,13	−1 13,60	*b*	17 52 27,81	13	+0,70	+0 0,23	*c*
		West.									
α Lyræ	18 33 12,89	18 34 27,20	14	−0,80	13,51		18 33 12,63	15	−0,24	0,50	*b*
ε' Lyræ	40 41,70	41 56,29	17	−0,77	13,82	*b*	40 41,64	15	−0,25	0,31	*b*
β Lyræ	46 0,88	47 15,60	17	−0,98	13,74	*b*	46 0,58	15	−0,22	0,52	*c*
δ Cygni	19 41 32,51	19 42 46,67	17	−0,53	13,63	*cd*	19 41 32,33	15	−0,37	0,55	*b*
B. A. C. 6817	46 50,83	48 5,21	17	−0,72	13,66	*cd*	46 50,61	15	−0,33	0,55	*b*
η Cygni	52 10,54	53 25,14	12	−0,92	13,68	*c*	52 10,20	15	−0,30	0,64	*b*
		Ost.									
31 Cygni	20 10 10,30	20 11 24,62	10	−0,79	13,53	*b*	20 10 9,07	15	+0,70	0,53	*b*
α Cygni	37 40,87	38 55,34	17	−0,85	13,62	*d*	37 39,73	15	+0,69	0,45	*c*
		1889. Juni 27.									
		Ost.									
θ Herculis	17 52 28,75	17 53 45,61	17	−1,30	−1 15,56	*c*	17 52 26,53	15	+0,38	+0 1,84	*a*
B. A. C. 6129	18 0 17,22	18 1 33,73	16	−0,91	15,60	*c*	18 0 14,89	15	+0,48	1,85	*a*
104 Herculis	7 45,44	9 2,53	17	−1,47	15,62	*b*	7 43,35	15	+0,34	1,75	*b*
Gr. 2533	12 13,62	13 30,54	15	−1,15	15,77		12 11,50	15	+0,42	1,70	*b*
		West.									
b Draconis	18 22 20,12	18 23 35,89	17	−0,10	15,67	*c*	18 22 18,97	15	−0,75	1,90	*a*
α Lyræ	33 12,91	34 29,52	17	−1,09	15,52	*d*	33 11,45	15	−0,53	1,98	*b*
ε' Lyræ	40 41,72	41 58,58	17	−1,05	15,81	*bc*	40 40,41	15	−0,50	1,85	*b*
β Lyræ	46 0,90	47 17,80	17	−1,26	15,64	*b*	45 59,37	15	−0,46	2,08	*b*
δ Cygni	19 41 32,55	19 42 49,15	17	−0,89	15,71	*c*	19 41 31,20	15	−0,63	1,98	*b*
B. A. C. 6817	46 50,82	48 7,55	17	−1,05	15,68	*c*	46 49,39	7	−0,60	2,08	*b*
η Cygni	22 10,51	53 27,40	17	−1,23	15,66	*c*	52 9,04	15	−0,56	2,03	*b*
25 Cygni	55 52,88	57 9,79	11	−1,17	15,74	*bc*	55 51,60	5	−0,57	1,85	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		1889. Juni 27.									
		Ost.									
o' sq. Cygni .	$20^h\,10^m\,10^s,34$	$20^h\,11^m\,27^s,10$	17	$-1^s,01$	$-1^m\,15^s,75$		$20^h\,10^m\,7^s,98$	15	$+0^s,47$	$+0^m\,1^s,89$	*b*
γ Cygni . . .	18 16,68	19 33,63	17	−1,24	15,71		18 14,44	15	+0,35	1,89	*a*
		1889. Juni 30.									
		Ost.									
θ Herculis . .	17 52 28,76	17 53 48,65	17	−1,04	−1 18,85	*bc*	17 52 22,55	15	+0,38	+0 5,83	*b*
B. A. C. 6129	18 0 17,22	18 1 36,65	17	−0,59	18,84	*c*	18 0 10,93	15	+0,52	5,77	*b*
104 Herculis .	7 45,45	9 5,55	17	−1,23	18,87	*b*	7 39,30	15	+0,34	5,81	*b*
Gr. 2533 . .	12 13,63	13 33,49	17	−0,87	18,99	*b*	12 7,44	15	+0,44	5,75	*b*
		West.									
b Draconis . .	18 22 20,13	18 23 39,39	17	−0,33	18,93	*b*	18 22 14,53	15	−0,36	5,96	*b*
α Lyræ . . .	33 12,93	34 33,00	17	−1,23	18,84	*b*	33 7,26	15	−0,34	6,01	*b*
ε' Lyræ . . .	40 41,75	42 2,05	17	−1,21	19,09	*b*	40 36,22	15	−0,33	5,86	*b*
β Lyræ . . .	46 0,93	47 21,28	17	−1,41	18,94	*b*	45 55,15	15	−0,34	6,12	*b*
δ Cygni . . .	19 41 32,59	19 42 52,60	17	−1,10	18,91	*b*	19 41 26,94	10	−0,45	6,10	*c*
B. A. C. 6817	46 50,81	48 11,06	17	−1,25	19,00	*b*	46 45,25	10	−0,44	6,00	*b*
η Cygni . . .	52 10,56	53 30,91	17	−1,42	18,93	*b*	52 4,84	14	−0,43	6,15	*b*
25 Cygni . .	55 52,93	57 13,32	15	−1,36	19,03	*bc*	55 47,30	13	−0,43	6,06	*b*
		Ost.									
o' sq. Cygni .	20 10 10,40	20 11 30,06	15	−0,76	18,90		20 10 3,89	14	+0,37	6,14	*c*
γ Cygni . . .	18 16,74	19 36,66	17	−1,01	18,91	*bc*	18 10,35	15	+0,31	6,08	*b*
α Cygni . . .	37 40,98	39 0,83	17	−0,82	19,03	*c*	37 34,48	9	+0,35	6,15	*c*
		Beobachter: Larssén.					Rosén.				
		1889. Juli 9.									
		Ost.									
θ Herculis . .	17 52 28,75	17 53 57,27	14	+0,32	−1 28,84	*b*	17 52 20,52	17	−2,56	+0 10,79	*a*
B. A. C. 6129	18 0 17,22	18 1 45,73	7	+0,37	28,88	*b*	18 0 7,80	17	−1,39	10,81	*b*
104 Herculis .	7 45,49	9 14,15	13	+0,29	28,95	*bc*	7 37,73	8	−3,04	10,80	*c*
		West.									
b Draconis . .	18 22 20,09	18 23 49,57	15	−0,49	28,99	*b*	18 22 11,04	17	−1,84	10,89	*b*
α Lyræ . . .	33 12,96	34 42,15	15	−0,34	28,85	*c*	33 5,84	17	−3,86	10,98	*b*
ε' Lyræ . . .	40 41,78	42 11,10	15	−0,34	28,98	*b*	40 34,82	17	−3,80	10,76	*b*
β Lyræ . . .	46 0,98	47 30,10	15	−0,31	28,81	*b*	45 54,41	17	−4,23	10,80	*a*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Stockholm.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
		1889. Juli 9.									
		West.									
δ Cygni . . .	$19^h 41^m 32^s,69$	$19^h 43^m 1^s,97$	15	$-0^s,39$	$-1^m 28^s,89$		$19^h 41^m 25^s,24$	17	$-3^s,39$	$+0^m 10^s,84$	*a*
B. A. C. 6817	46 50,97	48 20,11	15	−0,36	28,78		46 43,90	17	−3,76	10,83	*b*
η Cygni . . .	52 10,67	53 39,89	1	−0,33	28,89		52 3,94	17	−4,14	10,87	*a*
25 Cygni . .	55 53,04	57 22,26	9	−0,35	28,87		55 46,26	14	−4,02	10,80	*c*
		Ost.									
o' sq. Cygni .	20 10 10,54	20 11 38,96	15	+0,34	28,76		20 10 1,37	17	−1,65	10,82	*a*
γ Cygni . . .	18 16,88	19 45,38	14	+0,30	28,80		18 8,33	17	−2,33	10,88	*a*
α Cygni . .	37 41,15	39 9,70	15	+0,33	28,88		37 32,03	17	−1,82	10,94	*a*
		1889. Juli 14									
		West.									
θ Herculis . .	17 52 28,73	17 54 1,70	15	−0,17	−1 32,80	*d*	17 52 19,04	17	−2,58	+0 12,27	*a*
B. A. C. 6129	18 0 17,22	18 1 50,26	11	−0,18	32,86	*b*	18 0 6,33	17	−1,44	12,33	*b*
104 Herculis .	7 45,51	9 18,42	15	−0,17	32,74	*b*	7 36,28	17	−3,05	12,28	*a*
Gr. 2533 . .	12 13,67	13 46,75	11	−0,16	32,92	*c*	12 3,55	17	−2,15	12,27	*a*
		Ost.									
α Lyræ . . .	18 33 12,96	18 34 45,24	15	+0,45	32,73	*d*	18 33 4,49	15	−3,91	12,38	*b*
ε' Lyræ . . .	40 41,80	42 14,25	10	+0,45	32,90	*c*	40 33,43	17	−3,85	12,22	
β Lyræ . . .	46 0,99	47 33,38	15	+0,40	32,79	*c*	45 53,00	17	−4,27	12,26	*a*
δ Cygni . . .	19 41 32,72	19 43 4,96	12	+0,36	32,60	*c*	19 41 23,93	17	−3,56	12,35	*a*
η Cygni . . .	52 10,73	53 43,17	8	+0,30	32,74	*b*	52 2,64	17	−4,25	12,34	*a*
25 Cygni . .	55 53,10	57 25,57	2	+0,31	32,78	*b*	55 44,99	9	−4,13	12,24	*a*
		West.									
o' sq. Cygni .	20 10 10,59	20 11 43,81	15	−0,33	32,89	*b*	20 10 0,10	17	−1,79	12,28	*a*
γ Cygni . . .	18 16,94	19 50,08	15	−0,29	32,85	*b*	18 7,06	17	−2,44	12,32	*a*
α Cygni . . .	37 41,22	39 14,37	13	−0,32	32,83	*d*	37 30,84	17	−1,96	12,34	*a*

Endresultate der Zeitbestimmungen in Stockholm.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1888 Aug. 31	I	W	4	21^h37^m	$-2^m50^s,80$	21^h52^m	$-2^m50^s,82$	$-0^s,016$
		O	3	22 8	— 50,84			
	II	O	4	23 27	— 50,85	23 44	— 50,85	
		W	3	0 1	— 50,86			
Sept. 5	I	O	4	23 27	— 54,82	23 43	— 54,80	——
		W	4	23 59	— 54,78			
» 7	I	W	4	21 37	— 55,46	21 52	— 55,45	$-0,087$
		O	4	22 6	— 55,45			
	II	O	4	23 27	— 55,58	23 43	— 55,61	
		W	4	23 59	— 55,64			
» 14	I	W	4	23 27	— 57,20	23 43	— 57,23	$-0,062$
		O	4	23 58	— 57,26			
	II	O	4	1 25	— 57,35	1 40	— 57,35	
		W	4	1 54	— 57,36			
» 27	II	O	3	1 21	-3 1,01	1 37	-3 0,98	——
		W	4	1 54	— 0,95			
» 28	I	O	4	23 27	— 1,04	23 43	— 1,09	——
		W	4	23 59	— 1,13			
1889 Juni 25	I	O	1	17 52	-1 13,60	18 16	-1 13,65	$+0,017$
		W	3	18 40	— 13,69			
	II	W	3	19 48	— 13,66	20 6	— 13,62	
		O	2	20 25	— 13,58			
» 27	I	O	4	18 5	— 15,64	18 20	— 15,65	$-0,035$
		W	4	18 36	— 15,66			
	II	W	4	19 50	— 15,70	20 3	— 15,71	
		O	2	20 16	— 15,73			
30	I	O	4	18 5	— 18,89	18 20	— 18,92	$-0,022$
		W	4	18 36	— 18,95			
	II	W	4	19 50	— 18,97	20 6	— 18,96	
		O	3	20 23	— 18,95			
Juli 9	I	O	3	18 1	— 28,89	18 20	— 28,90	$+0,033$
		W	4	18 38	— 28,91			
	II	W	4	19 51	— 28,86	20 7	— 28,84	
		O	3	20 23	— 28,81			

Endresultate der Zeitbestimmungen in Stockholm.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1889 Juli 14	I	W	4	$18^h\ 5^m$	$-1^m32',88$	18^h23^m	$-1^m32',84$	$+0',035$
		O	3	18 41	— 32,81			
	II	O	3	19 51	— 32,71	20 7	— 32,78	
		W	3	20 23	— 32,86			

Endresultate der Zeitbestimmungen in Hernösand.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1888 Aug. 31	I	O	4	21^h35^m	$-0^m39',20$	21^h50^m	$-0^m39',25$	$-0',227$
		W	3	22 6	— 39,30			
	II	W	4	23 25	— 39,62	23 41	— 39,67	
		O	3	23 58	— 39,72			
Sept. 5	I	O	4	23 25	— 1 4,98	23 41	— 1 5,01	(— 0,227)
		W	4	23 58	— 5,04			
» 7	I	W	4	21 35	— 14,97	21 50	— 15,02	— 0,227
		O	4	22 5	— 15,07			
	II	O	4	23 25	— 15,39	23 41	— 15,44	
		W	4	23 58	— 15,49			
14	I	W	4	23 26	— 49,44	23 42	— 49,53	— 0,207
		O	4	23 58	— 49,62			
	II	O	4	1 23	— 49,91	1 38	— 49,93	
		W	4	1 53	— 49,96			
» 27	II	O	3	1 21	— 2 55,88	1 38	— 2 55,87	(— 0,200)
		W	4	1 54	— 55,87			
» 28	I	O	4	23 27	— 3 0,49	23 43	— 3 0,55	(— 0,200)
		W	4	23 59	— 0,61			
1889 Juni 25	I	O	1	17 52	+ 0 0,23	18 16	+ 0 0,34	+ 0,105
		W	3	18 40	+ 0,44			
	II	W	3	19 46	+ 0,58	20 5	+ 0,53	
		O	2	20 24	+ 0,49			
» 27	I	O	4	18 3	+ 1,78	18 20	+ 1,86	+ 0,036
		W	4	18 36	+ 1,94			
	II	W	4	19 49	+ 1,95	20 1	+ 1,92	
		O	2	20 14	+ 1,89			

Endresultate der Zeitbestimmungen in Hernösand.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stundlicher Gang.
1889 Juni 30	I	O	4	$18^h\ 3^m$	$+ 0^m\ 5^s,79$	$18^h 20^m$	$+ 0^m\ 5^s,89$	$+ 0^s,120$
		W	4	18 36	+ 5,99			
	II	W	4	19 49	+ 6,08	20 5	+ 6,10	
		O	3	20 22	+ 6,12			
Juli 9	I	O	3	18 0	+ 10,80	18 17	+ 10,83	+ 0,017
		W	4	18 35	+ 10,86			
	II	W	4	19 49	+ 10,84	20 5	+ 10,86	
		O	3	20 22	+ 10,88			
14	I	W	4	18 3	+ 12,29	18 22	+ 12,29	+ 0,012
		O	3	18 40	+ 12,29			
	II	O	3	19 50	+ 12,31	20 6	+ 12,31	
		W	3	20 22	+ 12,31			

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.
		Stockholm.	Hernösand.		
1888 Aug. 31	$21^h\ 1^m$	$+2^m36^s,10$	$+ 2^m36^s,14$	$+2^m36^s,12$	$+ 0^s,02$
	22 50	35,78	35,80	35,79	+ 0,01
	22 54	35,77	35,78	35,77 .	+ 0,005
	0 52	35,41	35,42	35,41 .	+ 0,005
Sept. 5	22 58	2 14,31	2 14,34	2 14,32 .	+ 0,015
	0 52	13,93	13,96	13,94 .	+ 0,015
» 7	21 2	2 4,96	2 4,98	2 4,97	+ 0,01
	22 52	4,61	4,62	4,61 .	+ 0,005
	23 0	4,58	4,60	4,59	+ 0,01
	0 53	4,20	4,21	4,20 .	+ 0,005
» 14	22 59	1 32,40	1 32,44	1 32,42	+ 0,02
	0 50	32,10	32,13	32,11 .	+ 0,015
	0 56	32,09	32,12	32,10 .	+ 0,015
	2 44	31,73	31,75	31,74	+ 0,01
27	0 54	1 29,80	1 29,83	1 29,81 .	+ 0,015
	2 42	29,44	29,47	29,45 .	+ 0,015

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.
		Stockholm.	Hernösand.		
1888 Sept. 28	23h 0m	+1m25s,30	+1m25s,33	+1m25s,31 .	+ 0s,015
	0 49	24,96	24,98	24,97	+ 0,01
1889 Juni 25	17 37	1 38,52	1 38,55	1 38,53 .	+ 0,015
	19 13	38,60	38,62	38,61	+ 0,01
	19 23	38,61	38,64	38,62 .	+ 0,015
	21 9	38,70	38,75	38,72 .	+ 0,025
» 27	17 37	1 41,98	1 42,01	1 41,99 .	+ 0,015
	19 13	42,01	42,05	42,03	+ 0,02
	19 23	42,04	42,07	42,05 .	+ 0,015
	21 7	42,10	42,13	42,11 .	+ 0,015
» 30	17 37	1 49,31	1 49,35	1 49,33	+ 0,02
	19 13	49,46	49,50	49,48	+ 0,02
	19 23	49,37	49,42	49,39 .	+ 0,025
Juli 9	17 38	2 3,93	2 3,96	2 3,94 .	+ 0,015
	19 14	4,11	4,13	4,12	+ 0,01
	19 24	4,11	4,13	4,12	+ 0,01
	21 11	4,16	4,14	4,15	——
14	17 43	2 9,46	2 9,49	2 9,47 .	+ 0,015
	19 14	9,52	9,55	9,53 .	+ 0,015
	19 24	9,52	9,56	9,54	+ 0,02
	21 9	9,62	9,66	9,64	+ 0,02

Ableitung der Endresultate.

Datum.	Sterngruppe.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen.	Uhrstand		Zahl der Zeitsterne.	Längendifferenzen		Persönliche Gleichung.	Definitive Längendifferenz.	Gewicht.
				in Stockholm.	in Hernösand.		aus den Gruppen.	aus den Tagesresultaten.			
1888 Aug. 31	I	21h55m	+2m35s,95	−2m50s,82	−0m39s,27	7	0m24s,40	0m24s,42.	+ 0s,07	0m24s,49.	30
	II	23 53	35,59	50,85	39,71	7	24,45				
Sept. 5	I	23 55	2 14,18	−2 54,80	−1 5,05	8	24,38	24,38	+ 0,07	24,45	24
» 7	I	21 57	2 4,79	−2 55,46	−1 15,04	8	24,37	24,31.	+ 0,07	24,38.	32
	II	23 57	4,40	55,68	15,49	8	24,26				

Ableitung der Endresultate.

Datum.	Stellung.	Uhrzeit in Stockholm.	Uhrdifferenzen aus den Signalen.	Uhrstand in Stockholm.	Uhrstand in Hernösand.	Zahl der Zeitsterne.	Längendifferenzen aus den Gruppen.	Längendifferenzen aus den Tagesresultaten.	Persönliche Gleichung.	Definitive Längendifferenz.	Gewicht.
1888 Sept. 14	I	23^h55^m	$+1^m32^s,27$	$-2^m57^s,24$	$-1^m49^s,57$	8	$0^m24^s,60$	$0^m24^s,56$.	$-0^s,07$	$0^m24^s,49$.	32
	II	1 50	31,92	57,36	49,97	8	24,53				
» 27	II	1 48	1 29,64	−3 0,99	−2 55,90	7	24,55	24,55	−0,07	24,48	23
» 28	I	23 55	1 25,14	−3 1,09	−3 0,58	8	24,63	24,63	−0,07	24,56	24
1889 Juni 25	I	18 25	1 38,57	−1 13,65	+0 0,36	4	24,56	24,53	−0,07	24,46	25
	II	20 16	38,67	13,62	0,55	5	24,50				
» 27	I	18 25	1 42,01	−1 15,65	+0 1,86	8	24,50	24,47	−0,07	24,40	30
	II	20 15	42,09	15,72	1,93	6	24,44				
» 30	I	18 25	1 49,40	−1 18,92	+0 5,90	8	24,58	24,51	−0,07	24,44	31
	II	19 23	49,40	18,94	6,02	7	24,44				
Juli 9	I	18 26	2 4,03	−1 28,90	+0 10,83	7	24,30	24,37	+0,07	24,44	30
	II	20 17	4,13	28,83	10,86	7	24,44				
» 14	I	18 28	2 9,51	−1 32,84	+0 12,29	7	24,38	24,45	+0,07	24,52	29
	II	20 17	9,59	32,77	12,31	6	24,51				

Es war ursprünglich die Absicht auch eine Beobachtung vom 5 Juli 1889 zu benutzen. Da aber bei näherer Untersuchung nur sechs von den beobachteten Zeitsternen und ein Polstern bei beiden Stationen dieselben waren und auch andere ungünstige Verhältnisse statt fanden, wurde diese sehr unvollständige Beobachtung ausgeschlossen.

Wenn man die obigen Tagesresultate nach Maassgabe ihrer beigefügten Gewichte zu einem Mittelwerth vereinigt, bekommt man für die Längendifferenz der Beobachtungspfeiler in Stockholm und Hernösand den folgenden Werth nebst dessen wahrscheinlichem Fehler:

$$0^m\,24^s,464 \pm 0^s,010\,.$$

Für den Unterschied der persönlichen Gleichung der beiden Beobachter wird aus denselben Tagesresultaten herauskommen:

$$\text{Rosén} - \text{Larssén} = +0^s,140\,.$$

Da der Beobachtungspfeiler in Hernösand $0^s,930$ westlich vom Hauptdreieckspunkte Hernö und derjenige in Stockholm $0^s,010$ östlich vom Meridiankreise der Sternwarte gelegen ist, so ergiebt sich für die bezüglichen Punkte der definitive Längenunterschied:

Stockholm (Meridiankreis) — **Hernö** (Marke) = $\mathbf{0^m\,23^s,524 \pm 0^s,010}$.

Bestimmung der Längendifferenz zwischen Hernö und Torneå im Jahre 1889.

Diese Längenbestimmung wurde in der Zeit vom 29 Juli bis 30 August unter etwas ungünstigen Witterungsverhältnissen ausgeführt.

Nachdem eine Zelthütte im Garten eines Landgutes, Kopukka, sehr nahe Haparanda errichtet und dort ein Beobachtungspfeiler aufgebaut worden war, wurden die Beobachtungen auf den beiden Stationen unmittelbar nach den beendigten Längenbestimmungen zwischen Hernösand und Stockholm angefangen. Für die Reduction der Beobachtungen in Kopukka auf dem Dreieckspunkt Torneå Landkirche, welcher der Russisch-Skandinavischen Gradmessung gehört, wurden auf dem Beobachtungspfeiler des Passageninstrumentes horizontale Richtungsbeobachtungen nach den aus dem »Arc du Meridien» bekannten Punkten Torneå Stadtkirche, Torneå Landkirche und Kokkomäki ausgeführt.

In folgender Zusammenstellung sind sowohl die Resultate der Horizontalwinkelmessung auf Kopukka als auch die aus »Arc du Meridien» erhaltenen Daten mitgetheilt, wodurch die für die fraglichen Reductionen nöthigen Entfernungen und Winkel nach der Pothenotischen Methode zu bekommen sind.

Kopukka: Beobachtungspfeiler des Passageninstrumentes:

Torneå Stadtkirche	0° 0′ 0″,0
Torneå Landkirche	78 42 56 ,0
Kokkomäki	119 1 30 ,5

Torneå Landkirche: Thurm, Hauptdreieckspunkt:

	Entfernung:	Azimuth:
Torneå Stadtkirche	2327,29 Meter	344° 25′ 4″,2
Kokkomäki	1167,81	140 25 14 ,3

In Hernösand wurde wie vorher das KULLBERG'sche Pendel und in Kopukka das KESSEL'sche Sternzeitchronometer N:o 1296 als Normaluhren gebraucht.

Die Wechselung der Stationen, welche nur einmal stattfand, war für die Beobachter folgende:

1889 Juli 29, 30, 31, August 1 beobachtete LARSSÉN in Hernösand und ROSÉN in Kopukka
August 11, 17, 20, 30 » » » Kopukka » » in Hernösand.

Positionen der beobachteten Sterne.

Sterne.	Grösse.	α	δ	Quelle.
Polsterne: Mittlere Oerter. 1889,0.				
τ Draconis	4,8	$19^h17^m41^s,09$	73° 8′ 57″	Berl. Jahrb.
$\varkappa$ Cephei	4,3	20 12 36,86	77 22 36	»
73 Draconis	5,3	20 32 57,94	74 34 27	»
77 »	5,8	21 7 42,43	77 40 34	»
β Cephei	3,0	21 27 13,60	70 4 24	»
B. A. C. 7510	5,5	21 28 3,93	80 2 33	Beob.
24 Cephei	4,8	22 7 40,31	71 47 40	Berl. Jahrb.
28	5,5	22 25 52,00	78 13 9	Stockholm.
31 »	5,1	22 33 1,69	73 4 1	Berl. Jahrb.
γ »	3,3	23 34 47,76	77 0 46	»
B. A. C. 8314	6,5	23 49 26,84	73 47 31	Yarnall.
Polaris	2,0	1 18 7,67	88 42 59	Berl. Jahrb.
Zeitsterne: Mittlere Oerter. 1889,0.				
ι Cygni	4,1	19 26 54,47	51 29 36	Berl. Jahrb.
ϑ »	4,6	19 33 27,89	49 57 51	»
δ »	2,8	19 41 30,37	44 51 36	
B. A. C. 6817	5,0	19 46 48,69	40 19 2	Yarnall.
ψ Cygni	5,2	19 52 45,60	52 8 40	Berl. Jahrb.
b^2	5,0	20 5 18,45	36 30 46	Yarnall.
33 »	4,3	20 10 49,10	56 13 41	Berl. Jahrb.
γ »	2,4	20 18 14,71	39 54 6	
ω^3 »	5,0	20 27 53,35	48 50 45	Yarnall.
α »	1,6	20 37 38,89	44 53 2	Berl. Jahrb.
λ »	4,6	20 43 5,08	36 4 59	»
ν »	4,0	20 53 2,11	40 44 24	»
ξ »	4,0	21 0 53,64	43 29 6	»
ζ »	3,0	21 8 12,71	29 46 18	»
σ »	4,5	21 13 3,42	38 55 47	Yarnall.
70 »	6,0	21 22 49,84	36 58 4	»
74 »	5,0	21 32 30,00	39 54 54	Berl. Jahrb.
π'	5,0	21 38 9,30	50 40 59	Yarnall.
π^2 »	4,3	21 42 41,58	48 47 46	Berl. Jahrb.
μ Cephei	5,7	21 51 9,25	56 4 49	Yarnall.
B. A. C. 7679	6,0	21 58 10,99	42 30 0	Beob.
20 Cephei	5,8	22 1 38,04	62 14 39	Berl. Jahrb.
π Pegasi	4,2	22 5 3,47	32 38 2	»
3 Lacerte	4,4	22 19 11,70	51 40 23	»
7 »	4,0	22 26 43,11	49 42 43	»
10 »	5,0	22 34 16,84	38 28 22	»
13 »	6,0	22 39 8,46	41 14 12	»
15 »	5,5	22 47 1,62	42 43 19	Beob.
o Andromedæ	3,6	22 56 48,85	41 43 46	Berl. Jahrb.
4 »	5,5	23 2 34,81	45 39 11	Beob.
Br. 3077	6,0	23 7 56,33	56 33 20	Berl. Jahrb.

Positionen der beobachteten Sterne.

Sterne.	Grösse.	α	δ	Quelle.
β Cassiopejæ	2,1	$0^h\ 3^m15^s,38$	58° 32′ 15″	Berl. Jahrb.
θ Andromedæ	5,5	0 11 17,39	38 3 56	Yarnall.
$\varkappa$ Cassiopejæ	4,3	0 26 41,65	62 19 8	Berl. Jahrb.
ξ »	4,0	0 30 47,34	53 17 9	
o »	5,0	0 38 32,42	47 40 36	
η »	3,8	0 42 23,03	57 13 38	
γ »	2,0	0 50 0,69	60 6 55	
β Andromedæ	2,3	1 3 31,08	35 1 55	

Instrumentfehler.

Die Collimationen und Azimuthe

beim REPSOLD'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**	Bemerkungen.
Hernösand .	1889 Juli 29	73 Draconis .	9	c	$-0^s,313$		$-0^s,42$		
		77 » .	6	b	——	$-0^s,307$	+ 0,03	$-0^s,228$	Nur in Ost.
		31 Cephei . .	3		——		− 0,41		Nur in West.
		28 » . .	9	a	− 0,301		——		
	30	τ Draconis . .	14	a	− 0,252		− 0,16		
		73 » . .	9	a	− 0,259		− 0,18		
		77 » . .	14	a	− 0,278	− 0,278	− 0,17	− 0,203	
		28 Cephei . .	14	a	− 0,335		——		
		31 » . .	6	a	− 0,267		− 0,26		
	31	τ Draconis . .	14	a	− 0,294		− 0,30		
		73 » . .	14	a	− 0,277		− 0,12		
		77 » . .	11	a	− 0,269	− 0,296	− 0,26	− 0,221	
		28 Cephei . .	12	b	− 0,332		——		
		31 » . .	5	a	− 0,309		− 0,21		
	Aug. 1	τ Draconis . .	14	b	− 0,262		− 0,06		
		77 » . .	14	a	− 0,316	− 0,307	− 0,21	− 0,122	
		28 Cephei . .	11	b	− 0,344		——		
		31 » . .	7	b	——		− 0,13		Nur in Ost.
Haparanda .	» 11	$\varkappa$ Cephei . .	9	b	− 0,246		− 0,26		
		B. A. C. 7510	13	a	− 0,244	− 0,252	− 0,26	− 0,264	
		24 Cephei . .	7	a	——		− 0,24		Nur in West.
		γ » . .	14	a	− 0,267		− 0,27		
	» 17	$\varkappa$ Cephei . .	14	b	− 0,254	− 0,278	− 0,03	− 0,182	
		β » . .	14	a	− 0,302		− 0,49		
	20	$\varkappa$ Cephei . . .	14	c	− 0,228		+ 0,03		
		β » . . .	13	c	− 0,276	− 0,289	− 0,39	− 0,123	
		24 » . . .	14	a	− 0,350		+ 0,05		
		γ » .	15	b	− 0,301		− 0,23		
»	» 30	$\varkappa$ Cephei . .	13	b	− 0,286		+ 0,11		
		β » . . .	14	c	− 0,305	− 0,249	− 0,25	− 0,084	
		α Ursæ minor.	42	b	− 0,155		− 0,16		

Die Collimationen und Azimuthe beim Herbst'schen Passageninstrumente sind:

Station.	Datum.	Sterne.	Zahl der Fäden.	Bild.	Beobachtete Collimation.	Angewandte **Collimation.**	Beobachtetes Azimuth.	Angewandtes **Azimuth.**	Bemerkungen.
Haparanda .	1889 Juli 29	τ Draconis . .	9	*b*	— 0ˢ,062		——		
		73 » . .	16	*a*	— 0,057	— 0ˢ,090	— 1ˢ,84	— 1ˢ,981	
		77 » . .	12	*a*	— 0,114		— 1,95		
		31 Cephei . .	13	*a*	— 0,125		— 2,21		
»	» 30	τ Draconis . .	16	*a*	— 0,223		— 2,14	— 2,171	
		73 » . .	16	*b*	— 0,230	— 0,251	— 2,18		
		77 » . .	11	*a*	— 0,277		— 2,52	— 2,572	
		31 Cephei . .	14	*a*	— 0,274		— 2,64		
	31	τ Draconis . .	15	*a*	— 0,299		— 2,57		
		73 » . .	16	*a*	— 0,323	— 0,334	— 2,46	— 2,625	
		77 » . .	6	*b*	——		— 2,70		Nur in Ost.
		31 Cephei . .	15		— 0,379		— 2,81		
»	Aug. 1	τ Draconis . .	15	*c*	— 0,358		— 2,79		
		73 » . .	12	*b*	— 0,370	— 0,416	— 2,97	— 2,926	
		77 » . .	12	*b*	— 0,473		— 2,81		
		31 Cephei . .	15	*c*	— 0,463		— 3,10		
Hernösand .	» 11	$\varkappa$ Cephei . .	15	*c*	— 0,076		+ 1,10		
		B. A. C. 7510	14	*b*	— 0,095	— 0,058	+ 1,09	+ 0,983	
		24 Cephei . .	5	*c*	——		+ 0,85		Nur in West.
		γ » . .	15	*b*	— 0,004		+ 0,88		
»	» 17	$\varkappa$ Cephei . . .	14	*b*	+ 0,009	0,000	+ 1,24	+ 1,223	
		β » . . .	14	*a*	— 0,009		+ 1,19		
»	» 20	$\varkappa$ Cephei . . .	12	*b*	— 0,229		+ 1,19		
		β » . . .	13	*b*	— 0,250	— 0,224	+ 1,06	+ 1,097	
		24 » . . .	15	*b*	— 0,230		+ 1,12		
		γ » . . .	15	*a*	— 0,187		+ 1,01		
	» 30	$\varkappa$ Cephei . . .	16	*a*	+ 0,157		+ 1,16		
		β » . . .	14	*c*	+ 0,141	+ 0,155	+ 1,13	+ 1,104	
		Polaris . . .	19	*b*	+ 0,168		+ 1,01		

Neigungen beim Repsold'schen Passageninstrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Hernösand .	1889 Juli 29	+ 0ˢ,130	+ 0ˢ,122
.	» 30	+ 0,030	+ 0,021
.	31	— 0,062	— 0,125
.	Aug. 1	— 0,110	— 0,161
Haparanda .	» 11	+ 0,243	+ 0,257
» .	» 17	+ 0,104	——
» .	» 20	+ 0,040	+ 0,009
» .	» 30	+ 0,036	+ 0,007

Neigungen beim Herbst'schen Passageninstrumente.

Station.	Datum.	Gruppe I.	Gruppe II.
Haparanda .	1889 Juli 29	+ 0ˢ,072	+ 0ˢ,075
» .	» 30	— 0,071	— 0,080
» .	» 31	+ 0,021	+ 0,025
» .	Aug. 1	— 0,042	— 0,048
Hernösand .	» 11	— 0,099	— 0,101
» .	» 17	+ 0,036	——
» .	» 20	+ 0,085	+ 0,065
» .	» 30	+ 0,050	— 0,011

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Haparanda.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild
		Beobachter: Rosén.					Larssén.				
		Juli 29.									
		Ost.									
74 Cygni . .	$21^h32^m32^s,34$	$21^h32^m54^s,51$	17	$-0^s,92$	$-21^s,25$	*a*	$21^h32^m16^s,27$	15	$+0^s,44$	$+15^s,63$	*b*
π' Cygni . .	38 11,94	38 33,67	17	−0,57	21,16	*a*	37 55,57	15	+0,60	15,77	*b*
π^2 Cygni . .	42 44,15	43 6,01	17	−0,63	21,23	*a*	42 27,89	15	+0,57	15,69	*a*
		West.									
μ Cephei . .	21 51 12,10	21 51 34,01	17	−0,63	21,28	*b*	21 50 56,81	14	−0,38	15,67	*b*
B. A. C. 7679	58 13,35	58 35,69	2	−1,10	21,24		57 57,98	11	−0,37	15,74	*c*
π Pegasi . .	22 5 5,63	22 5 28,12	17	−1,33	21,16	*a*	22 4 5,31*	15	−0,37	15,76	*b*
3 Lacertæ . .	19 14,29	19 36,28	17	−0,81	21,18	*a*	19 58,96	12	−0,38	15,71	
		Juli 30.									
		West.									
ι Cygni . . .	19 26 56,98	19 27 17,85	14	−1,45	−19,42	*a*	19 26 41,20	15	−0,46	−16,24	*b*
ϑ Cygni . . .	33 30,37	33 51,28	16	−1,51	19,40	*b*	33 14,66	12	−0,45	16,16	*b*
δ Cygni . . .	41 32,74	41 53,74	17	−1,64	19,36	*b*	41 16,86	15	−0,44	16,32	*b*
B. A. C. 6817	46 50,99	47 12,16	17	−1,75	19,42	*b*	46 35,25	14	−0,42	16,16	*b*
		Ost.									
ψ Cygni . . .	19 52 48,20	19 53 8,33	17	−0,62	19,51	*b*	19 52 31,60	15	+0,44	16,16	*a*
b^2 Cygni . .	20 5 20,72	20 5 41,23	17	−1,21	19,30	*b*	20 5 4,24	2	+0,27	16,21	
33 Cygni . .	10 51,93	11 11,77	17	−0,39	19,45	*ab*	10 35,27	15	+0,51	16,15	*b*
γ Cygni . . .	18 17,05	18 37,59	17	−1,10	19,44		18 0,58	15	+0,30	16,17	*b*
74 Cygni . .	21 32 32,35	21 32 52,87	14	−1,11	19,41	*b*	21 32 15,83	15	+0,29	16,23	*a*
π' Cygni . .	38 11,95	38 31,93	12	−0,70	19,28	*b*	37 55,18	15	+0,40	16,37	*a*
π^2 Cygni . .	42 44,16	43 4,34	16	−0,80	19,38	*b*	42 27,49	15	+0,38	16,29	*b*
		West.									
μ Cephei . .	21 51 12,11	21 51 32,77	15	−1,31	19,35	*a*	21 50 56,48	15	−0,50	16,13	*a*
20 Cephei . .	22 1 41,29	22 2 1,66	14	−1,03	19,34	*b*	22 1 25,82	15	−0,55	16,02	*b*
π Pegasi . .	5 5,64	5 26,84	16	−1,92	19,28	*b*	4 49,75	14	−0,43	16,32	*b*
3 Lacertæ .	19 14,31	19 35,03	15	−1,46	19,26	*b*	18 58,56	15	−0,48	16,23	*b*
		Juli 31.									
		West.									
ι Cygni . . .	19 26 56,97	19 27 16,36	17	−1,56	−17,83	*b*	19 26 40,16	15	−0,65	+17,46	*a*
ϑ Cygni . . .	33 30,36	33 49,83	13	−1,61	17,86	*b*	33 13,53	15	−0,63	17,46	*a*
δ Cygni . . .	41 32,74	41 52,30	6	−1,77	17,79	*b*	41 15,84	15	−0,60	17,50	*b*
B. A. C. 6817	46 50,98	47 10,79	7	−1,90	17,91		46 34,20	15	−0,57	17,35	*a*

* π Pegasi = 27 Pegasi + 44^s,93.

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Haparanda.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Rosén.					Larssén.				
		Juli 31.									
		Ost.									
ψ Cygni . . .	$19^h52^m48^s,19$	$19^h53^m\ 6^s,59$	11	$-0^s,44$	$-17^s,96$	*b*	$19^h52^m30^s,40$	15	$+0^s,31$	$+17^s,48$	*a*
b^2 Cygni . . .	20 5 20,72	20 5 39,68	14	−1,16	17,80	*a*	20 5 2,94	15	+0,18	17,60	*b*
33 Cygni . .	10 51,93	11 9,91	9	−0,15	17,83	*b*	10 34,12	15	+0,38	17,43	*a*
γ Cygni . . .	18 17,05	18 35,93	16	−1,04	17,84	*b*	17 59,40	15	+0,21	17,44	*b*
74 Cygni . .	21 32 32,36	21 32 51,20	14	−1,03	17,81		21 32 14,68	15	+0,13	17,55	*a*
π' Cygni . .	38 11,96	38 30,25	12	−0,51	17,78		37 54,16	15	+0,21	17,59	*a*
π^2 Cygni . .	42 44,17	43 2,61	13	−0,62	17,82		42 26,43	15	+0,19	17,55	*b*
		West.									
μ Cephei . .	21 51 12,13	21 51 31,34	14	−1,36	17,85	*b*	21 50 55,58	13	−0,80	17,35	*a*
π Pegasi . . .	22 5 5,66	22 5 25,49	12	−2,08	17,75	*c*	22 4 48,70	15	−0,61	17,57	*a*
3 Lacertæ . .	19 14,32	19 33,57	15	−1,54	17,71		18 57,47	14	−0,75	17,60	*b*
		Aug. 1.									
		West.									
ι Cygni . . .	19 26 56,96	19 27 14,29	17	−1,89	−15,44	*c*	19 26 38,58	11	−0,70	+19,08	*b*
ϑ Cygni . . .	33 30,36	33 47,78	17	−1,93	15,49	*c*	33 11,98	7	−0,69	19,07	*a*
δ Cygni . . .	41 32,73	41 50,23	9	−2,10	15,40	*c*	41 14,30	6	−0,63	19,06	*b*
B. A. C. 6817	46 50,98	47 8,68	17	−2,23	15,47	*c*	46 32,55	4	−0,59	19,02	*b*
		Ost.									
ψ Cygni . . .	19 52 48,19	19 53 4,21	11	−0,50	15,52	*c*	19 52 28,78	4	+0,28	19,13	*b*
70 Cygni . .	21 22 52,16	21 23 8,78	13	−1,28	15,34	*b*	21 22 33,05	15	+0,13	18,98	*a*
74 Cygni . .	32 32,37	32 48,87	16	−1,15	15,35	*b*	32 13,27	15	+0,15	18,95	*a*
π' Cygni . .	38 11,97	38 27,83	14	−0,59	15,27	*b*	37 52,63	15	+0,19	19,15	*b*
π^2 Cygni . .	42 44,18	43 0,29	16	−0,71	15,40	*b*	42 24,95	15	+0,19	19,04	*b*
		West.									
μ Cephei . .	21 51 12,14	21 51 29,24	16	−1,69	15,41	*b*	21 50 54,10	15	−0,86	18,90	*b*
20 Cephei . .	22 1 41,32	22 1 58,14	17	−1,37	15,45	*c*	22 1 23,40	15	−1,01	18,93	*a*
π Pegasi . .	5 5,67	5 23,41	17	−2,40	15,34	*b*	4 47,17	13	−0,60	19,10	*b*
3 Lacertæ . .	19 14,34	19 31,55	16	−1,88	15,33	*c*	18 56,10	15	−0,78	19,02	*c*
		Beobachter: Larssén.					Rosén.				
		Aug. 11.									
		Ost.									
ω^3 Cygni . .	20 27 55,92	20 28 4,02	15	+0,61	−8,71	*a*	20 27 29,02	17	+0,30	+26,60	*b*
α Cygni . . .	37 41,37	37 49,65	15	+0,55	8,83	*b*	37 14,56	17	+0,37	26,44	*d*
λ Cygni . . .	43 7,41	43 15,89	15	+0 35	8,89	*a*	42 40,43	17	+0,50	26,48	*b*

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Haparanda.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: LARSSÉN.					ROSÉN.				
					Aug. 11.						
					West.						
ν Cygni . . .	$20^h\,53^m\,4^s,54$	$20^h\,53^m\,13^s,45$	15	$-0^s,19$	$-\,8^s,72$	a	$20^h\,52^m\,37^s,76$	17	$+\,0^s,28$	$+\,26^s,52$	d
ξ Cygni . . .	21 0 56,14	21 1 5,00	15	$-0,18$	8,68	b	21 0 29,41	17	$+\,0,23$	26,50	c
ζ Cygni . . .	8 15,00	8 23,88	15	$-0,24$	8,64	b	7 48,12	17	$+\,0,44$	26,44	c
σ Cygni . . .	13 5,85	13 14,71	15	$-0,19$	8,67	b	12 39,10	17	$+\,0,32$	26,43	d
3 Lacertæ . .	22 19 14,49	22 19 23,33	15	$-0,11$	8,73	a	22 18 47,93	16	$+\,0,05$	26,51	c
7 Lacertæ . .	26 45,84	26 54,61	15	$-0,12$	8,65	b	26 19,42	14	$+\,0,10$	26,32	
10 Lacertæ .	34 19,25	34 28,08	15	$-0,18$	8,65	b	33 52,54	16	$+\,0,32$	26,39	
					Ost.						
15 Lacertæ .	22 47 4,11	22 47 12,25	15	$+\,0,52$	8,66	a	22 46 37,44	2	$+\,0,41$	26,26	
o Andromedæ	56 51,30	56 59,46	15	$+\,0,51$	8,67	a	56 24,55	16	$+\,0,42$	26,33	b
4 Andromedæ	23 2 37,34	23 2 45,44	15	$+\,0,58$	8,68	a	23 2 10,74	16	$+\,0,35$	26,25	c
					Aug. 17.						
					Ost.						
γ Cygni . . .	20 18 17,00	20 18 18,68	7	$+\,0,38$	$-\,2,06$	b	20 17 49,21	12	$+\,0,66$	$+\,27,13$	b
ω^3 Cygni . .	27 55,86	27 57,24	2	$+\,0,49$	1,87	b	27 28,15	17	$+\,0,49$	27,22	a
α Cygni . . .	37 41,34	37 42,99	15	$+\,0,44$	2,09	b	37 13,55	17	$+\,0,58$	27,21	b
λ Cygni . . .	43 7,40	43 9,20	15	$+\,0,34$	2,14	a	42 39,56	17	$+\,0,72$	27,12	b
					West.						
ν Cygni . . .	20 53 4,53	20 53 6,91	15	$-0,35$	2,03	a	20 52 36,79	17	$+\,0,64$	27,10	d
ξ Cygni . . .	21 0 56,13	21 0 58,45	15	$-0,35$	1,97	a	21 0 28,36	17	$+\,0,60$	27,17	b
ζ Cygni . . .	8 15,01	8 17,36	15	$-0,34$	2,01	a	7 47,09	17	$+\,0,79$	27,13	b
σ Cygni . . .	13 5,85	13 8,09	14	$-0,35$	1,89	a	12 38,05	15	$+\,0,67$	27,13	b
					Aug. 20.						
					Ost.						
γ Cygni . . .	20 18 16,98	20 18 14,44	8	$+\,0,36$	$+\,2,18$	b	20 17 46,19	14	$+\,0,94$	$+\,29,85$	b
ω^3 Cygni . .	27 55,85	27 53,11	15	$+\,0,45$	2,29	a	27 25,18	17	$+\,0,87$	29,80	c
α Cygni . . .	37 41,32	37 38,65	15	$+\,0,40$	2,27	b	37 10,51	17	$+\,0,90$	29,91	c
λ Cygni . . .	43 7,39	43 4,88	15	$+\,0,32$	2,19	a	42 36,65	17	$+\,0,98$	29,76	b
					West.						
ν Cygni . . .	20 53 4,52	20 53 2,56	15	$-0,40$	2,36	a	20 52 34,40	17	$+\,0,34$	29,78	b
ξ Cygni . . .	21 0 56,13	21 0 54,00	15	$-0,41$	2,54	a	21 0 26,01	17	$+\,0,30$	29,82	b
ζ Cygni . . .	8 15,01	8 12,95	15	$-0,37$	2,43	a	7 44,73	17	$+\,0,51$	29,87	b
σ Cygni . . .	13 5,85	13 3,73	15	$-0,39$	2,51	a	12 35,61	17	$+\,0,38$	29,86	d

Beobachtungen der Zeitsterne.

Sterne.	Rectascensionen.	Beobachtungen in Haparanda.					Beobachtungen in Hernösand.				
		Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.	Beobachtete Durchgangszeit.	Zahl der Fäden.	Instrumental-Correction.	Uhrstand.	Bild.
		Beobachter: Larssén.					Rosén.				
					Aug. 20.						
					West.						
3 Lacertæ . .	$22^h\,19^m\,14^s,58$	$22^h\,19^m\,12^s,57$	15	$-0^s,51$	$+2^s,52$	*a*	$22^h\,18^m\,44^s,74$	10	$+0^s,08$	$+29^s,78$	*b*
7 Lacertæ . .	26 45,93	26 43,81	15	−0,49	2,61	*bc*	26 15,94	17	+0,13	29,86	*b*
10 Lacertæ .	34 19,35	34 17,29	15	−0,43	2,49	*b*	33 49,19	16	+0,36	29,80	*b*
13 Lacertæ .	39 11,03	39 8,96	15	−0,44	2,51	*b*	38 40,87	10	+0,31	29,85	*b*
					Ost.						
15 Lacertæ .	22 47 4,23	22 47 1,43	15	+0,33	2,47	*c*	22 46 33,49	16	+0,89	29,85	*b*
o Andromedæ	56 51,42	56 48,57	12	+0,33	2,52	*b*	56 20,65	17	+0,90	29,87	*a*
4 Andromedæ	23 2 37,49	23 2 34,62	15	+0,36	2,51	*b*	23 2 6,77	17	+0,87	29,85	*b*
Br. 3077 . .	7 59,62	7 56,61	15	+0,50	2,51	*b*	7 29,12	16	+0,74	29,76	
					Aug. 30.						
					Ost.						
γ Cygni . . .	20 18 16,87	20 17 52,45	9	+0,39	+24,03	*b*	20 17 46,67	13	+0,42	+29,78	*a*
α Cygni . . .	37 41,22	37 16,64	8	+0,45	24,13	*b*	37 10,98	17	+0,33	29,91	*a*
λ Cygni . . .	43 7,32	42 42,93	15	+0,37	24,02	*a*	42 37,05	14	+0,48	29,79	*b*
					West.						
ν Cygni . . .	20 53 4,45	20 52 40,66	15	−0,42	24,21	*b*	20 52 33,79	17	+0,80	29,86	*a*
ξ Cygni . . .	21 0 56,05	21 0 32,18	15	−0,42	24,29	*b*	21 0 25,46	17	+0,77	29,82	*b*
ζ Cygni . . .	8 14,98	7 51,13	15	−0,39	24,24	*c*	7 44,28	16	+0,92	29,78	*b*
σ Cygni . . .	13 5,87	12 41,86	7	−0,41	24,42	*b*	12 35,11	17	+0,83	29,93	*a*
					Ost.						
β Cassiopejæ .	0 3 18,78	0 2 53,72	12	+0,58	24,48	*b*	0 2 49,13	17	−0,17	29,82	*a*
$\varkappa$ Cassiopejæ .	26 45,25	26 19,98	6	+0,67	24,60		26 15,72	17	−0,34	29,87	*a*
ζ Cassiopejæ .	30 50,34	30 25,41	11	+0,50	24,43	*c*	30 20,39	10	+0,02	29,93	*a*
					West.						
o Cassiopejæ .	0 38 35,18	0 38 11,41	5	−0,49	24,26	*d*	0 38 4,73	17	+0,63	29,82	*b*
η Cassiopejæ .	42 26,32	42 2,77	9	−0,58	24,13	*b*	41 56,30	14	+0,46	29,56	*b*
γ Cassiopejæ .	50 4,05	49 40,19	15	−0,63	24,49	*b*	49 33,82	16	+0,39	29,84	*b*
β Andromedæ	1 3 33,45	1 3 9,19	15	−0,42	24,68	*b*	3 2,79	16	+0,80	29,86	*b*

Endresultate der Zeitbestimmungen in Hernösand.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1889 Juli 29	I	O	3	21^h38^m	+ 15',70	21^h50^m	+ 15',71	(+ 0',030)
		W	4	22 3	+ 15,72			
30	I	W	4	19 37	+ 16,22	19 52	+ 16,20	
		O	4	20 7	+ 16,17			+ 0,020
	II	O	3	21 37	+ 16,30	21 52	+ 16,24	
		W	4	22 4	+ 16,18			
» 31	I	W	4	19 37	+ 17,44	19 51	+ 17,46	
		O	4	20 6	+ 17,49			+ 0,040
	II	O	3	21 37	+ 17,56	21 51	+ 17,54	
		W	3	22 5	+ 17,51			
Aug. 1	I	W	4	19 37	+ 19,06	19 45	+ 19,09	
		O	1	19 52	+ 19,13			— 0,039
	II	O	4	21 34	+ 19,03	21 49	+ 19,01	
		W	4	22 4	+ 18,99			
» 11	I	O	3	20 35	+ 26,51	20 49	+ 26,49	
		W	4	21 3	+ 26,47			— 0,076
	II	W	3	22 26	+ 26,41	22 40	+ 26,35	
		O	3	22 55	+ 26,28			
» 17	I	O	4	20 31	+ 27,17	20 47	+ 27,15	(— 0,038)
		W	4	21 3	+ 27,13			
» 20	I	O	4	20 31	+ 29,83	20 47	+ 29,83	
		W	4	21 3	+ 29,83			0,000
	II	W	4	22 30	+ 29,82	22 44	+ 29,83	
		O	4	22 58	+ 29,83			
» 30	I	O	3	20 33	+ 29,83	20 48	+ 29,84	
		W	4	21 3	+ 29,85			— 0,005
	II	O	3	0 20	+ 29,87	0 34	+ 29,82	
		W	4	0 48	+ 29,77			

Endresultate der Zeitbestimmungen in Haparanda.

Datum.	Sterngruppe.	Kreislage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1889 Juli 29	I	O	3	21^h38^m	— 21',21	21^h51^m	— 21',21	(0',000)
		W	4	22 4	— 21,21			
30	I	W	4	19 38	— 19,40	19 52	— 19,41	
		O	4	20 7	— 19,42			+ 0,040
	II	O	3	21 38	— 19,36	21 52	— 19,33	
		W	4	22 5	— 19,31			

Endresultate der Zeitbestimmungen in Haparanda.

Datum.	Stern-gruppe.	Kreis-lage der Sterne.	Zahl der Sterne.	Uhrzeit.	Uhrstand.	Uhrzeit.	Uhrstand.	Stündlicher Gang.
1889 Juli 31	I	W	4	$19^h 38^m$	$-17^s,85$	$19^h 52^m$	$-17^s,85$	$+0^s,030$
		O	4	20 7	$-17,86$			
	II	O	3	21 38	$-17,80$	21 52	$-17,79$	
		W	3	22 5	$-17,77$			
Aug. 1	I	W	4	19 37	$-15,45$	19 45	$-15,47$	$+0,052$
		O	1	19 53	$-15,52$			
	II	O	4	21 34	$-15,34$	21 50	$-15,36$	
		W	4	22 5	$-15,38$			
» 11	I	O	3	20 36	$-8,81$	20 50	$-8,75$	$-0,043$
		W	4	21 4	$-8,68$			
	II	W	3	22 27	$-8,68$	22 41	$-8,67$	
		O	3	22 56	$-8,67$			
» 17	II	O	4	20 32	$-2,04$	20 48	$-2,01$	$(+0,063)$
		W	4	21 4	$-1,98$			
» 20	I	O	4	20 32	$+2,23$	20 48	$+2,35$	$+0,082$
		W	4	21 4	$+2,46$			
	II	W	4	22 30	$+2,53$	22 45	$+2,51$	
		O	4	22 59	$+2,50$			
» 30	I	O	3	20 33	$+24,06$	20 48	$+24,17$	$+0,074$
		W	4	21 3	$+24,29$			
	II	O	3	0 20	$+24,50$	0 34	$+24,45$	
		W	4	0 48	$+24,39$			

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Hapa-randa.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhr-differenzen.	Einfache Stromzeit.	Bemerkungen.
		Haparanda.	Hernösand.			
1889 Juli 29	$21^h 4^m$	$+25^m 22^s,41$	$+25^m 22^s,53$	$+25^m 22^s,47$	$+0^s,060$	
	23 8	22,31	22,37	22,34	$+0,030$	
» 30	19 8	25 20,99	25 21,22	25 21,10	$+0,115$	
	20 50	21,12	21,20	21,16	$+0,040$	
	21 4	21,08	21,12	21,10	$+0,020$	
	23 8	21,05	21,09	21,07	$+0,020$	

Uhrdifferenzen aus den Registrirsignalen.

Datum.	Uhrzeit in Haparanda.	Uhrdifferenzen aus den Signalen gegeben in		Mittelwerth der Uhrdifferenzen.	Einfache Stromzeit.	Bemerkungen.
		Haparanda.	Hernösand.			
1889 Juli 31	19h 8m	+25m20s,93	+25m20s,91	+25m20s,92	—0s,010	Grosse Störungen auf der Linie sind bemerkbar.
	20 51	20,87	20,85	20,86	—0,010	
	21 4	20,87	20,79	20,83	—0,040	
	23 8	20,74	20,74	20,74	0,000	
Aug. 1	19 8	25 20,07	25 20,15	25 20,11	+0,040	
	23 8	19,82	19,93	19,87	+0,055	
» 11	20 3	25 20,64	25 20,65	25 20,64	+0,005	
	21 46	20,57	20,62	20,60	+0,025	
	22 1	20,58	20,62	20,60	+0,020	
	23 47	20,52	20,55	20,54	+0,015	
» 17	20 3	25 14,73	25 14,77	25 14,75	+0,020	
	21 46	14,70	14,74	14,72	+0,020	
» 20	20 3	——	25 12,91	(25 12,91)	——	Störungen auf der Linie durch Luftelektricität.
	21 46	25 12,93	12,91	12,92	—0,010	
	22 0	12,90	12,88	12,89	—0,010	
	23 47	12,72	12,74	12,73	+0,010	
» 30	21 46	24 51,03	24 51,07	24 51,05	+0,020	
	0 7	50,84	50,87	50,85	+0,015	
	2 4	50,62	50,67	50,65	+0,025	

Ableitung des Endresultates.

Datum.	Sterngruppe.	Uhrzeit in Haparanda.	Uhrdifferenzen aus den Signalen.	Uhrstand		Zahl der Zeitsterne.	Längendifferenzen		Persönliche Gleichung.	Definitive Längendifferenz.	Gewicht.
				in Haparanda.	in Hernösand.		aus den Gruppen.	aus den Tagesresultaten.			
1889 Juli 29	I	22h 6m	+25m22s,40	—21s,21	+15s,71	7	24m45s,48	24m45s,48	—0s,02	24m45s,46	23
30	I	19 59	25 21,13	—19,41	+16,19	8	45,53	45,53	—0,02	45,51	31
	II	22 6	21,08	—19,32	+16,24	7	45,52				
» 31	I	20 0	25 20,89	—17,85	+17,45	8	45,59	45,54	—0,02	45,52	30
	II	22 6	20,79	—17,78	+17,53	6	45,48				
Aug. 1	I	19 8	25 20,11	—15,50	+19,13	5	45,48	45,55	—0,02	45,53	29
	II	23 8	19,87	—15,29	+18,97	8	45,61				
» 11	I	20 55	25 20,62	—8,75	+26,51	7	45,36	45,45	+0,02	45,47	29
	II	22 54	20,57	—8,66	+26,37	6	45,54				

Ableitung der Endresultate.

Datum.	Stern-gruppe.	Uhrzeit in Hapa-randa.	Uhr-differenzen aus den Signalen.	Uhrstand in Haparanda.	Uhrstand in Hernösand.	Zahl der Zeitsterne.	Längendifferenzen aus den Gruppen.	Längendifferenzen aus den Tages-resultaten.	Persön-liche Gleichung.	Definitive Längen-differenz.	Gewicht.
1889 Aug. 17	I	$20^h 55^m$	$+25^m 14^s,74$	$-2^s,01$	$+27^s,16$	8	$24^m 45^s,57$	$24^m 45^s,57$	$+0^s,02$	$24^m 45^s,59$	24
» 20	I	20 54	25 12,91	+ 2,36	+ 29,83	8	45,44	45,47	+ 0,02	45,49	32
	II	22 54	12,81	+ 2,52	+ 29,83	8	45,50				
» 30	I	21 46	24 51,05	+ 24,24	+ 29,84	7	45,45	45,43	+ 0,02	45,46	30
	II	1 6	50,75	+ 24,49	+ 29,82	7	45,42				

Die obigen Tagesresultate nach Maassgabe ihrer Gewichte zu Mittelwerthen vereinigt, ergeben für den Längenunterschied der Beobachtungspfeiler in Hernösand und Haparanda den Werth:

$$24^m 45^s,501 \text{ mit dem wahrscheinlichen Fehler } \pm 0^s,010 .$$

Für den Unterschied der persönlichen Gleichung der beiden Beobachter erhält man aus den Tagesresultaten:

$$\text{Rosén} - \text{Larssén} = + 0^s,048 .$$

Da der Beobachtungspfeiler in Hernösand $0^s,930$ westlich vom Dreieckspunkte Hernö und derjenige in Haparanda $3^s,348$ westlich vom Dreieckspunkte Torneå Landkirche gelegen war, wurde also das Endresultat des Längenunterschiedes für die bezüglichen Punkte:

$$\textbf{Hernö} - \textbf{Torneå} = \mathbf{24^m 47^s,919 \pm 0^s,010} .$$

KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N:o 2.

SYNOPSIS

OF

THE NAVICULOID DIATOMS

BY

P. T. CLEVE.

PART I.

WITH 5 PLATES.

PRESENTED TO THE R. SWEDISH ACADEMY OF SCIENCES MAY 10, 1893.

STOCKHOLM 1894.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

INTRODUCTION.

In scarcely any department of natural history is the synonymy so intricate as in that of the *Diatomaceæ*. An enormous number of names has been given to forms, frequently very incompletely described, or not at all, and often inaccurately figured. Moreover the literature is scattered throughout papers and periodicals, in many different languages, some of which are of very difficult access. These circumstances, together with the necessity of using the most excellent and powerful lenses, make the study of the diatoms a difficult one. But that study is of considerable importance. These small organisms form a peculiar class of highly developed unicellular algæ, the structural investigation of which may bring to light facts of much interest. Their silicious shells are very persistent and occur in a fossil state in strata of clays, marls, limestone etc., belonging to different geological epochs, especially the tertiary and post-tertiary, and may become of great value in geological researches, as certain indications of the nature of the water in which the sediments were deposited. When carefully studied the fossil diatoms will surely become as important as the fossil shells. Such considerations induced me six years ago to subject the Diatomaceæ to a critical examination, with the principal objects of getting rid of the heavy burden of names of slight or obscure import, of limiting as concisely as possible the genera or groups, species and varieties, and of classing them according to their natural relations. Every one who knows the amount of literature in the diatomology must be aware that such an enterprise would occupy an ordinary life time, or at any rate a large part of it. It was therefore necessary to limit the work to some division of the diatoms. The large and beautiful discoid forms have attracted many workers, and have been described in numerous monographs; but less interest has been bestowed on the Raphidieæ, which are of more importance in the geological researches of my country. I have, then, preferred to limit my present work to the Raphidieæ which are characterised by the presence of a median line, a feature of their valves which must be of great importance, to judge from its constant occurrence in this tribe.

For the complete knowledge of these diatoms it would have been desirable to study them in the living state, and complete the splendid work in this direction begun by Pfitzer; but I had very little time for such researches, the examination of many thousand slides, and drawings of almost all the forms having occupied me principally, and prevented me from a more extensive study of the living forms. My principal object was to construct a solid basis for farther researches in different directions, and in my opinion the first thing to be done was to systematize the nomenclature so as to make it possible to recognize the forms registered in the science. In the following synopsis I have endeavoured to give as exact diagnoses as possible of all forms, belonging to the tribe *Raphidieæ*, not omitting any one described or figured heretofore in a manner to be recognized. I therefore propose that all names, not mentioned here, may be dropped in oblivion. To give a list of all those names of doubtful or obscure signification would be a very fruitless work, but if any of my readers desires to search for such, he will find them set forth in the catalogues of Habirshaw and of Chase or in the large work recently published by De Toni (Sylloge algarum Vol. II Bacillarieæ Sect. I Raphidieæ) in which he has given diagnoses of or at least mentioned all the published forms. In the last named work also a very valuable list is supplied of publications on the diatoms, prepared by Deby, which relieves me from the necessity of giving such a list here.

In carrying out this work I have been kindly assisted by several diatomists, who sent me for examination slides from their collections. Among them I name with recognition Prof. J. Brun, Mr Kinker, Mr. Le-Tourneur, Mr. J. D. Möller, Mr. P. Petit, Dr. Rae, Mr. Thum, Mr. E. Weissflog, Prof. Van Heurck and Mr. Ward. I am indebted to Mr. Julien Deby, who sent from his gigantic collection everything of interest to me, and to Mr. E. Grove, who not only sent me a large number of slides, but also took the trouble of revising the manuscript and the proofs. Materials from different parts of the world have been sent by Dr. Aurivillius (from Java), Mr. Beddome (from Tasmania), Mr. Dusén (from Cameroon), Captain G. C. Eckman (marine mud from the Atlantic and Mediterranean), Prof. Lagerheim (from Ecuador) and Dr. Norstedt (from Australia, New Zealand etc.). To Mr. Comber I am indebted for many fine photographs of several forms of interesting structure. To all these gentlemen I give my best thanks.

On the value of the characteristics.

It may be stated as an axiom that those characteristics are of the greatest importance which occur in the greatest number of forms, and on the other hand that the characteristics which occur in some, but not in all, of a number of forms otherwise nearly related are of less importance. The older authors as a rule attached but little importance to the more constant characteristics, but on the contrary gave much attention to trifling differences, because the latter are frequently more conspicuous than the former. They founded not only species but genera and divisions on characteristics, which were actually subject to variation in species otherwise identical. I will in the following pages treat of all characteristics which have been used for the description of species and genera.

Habit of life and growth. Most diatoms live in a free state, floating in the water, but many are attached to solid bodies in the water, some are stipitate on gelatinous stalks, and others enclosed in gelatinous tubes or masses of different shape and consistence. A careful examination shews that many of the attached or enclosed forms also occur in a free state; and that there are frequently very slight differences between species, which live attached or enclosed, and others which never occur in such a state. On the other hand forms, which are stipitate, or enclosed in tubes, belong to the most different types. For these reasons I regard as a characteristic of very little importance the mode of occurrence in free or attached state. At least, genera and species should not be founded on such characteristics alone. Genera, such as *Schizonema*, *Endostauron*, *Endosigma*, *Encyonema*, *Cocconema*, are in my opinion not acceptable. [1]

Size. The limits of the dimensions of the forms of each species are in most cases pretty definite, the larger forms of each species being as a rule twice as large as the smallest. Still, in some cases the variability is more extensive and the followings may be cited as species in which the dimensions of the forms are subject to very considerable variation: Amphora ovalis, Achnanthes brevipes, Pinnularia viridis.

Form of the frustule. Most frustules of the Raphidieæ are straight, and nearly symmetrical, with the longitudinal and transverse axes, but a great number of forms are in some or other respects asymmetrical. A flexure of the frustule along the longitudinal, or the transverse axis, occur in the old genera *Cocconeis* and *Achnanthes* which have been distinguished hitherto principally by this characteristic. As to *Cocconeis* it seems probable that the flexure may be derived from the

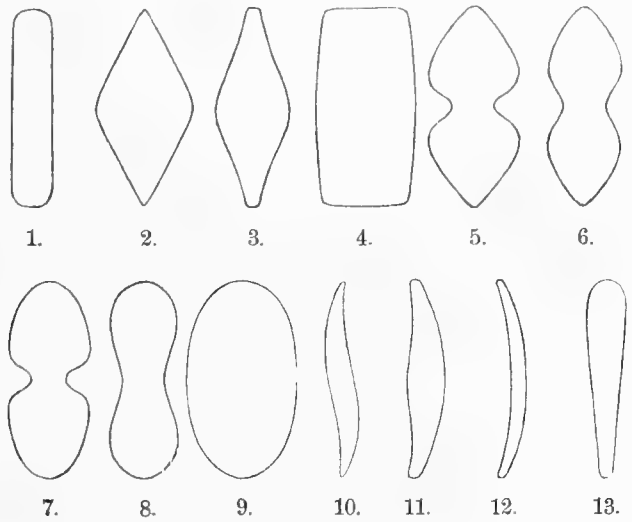
[1] The gelatinous substance of the stipes of *Achnantes longipes* is intensely stained by hæmatoxyline, and no continuation of the substance of the stipes is visible in the interior of the frustule. On the other hand the stipes is not stained by Congo-red, methyle-green, eosine, and methylène-blue. The gelatinous tubes of Navicula (Schizonema) mollis are stained by hæmatoxyline, fuchsine, methyle-green and saffranine, but not by eosine. The tubes of Amphipleura (Berkelya) Dillwynii are stained by hæmatoxyline and methyle-green, but not by Congo-red. The gelatinous envelopes of Mastologia are stained by methyle-green, fuchsine and saffranine, but not by eosine and Congo-red.

form of the objects, to which these forms are attached by the lower valve, and in *Achnanthes* there are several forms, which owing to other important characteristics must be placed in this genus, although they are not at all genuflexed. Moreover genuflexed species occur in groups of allied forms the greater number of which are straight, for instance in the *Naviculæ lineolatæ*, *Nav. microstigmaticæ*, *Gyrosigma*, *Pleurosigma*, and in some species the degree of flexure seems to be subject to variation (for instance in *Gyrosigma arcticum*). The geniculated flexure is thus no generic characteristic, though in most cases of specific value.

Zone. The zone in the Raphidieæ is in most cases simple, that is without longitudinal divisions, but in many *Amphoræ*, in *Amphiprora* and in the group *Libellus* of the *Naviculæ microstigmaticæ* it is complex. This characteristic appears to be subject to very little variation and to be of importance in the limitation of genera. There are however in some cases small variations. The zone of *Amphora commutata* seems in some varieties to have, and in others not to have, faint divisions. *Amphora robusta* has usually no divisions, but in a variety from California there are longitudinal rows of alveoli on the zone. In the *Naviculæ microstigmaticæ* also, some allied forms have divisions and others are without them. Still we may consider the complexity of the zone as an important characteristic.

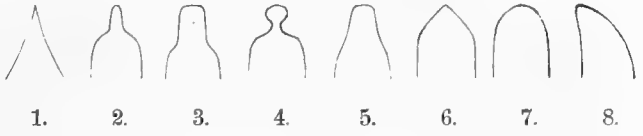
Outline of the valves. The outline of the valves of the naviculoid diatoms is very variable, presenting every intermediate passage from narrow linear to almost orbicular. The valves are non-constricted, constricted, or biconstricted, and, occasionally, some forms have 3 or 4 constrictions. Sometimes the valve is sigmoid.

The following schematic figures will illustrate the meaning of the terms used in my descriptions.



Outline of the valves. Fig. 1 Linear, 2 Rhomboidal, 3 Lanceolate, 4 Rectangular, 5—8 Panduriform with deltoid, subelliptical, tongue-shaped and broadly rounded segments, 9 Elliptical, 10 Sigmoid, 11 Cymbiform, 12 Lunate, 13 Clavate.

The *ends* of the valves also have a great variety of shapes, as



Ends of the valves. 1 Acuminate, 2 Apiculate, 3 Rostrate, 4 Capitate, 5 Truncate (subrostrate), 6 Cuneate, 7 Rounded obtuse, 8 Obliquely or unilaterally rounded.

The constancy of the outline is very different in different cases. Some species seem to be very constant in shape, as *Diploneis elliptica*, many species of *Pinnularia*, *Cocconeis* and *Amphora*.

But in other cases the form is subject to much change as, for instance, in *Navicula mutica*. The shape of the ends is frequently not constant, as in the genus *Neidium*, *Navicula viridula*, and others. In the same natural group of diatoms both the outline and the ends are frequently subject to much variation. I therefore conclude that though the shape of the valve may be of service to some extent as a specific distinction, it is of no real importance in limiting or defining genera.

On the *sigmoid flexure* of the valves have been founded the genera *Pleurosigma* and *Scoliopleura*. This characteristic is subject to great variation in *Pleurosigma*, some forms of which are almost straight. On the other hand widely different forms of other genera are sigmoid, as *Navicula Raeana*, *Navicula Sigma*, *Caloneis stauroph*ora. I have occasionally seen a sigmoid valve of *Frustulia Lewisiana* and one of *Navicula cincta var. Heufleri*. The sigmoid flexure of the valve can only be regarded as a specific characteristic.

The *symmetry* or *asymmetry* of the valve has been considered by Heiberg, Pfitzer and others as of great importance in the formation of families. But this can hardly be maintained, since we meet with forms both symmetrical and asymmetrical in the same species, as for instance *Trachyneis apera*, *Frustulia vulgaris* and others; and there are asymmetrical species closely allied to symmetrical in the section *Naviculæ lineolatæ*, *Pinnularia*, *Caloneis* and others. The degree of asymmetry is also variable. This tends to shew that asymmetrical forms are derived from symmetrical and vice versa, and that in a natural system they cannot be placed in different families. As a generic distinction it may, when combined with other characteristics, be of value in certain cases.

A median *constriction* of the valve has been usually considered as an important characteristic, but it is not so, panduriform species being closely connected with others which are not at all constricted. *Dictyoneis marginata*, for instance, is usually deeply constricted, but varieties exist connecting this species with the non-constricted *D. Thumii*, which may therefore be considered as its variety. In the genus *Diploneis* very closely connected, constricted, and non-constricted forms exist. *Diploneis didyma* is usually panduriform, but in slightly brackish water the constriction becomes less distinct and, finally, not perceptible. We conclude thus that the outline of the valve in this respect is too variable to furnish generic distinctions, though in many cases, when constant, it may be a valuable specific characteristic.

Central nodule. The central nodule constitutes a more or less conical, interior silicious mass in the centre of the valve. In many cases it expands laterally into a *stauros*, and on this characteristic has been founded the genus *Stauroneis*. It is to be remarked that a stauroid nodule occurs in widely different forms, and that some really allied forms scarcely differ otherwise than in the presence or absence of a stauros. In such cases the stauros cannot be used as a generic distinction. As a specific characteristic it is in most cases very valuable, as it is very constant in the same species.

The central nodule extends not only transversely, but is in many cases prolonged into *horns*, as in *Diploneis*, in which they closely follow the median line. In other cases, as is *Dictyoneis*, larger forms of *Stauroneis*, *Frustulia*, the median line is enclosed between silicious ribs, in the middle frequently fused together with the central nodule, which thus seems to be elongated. The prolongation of the central nodule in such a manner reaches its maximum in *Amphipleura*, where the »*forks*» represent the horns of *Diploneis*. In the section *Naviculæ lyratæ* the horns are distant from the median line and developed into the lyriform markings, or large lateral, lunate areas, characterizing this section. The characteristics of the central nodule are subject to only slight variation and are therefore of importance.

Median line. The median line is in all probability a fissure of more or less complicated structure, and seems to afford valuable characteristics. In most of the *Mastogloiæ* it is undulating, also in *Navicula plicatula*. In *Pleurosigma*, *Gyrosigma*, and others, it is more or less sigmoid, but this characteristic, though valuable specifically, is not of sufficient constancy to afford generic distinction, sigmoid median lines occurring in forms nearly akin to others with straight median lines,

as for instance *Navicula Raeana* and *Nav. Yarrensis*, *Nav. tumida* and *Nav. plicata*, *Navicula Sigma* and *Nav. superimposita*, *Cocconeis heteropleura* and *C. pellucida*.

The direction of the *terminal fissures* in most Naviculæ is the same in both extremities, but there are forms in which they are disposed in contrary directions. The latter characteristic on which GRUNOW was inclined to found a separate genus, *Pseudopleurosigma*, occurs in widely different groups, and it would not be in accordance with a natural system to class in one genus all forms with the terminal fissures in contrary directions. Such forms are frequently allied to others with the fissures in the same direction. On the other hand as a specific characteristic it seems to be of very great value.

Areas, or structureless parts of the valve, occur usually along the median line and around the central nodule. I call these areas *axial* and *central areas*. There are also, sometimes, *lateral* areas, or blank spaces on both sides of the median line, separated from the latter by a striated portion. The form, the presence, or absence, of such areas is in most cases a valuable specific characteristic, and, frequently, a useful distinction in groups of allied forms.

Longitudinal lines. In a great number of forms there occur lines, parallel to the median line, in some cases dilated into longitudinal bands or lateral areas, limiting an interior elevated or depressed portion. Although such longitudinal lines or lateral areas occur in certain groups of forms most of which are devoid of them, as in the *Naviculæ lineolatæ*, and in the whole group of the *Naviculæ lyratæ*, they are nevertheless in my opinion of great systematic importance. In the *Naviculæ lyratæ* the longitudinal lines or lateral areas are expansions of the central nodule, corresponding with the »horns» of *Diploneis*. In other cases they are merely non-striate portions of the valve, but in *Amphiprora*, *Diploneis*, *Caloneis* they are of a different nature. In *Amphiprora* they mark the limit between the elevated interior and the flatter exterior parts, which frequently have a different structure. They appear to be of the same nature in *Caloneis*. In *Diploneis* they limit a depressed portion, and the same is the case in several groups of *Amphora*, in which they are freqently so placed as to be distinctly seen only in favourable positions of the valve. In several cases the longitudinal lines are double. In *Diploneis* I call the space between the median line and the interior longitudinal line the *furrow*, and the space between two longitudinal lines the *lunula*. The presence or absence of longitudinal lines appears to me to be of very great importance in the construction of genera.

Structure of the valve. The valves of the naviculoid diatoms vary greatly in structure. In most cases the valves are decorated with small or large puncta, disposed in different manners. At present it seems to be generally admitted that these puncta are small cavities in the silicious mass of the valve. They are rarely scattered irregularly, but are usually arranged in transverse rows, more or less radiate or parallel, called *striæ*. The puncta are also so arranged as to form straight, or undulating, longitudinal rows, parallel to the median line, or decussating straight, or curved, rows as in *Pleurosigma* and others. When the puncta are large they are called *alveoli* and have the appearance of more or less quadrate spaces, as in several forms of *Diploneis* and *Amphora*. The silicious mass enclosing the alveoli in such cases has a reticulated appearance. I call these siliceous walls of the alveoli, if forming continuous silicious ribs, *costæ*. The strong, transverse silicious ribs of *Diploneis Crabro* are such costæ. The alveoli or puncta are frequently united, as in *Pinnularia*, *Caloneis* etc. In such cases the striæ appear to be channels, communicating with the interior, in the larger *Pinnulariæ*, by a larger *foramen* or *ocellus*. The outside part of the valve consists in several cases of a thin, minutely punctate stratum, usually seen only with difficulty. In a variety of *Diploneis splendida*, called *Dip. diplosticta*, there is such a finely punctate stratum outside the layer of alveoli. In the genus *Dictyoneis* it is also visible, the minute puncta forming transverse, and at the same time obliquely decussating striæ. This is also the case with the genus *Trachyneis*, where the fine puncta form longitudinal or somewhat oblique lines. In the group *Naviculæ lineolatæ* the transverse striæ are crossed by fine lines, which appear to be formed by closely crowded alveoli, as transitions exist from striæ of this nature to striæ composed of distinct

puncta. In many forms there is an interior stratum, which may be isolated from the alveolar network. It is frequently found in preparations of *Trachyneis Debyi* and allied forms, and has been figured in A. SCHMIDTS Atlas Pl. XLVIII f. 23. Also in *Navicula distans* this interior stratum occurs frequently in an isolated form.

In the most complicated cases, as in *Trachyneis*, we may distinguish three different strata, thus

1. The porous or ocelliferous interior stratum.
2. The alveolar stratum of reticulating costæ.
3. The exterior, minutely punctate stratum.

The structure of the valves presents characteristics which are of great importance for distinction both of species and genera. The coarseness of the structure may vary in the same species, though in most cases such variation is less than is usually believed. The direction of the striæ, the arrangement of their puncta, are characteristics subject to only very slight variation in the same species and in groups of allied forms.

Cell-contents. As is well known, the chromatophores of the diatoms present a great variation in different tribes, consisting in some of numerous granules, in others of one or two plates. To the latter type belong almost all the naviculoid diatoms, which have either one or two chromatophore-plates. The position and the form of these plates appear to be constant for groups of allied species, as is proved by the excellent researches of PFITZER. But the cell-contents are known only in a very limited number of forms, and the characteristics dependent on the cell-contents are, for the greatest number of forms, yet to be studied. The same is also the case with the reproduction by means of *auxospores*, and the characteristics, derived from the living cell, cannot for the present be used in the systematic arrangement of species, as they are too little known.

The characteristics derived from the structure of the valve are of the greatest importance in the definition of genera and families, and next to those, in my opinion, are the presence or absence of longitudinal lines, and the nature of the non-striate parts of the valve, or the areas.

An ideal system should take in consideration the evolution of the different forms, but in the present fragmentary state of our knowledge, such consideration cannot be more than an approximation wich may become closer to the truth as our knowledge of the forms becomes more extensive and perfect, The question which of the groups of forms are the highest and lowest may be answered by considering as the lowest those in which the characteristics are the least developed, and as the highest those in which the characteristics have attained their greatest evolution. But a greater development in one direction usually involves the slighter development, or obliteration, of other characteristics, so that one group may be the highest in some respects, and another in others. The changes of the organisms do not always indicate progress, but are frequently retrograde, especially where the mode of life has become parasitical. A natural system must consequently take account not only of the upward evolution, but also of the downward.

As the known diatoms probably represent merely a fraction of those, which exist and have existed, it will be necessary in constructing a natural system to fill the gaps with conjectures.

There can be no doubt that the naviculoid diatoms are most nearly connected with the *Nitzchieæ* among the diatoms without median line. The genera *Tropidoneis* and *Amphiprora* are very closely allied to several forms of *Nitzchia*. We meet in that genus with the carinated asymmetrical valves and the wing of *Tropidoneis*, also the complex zone and the carinal puncta of *Amphiprora*. In constructing a natural system then we may arrange the genera and groups in order of their relationship to the two genera above mentioned, and the following scheme shews how I suppose the different groups of the naviculoid forms to be related.

1. Nitzchieæ { Amphiprora (2) Auricula. / Tropidoneis (4).
2. Amphiprora { .... Dictyoneis .... Mastoneis. / .... Scoliotropis .... Gomphoneis. / .... Pleurosigma (3), Toxonidea.
3. Pleurosigma .... Naviculæ Decussate ... Anomoeoneis.
4. Tropidoneis { Naviculæ fusiformes (5). / Naviculæ microstigmaticæ (7).
5. Naviculæ fusiformes { Naviculæ othostichæ. / Gyrosigma. / Frustulia (6). / Cistula. / Stenoneis.
6. Frustulia { Amphipleura. / Brébissonia.
7. Naviculæ microstigmaticæ { Nav. minusculæ .... Microneis. / Nav. decipientes (8). / Nev. punctatæ (9). / Anorthoneis. / Eucocconeis. / Halamphora. / Oxyamphora. / Amblyamphora. / Psammamphora.
8. Naviculæ decipientes { Nav. bacillares. / Nav. entoleiæ. / Nav. mesoleiæ. / .... Heteroneis.
9. Naviculæ punctatæ { Nav. lineolatæ (10). / Nav. lyratæ (12). / Nav. heterostichæ .... Actinoneis. / .... Achnanthidium. / .... Disconeis.
10. Naviculæ lineolatæ { Cymbella. / Gomphonema, Rhoicosphenia. / Trachyneis. / Nav. lævistriatæ (11).
11. Naviculæ lævistriatæ { Pinnularia. / Cymbamphora. / Archæamphora.
12. Naviculæ lyratæ { Diploneis (13). / Pseudo-amphiprora (14).
13. Diploneis { Amphora .... Diplamphora. / Cymatoneis. / Scoliopleura. / Nav. nicobaricæ. / Nav. luxuriosæ.
14. Pseudo-amphiprora { Caloneis .... Neidium. / .... Calamphora.
15. { .... Achnanthes .... Pleuroneis. / .... Mastogloia.
16. Mastogloia { Cocconeis. / Campyloneis.

Tropidoneis comprises both symmetrical not-winged and asymmetrical winged forms. The former appear to be related to the *Naviculæ microstigmaticæ* and *Nav. fusiformes*. As asymmetrical forms of the *Nav. microstigmaticæ* are to be considered the following sections of the old genus *Amphora: Oxyamphora*, *Amblyamphora*, *Psammamphora* probably also *Halamphora*. *Anorthoneis* is probably an asymmetrical form of *Nav. microstigmaticæ*. The *Nav. minusculæ*, of which *Microneis* and *Eucoceoneis* appear to comprise degenerating forms, are probably also allies of *Nav. microstigmaticæ*. To the last named large section the *Nav. decipientes*, *Nav. entoleiæ* and *Nav. mesoleiæ* are certainly akin. *Heteroneis* may comprise degenerating forms allied to the same group.

From the *Nav. microstigmaticæ* the passage is gradual to the *Nav. punctatæ* and *Nav. heterostichæ* and the former section is very closely connected with the *Nav. lyratæ*. As degenerating forms are perhaps to be regarded *Disconeis* and *Achnanthidium*. Also some asymmetrical forms exist in the section *Nav. punctatæ*. Some *Cymbellæ* represent very likely asymmetrical forms of *Nav. punctatæ*.

The *Naviculæ Lyratæ* are by intermediate forms connected with *Diploneis*. Akin to the *Nav. lyratæ* I also consider *Pseudo-amphiprora*. The new groups *Amphora* and *Diplamphora*, broken out from the old genus *Amphora*, may be regarded as asymmetrical forms of *Diploneis*.

Pseudo-amphiprora is connected by intermediate forms with *Caloneis*, to which also *Neidium* seems to be allied.

The *Nav. lineolatæ* pass over to the group *Punctatæ* by transitional forms, and the former are also akin to *Trachyneis* (with the asymmetrical form *Amphora Clevei*). A part of the *Cymbellæ*, *Gomphonema*, *Rhoicosphenia* and *Amphora labuensis* may be considered as asymmetrical forms of the *Nav. lineolatæ*. Degenerated forms of the *Nav. lineolatæ* are probably to be found in *Actinoneis*. — On the other hand the *Nav. lineolatæ* are closely connected with the *Nav. lævistriatæ*, and those with *Pinnularia*, and I consider, with much hesitation, *Cymbamphora* as asymmetrical forms of the *Nav. lævistriatæ*.

I have no decided opinion as to the distantly related genera *Pleuroneis* and *Achnanthes* (sensu stricto). They seem in some way to be akin to the peculiar *Alloioneis Castracanei* Pantoc., which I know only from the figures. The structure resembles that of *Mastogloia Grevillei*. It may be possible that *Alloioneis Castracanei* connects *Achnanthes* and *Mastogloia*. The latter genus comprises forms with very different structure, which in some cases resembles that of the *Nav. orthostichæ* in others that of the *Nav. decussatæ* and *Pleurosigma*. Some forms of *Mastogloia* have the central nodule dilated into horns or connected with lateral areas as in the *Nav. lyratæ*. It might therefore be said that the *Mastogloiæ* belong to different types, but to prove this is not possible.

It is not easy to find in a natural system the place a form occupies, as the most important characteristics are usually the least striking. For practical purposes it is necessary to have an artificial classification in order to identify rapidly an unknown form, but it is by no means an easy task to construct an artificial key of such numerous and variable forms as the naviculoid diatoms. Still I have tried to compile an artificial key, which, however little rigorous it may be, will still be useful.

Artificial key of the groups and genera of naviculoid diatoms.

1.	Both valves similar	2.
	— — dissimilar	*Achnantheæ.*
2.	Frustules with a loculiferous rim	*Mastogloia.*
	— without — —	3.
3.	Valves symmetrical or almost so	4.
	— asymmetrical —	38.
4.	Valves with longitudinal lines	5.
	— without — —	13.
5.	Median line sigmoid	6.
	— — straight	8.
6.	Axial part of the valve elevated into a keel	*Amphiprora.*
	— — not — —	7.
7.	Structure double	*Scoliotropis.*
	— simple	*Scoliopleura.*[1]
8.	Central nodule with horns, enclosing the median line	*Diploneis.*
	— — without — — —	9.
9.	Central nodule stauroid	10.
	— not —	11.
10.	Striæ distinctly punctate	*Pseudo-amphiprora.*
	— not — —	*Caloneis* (partim).
11.	Striæ distinctly punctate	12.
	— not — —	*Caloneis* (partim).[2]
12.	Valve with elevated ridges	*Cymatoneis.*
	— without —	*Neidium.*
13.	Structure double	14.
	— simple	16.
14.	Interior stratum with transverse costæ	*Mastoneis.*
	— — reticulate —	15.
15.	Reticulum of rounded meshes	*Dictyoneis.*
	— rhomboid or rectangular —	*Trachyneis.*
16.	Striæ apparently smooth	17.
	— distinctly punctate or lineate	18.
17.	Valve more or less linear	*Pinnularia.*
	— — lanceolate	*Nav. lævistriatæ.*
18.	Median line sigmoid	19.
	— not —	20.
19.	Striæ decussating	*Pleurosigma.*
	— transverse and longitudinal	*Gyrosigma.*

[1] *Caloneis staurophora.* — [2] *Nav. luxuriantes, Nav. nicobaricæ.*

20.	Valve with lateral areas uniting with the central area	*Nav. lyratæ* (*Anomoeoneis* partim).
	— without — — — —	21.
21.	Puncta arranged in decussating rows	*Nav. decussatæ* (*Anomoeoneis* partim).
	— — transverse striæ	22.
22.	Striæ minutely and transversely lineate	23.
	— punctatæ — —	24.
23.	Central nodule elongated	*Brebissonia.*
	— not —	*Nav. lineolatæ.*
24.	Puncta arranged in longitudinal, almost straight rows	25.
	— — — — undulating rows	28.
25.	Median line between siliceous ribs	26.
	— not — — —	*Nav. orthostichæ* (*Nav. fusiformes* partim).
26.	Punctation coarse	*Cistula.*
	— fine	27.
27.	Central nodule uniting with the ribs in a very elongated axial costa	*Amphipleura.*
	Central nodule not uniting with the ribs or uniting for a short way only	*Frustulia* (*Nav. orthostichæ* partim).
28.	Striæ distinctly punctate	29.
	— indistinctly or very finely punctate	32.
29.	Puncta coarse	*Nav. punctatæ.*
	— small	30.
30.	Median striæ of unequal length	*Nav. heterostichæ.*
	— — equal —	31.
31.	Valve very convex, and carinated	*Tropidoneis.*
	Valve slightly convex not carinated	*Nav. microstigmaticæ* (*Nav. mesoleiæ* and *Nav. entoleiæ* partim).
32.	Terminal nodules incrassate or transversely dilated	*Nav. bacillares.*
	— not — — —	33.
33.	Median striæ more distant than the others	*Nav. decipientes* (*Nav. microstigmaticæ* partim).
	— not — — —	34.
34.	Axial area more or less lanceolate	*Nav. entoleiæ.*[1]
	— indistinct	35.
35.	Central area large	36.
	— indistinct	37.
36.	Central area a transverse fascia	*Stenoneis.*
	— quadrate or rounded	*Nav. mesoleiæ* (*Anomoeoneis* partim).
37.	Broad membranaceous forms	*Nav. minusculæ.*
	Narrow — —	*Nav. fusiformes* (*Nav. microstigmaticæ* partim).
38.	Valve clavate	39.
	— not —	40.
39.	Structure: transverse striæ or rows of puncta	*Gomphonema.*
	— — costæ, alternating with double rows of puncta	*Gomphoneis.*
40.	Structure: decussating rows of minute puncta	*Toxonidea.*
	— transverse striæ or rows of puncta	41.
41.	Valve not strongly asymmetrical	*Cymbella* (*Tropidoneis, Trachyneis, Nav. punctatæ* partim).
	— strongly asymmetrical	42.
42.	Median line on an elevated keel	*Auricula.*[2]
	— not — —	*Amphora.*

Habitat and geographical distribution of diatoms.

A knowledge of the habitat and the geographical distribution of the diatomaceæ is of great importance, especially for geological researches. Fossil diatoms occur doubtless more frequently in geological strata than is usually believed, and may furnish the geologist with valuable evidence about the qualities of the water in which the sediments were deposited, whether fresh, brackish or

[1] *Navicula americana.* — [2] *Tropidoneis* partim and *Amphora Schmidtii*

strongly saline, and, in the latter case, whether the sea was tropical, temperate or arctic. There are also reasons to believe that the accurate investigation of the geographical distribution of the freshwater-forms will enable the geologist to ascertain the climate of the periods, when the freshwater deposits were formed.

Considerations of that nature have induced me to pay much attention to the geographical distribution of the Diatomaceæ. In the abundant literature upon the subject we find many lists of diatoms ocurring in certain seas, countries, and deposits, but I have intentionally made very little use of them, not being satisfied as to the accuracy of the determinations or limitations of species by the various authors. I have besides had sad experience how easily one may be deceived by slides of materials the loaclities of which are incorrectly named and which durnig the preparation have not been kept rigorously isolated from other materials. For such reasons I have relied mainly on my own observations only, though I still feel there may be among them some errors as to the localities, arising from the latter cause, as I had no opportunity of controlling the mode in which every slide, examined by me, had been prepared.

Many diatoms are cosmopolitan, occurring in all parts of the world, but there are on the other hand many species, genera and groups which occur only in certain seas and climates. The arctic sea has its characteristic form of *Triceratium arcticum* (or *Biddulphia Balæna*), *Campylodiscus Helianthus* and others. There are numerous common atlantic species which have never been found in the Arctic Sea. The tropical seas have their own peculiar species, not found in the Atlantic or in the arctic sea. The same is the case with several freshwater-forms. *Navicula (Diadesmis) confervacea*, *Achnanthes inflata*, *Cerataulus lævis* occur in tropical or subtropical countries throughout the whole globe. Of *Tabellaria flocculosa*, one of the most frequent diatoms of Europe, not a trace has been found either in South America from Ecuador to Argentina or in Australia or New Zealand. *Gomphonema geminatum*, of frequent occurence in Scandinavia, Gt. Britain, and the Alps, does not live in the main-land of Europe. The same is the case with *Tetracyclus*, *Diatomella Balfouriana* and others. *Stauroneis Fulmen* and *St. Frauenfeldiana* are peculiar to the Australian region. I could easily multiply these examples, but they are enough to show that the study of the geographical distribution of the diatoms offers many points of interest.

I have examined a large number of samples of silurian clays and limestones, rhætic and cretaceous rocks of Sweden, but I never found in them a trace of a diatom. I have also searched for diatoms in the eocene and oligocene strata of Paris, but hitherto in vain, though I think it probable that they may yet be found there, as diatoms are found in the London clay of Sheppey. On the other hand fossil diatoms are very frequent in strata of the tertiary period in Barbados, Trinidad, New Zealand, Hungary, Japan, Denmark, etc. as is well known to every diatomist. If it be true, as PANTOCSEK believes, that the deposit of Kusnetzk belongs to the Trias, this is the oldest known diatomiferous rock, as the statement by CASTRACANE that diatoms occur in the carboniferous system has never been verified.

Some of the postglacial strata of Sweden are very rich in diatoms, and I have examined a considerable number of them. Among them the glacial clay and glacial marl have constantly been found by me free from diatoms, probably because the water, in which these deposits were formed, was too turbid for their growth. The strata, formed later than these, usually contain diatoms of both brackish and fresh-water habitat. The brackish-water-diatoms of the ancient baltic deposits comprise forms occuring in the present time in the southern part of the Baltic, as *Rhabdonema arcuatum* and *Coscinodiscus asteromphalus*, both characteristic fossils of the Litorina-epoch. The freshwater-species found in the Swedish post-glacial deposits are still living, but there are among them several peculiar species, not hitherto found in the southern or median part of the country, as *Pinnularia cardinalis*, *Navicula amphibola*, *Nav. Semen*, *Anomoeoneis serians* and others. Of interest is the occurrence of *Terpsinoe americana*, now extinct in Europe (or at least in northern Europe), in brackish or slightly brackish deposits of the Litorina-epoch. I have

noticed this species in deposits from Warnemünde in Germany and from the eastern Småland in Sweden.

The microscopical examination of the præ- and inter-glacial deposits of northern Germany and Denmark have furnished evidence that these strata were formed in inlets from the North Sea and not from the Arctic Sea.

All these facts prove of what importance the study of fossil diatomaceæ is becoming to Geologists.

Amphiprora Ehb. (1843).

Valve lanceolate, acute, convex. Axial part of the valve elevated into a sigmoid keel, usually separated from the lower part by a line of junction. Axial area indistinct. Central area small or none. Structure of the lower part of the valve: transverse striæ, rarely scattered puncta; structure of the keel: puncta in transverse or decussating rows. — Frustule strongly constricted in the middle. Junction between the keel and the lower part of the valve usually visible as a more or less sinuose line. Connecting zone complex, with more or less numerous, transversely striate divisions. — Cell-contents (of A. alata) a single chromotophore-plate along the zone. The division of the chromotophore begins from its ends (Pfitzer, Bau u. Entw. p. 94).

The name Amphiprora was given by Ehrenberg 1843 (Am. p. 122) to two naviculoid diatoms. *A. constricta*, the figure of which represents some species of Navicula in the frustular view, is slightly constricted in the middle. It seems impossible now to make out what form this name may denote. The other Amphiprora is, as the figures in »the Microgeology» shews, *Nav. Semen*. In the »Bacillarien» Kützing adds a third species, *A. alata*, which is distinguished by its sigmoid median line, and the lines on both sides of the median line, as well as by a complex connecting zone. Later on several other forms were described ass Amphiprora by Bailey, W. Smith, and others. W. Smith describes as *Amphiprora vitrea* a form with straight median line and not complex connecting zone. Forms of very heterogenous nature were thus thrown together in the genus Amphiprora. Rabenhorst tried 1864, (Fl. Eur. Alg. p. 257) to separate the forms with a sigmoid median line as a new genus, *Amphicampa*, which name Pfitzer 1871 (Bau und Entw. p. 94) changed to *Amphitropis*. — I consider that the name Amphiprora may be retained for the forms with sigmoid keel and complex zone, as *A. alata* is the first recognizable form described. For the other forms I have 1891 (Diatomiste I, p. 51) proposed the name *Tropidoneis*.

The genus Amphiprora seems to be akin to the Nitzschieæ, and is on the other hand connected with *Auricula*. The complex zone, the single chromatophore, the puncta or lines on the keel remind one of the Nitzschieæ. In most species of Amphiprora the keel forms a well marked part of the valve, bordered by a junction-line, which is frequently denticulated or sinuose, and very suggestive of the alæ of Surirellæ. Whether this line projects into a true wing, I have not been able to discover. In all cases it occupies the same position as the wing of Surirellæ.

The structure of the valve is somewhat different in different sections. Three types may be distinguished: the type of *A. alata*, of *A. gigantea*, and of *A. Temperei*. In the first named the keel as well as the valve have transverse striæ. In larger forms of that type the striæ seem to be finely transversely lineate, with rather coarser puncta on the keel, which puncta appear to belong to an interior stratum. In the forms, of which *A. gigantea* is the type, the keel and the lower part of the valve have entirely different structure. The keel has puncta, disposed in obliquely decussating rows as in Pleurosigma, and the lower part of the valve has transverse striæ. In *A. Temperei* the keel has two rows of large stigmas and in addition very fine transverse striæ, while the lower part of the valve shews only fine scattered puncta.

Some few forms of Amphiprora live in fresh water, the greater part in brackish water, and some are purely marine. They occur in all parts of the world.

Artificial key.

1.	Keel with decussating rows of puncta	*A. gigantea* Grun.
	— without — — —	2.
2.	Keel with double rows of large marginal puncta	*A. Temperei* Cl.
	— without — — — —	3.
3.	Keel not separate from the lower part of the valve	4.
	— separate — — — —	5.
4.	Valve siliceous	*A. conspicua* Grev.
	— membranaceous	*A. Dusenii* Cl.
5.	Keel and valve separated by a row of puncta	*A. margine punctata* Cl.
	— — — — — junction-line	6.
6.	Valve membranaceous	7.
	— solid	8.
7.	Junction-line with several denticulations	*A. ornata* Bail.
	— — one or no —	*A. paludosa* W. Sm.
8.	Margin of the valve crenulated	*A. crenulata* Temp.
	— — not —	9.
9.	Striæ of the keel obsolete	*A. Brebissoniana* Grev.
	— — distinct	10.
10.	Striæ on the keel wider than on the valve	*A. Kjellmanii* Cl.
	— — closer — —	*A. kryophila* Cl.
	— — and the valve æquidistant	11.
11.	Keel strongly sigmoid	*A. alata* Kütz.
	— slightly —	12.
12.	Striæ 6 in 0,01 mm.	*A. Meneghiniana* Grev.
	— 11 to 12 —	*A. lata* Grev.

1. **A. Paludosa** W. Sm. (1853). — Frustule membranaceous, in the zone-view deeply constricted, with rounded to truncate ends. B. 0,03 to 0,05 mm. Junction-line sinuose (or not). V. linear-lanceolate, with acute (or apiculate) ends. L. 0,055 to 0,13 mm. Median line strongly sigmoid. Striæ 19 to 20 in 0,01 mm., some of them frequently coarser than the others. — W. Sm. B. D. I. p. 44, Pl. XXXI f. 269. V. H. Syn. p. 121, Pl. XXII f. 10.

Brackish water: North Sea (Sweden! England! Belgium!) Cape May! Barbados!

Var. *bahusiensis* Cl. — Frustule strongly constricted. L. 0,08; B. 0,04 mm. Junction-line not sinuose and not punctate. Striæ 22 in 0,01 mm., those on the zone and the basal part of the valve more marked. Striæ of the keel faint, ending at the median line in very small puncta.

Marine: Sweden, Fiskebäckskil!

Var. *africana* Grun. (1879). — Frustule strongly constricted. L. 0,05 to 0,06; B. 0,03 mm. Junction-line not sinuose and not punctate. Striæ 20 in 0,01 mm., those on the keel with coarse puncta. — *A. pal. v. afr.* Grun. in Cl. M. D. N:o 196.

Brackish water: South Africa!

Var. *subsalina* Cl. — Frustule very thin, strongly constricted in the middle. L. 0,04: B. 0,03 mm. Junction-line with a large sinus. Striæ 23 in 0,01 mm. — Pl. I f. 1.

Brackish water: Artern, Saxony!

Var. *hyperborea* Grun. (1880). — Frustule slightly constricted in the middle. L. 0,065 to 0,07; B. 0,035 to 0,036 mm. Junction-line slightly sinuose. Striæ 27 to 28 in 0,01 mm. — *A. pal. var.? hyp.* Grun. A. D. p. 62. Pl. V f. 86.

Brackish water: Sea of Kara (Grun.).

Forma minuta Grun. (1884). — L. 0,035 mm. — *A. hyp. f. min.* Grun. Franz Josephs L. D. p. 54 (106), Pl. I f. 51.

Marine: Franz Josephs Land (Grun.).

Var. *Pokornyana* GRUN. (1860). — Frustule slightly constricted. L. 0,065 to 0,087; B. 0,02 to 0,027 mm. Junction-line slightly sinuose. Valve narrow, linear, with rostrate ends, and almost straight median line. — GRUN. Verh. 1860 p. 569 Pl. VI f. 9.

Brackish water: Neusiedlersee (Hungary); Sea of Kara (GRUN.).

The above description is from the work of GRUNOW. In Cl. M. D. N:o 256 (Lymington, England) occurs a form, determined by GRUNOW as A. Pokorn. L. 0,09; B. 0,04 mm. Striæ 16 in 0,01 mm., coarsely punctate on the keel. Junction-line slightly sinuose. Keel strongly sigmoid.

Var. *punctulata* GRUN. (1880). — Frustule slightly constricted. L. 0,037 to 0,095 mm. B. 0,02 to 0,023 mm. Junction-line not sinuose, with a row of small puncta. Striæ about 27, on the keel 24 in 0,01 mm. — *A. pal. v. punct.* GRUN. A. D. p. 62, Pl. IV f. 84. Franz Josephs L. D. p. 53 (105), Pl. I f. 54, 55.

Brackish water: Sea of Kara! Franz Josephs Land (GRUN.), Cape Wankarema!

Var. *Nereis* LEWIS (1861). — Frustule strongly constricted in the middle. L. 0,05 to 0,114 mm Junction-line not sinuose, but with distant puncta. Striæ 22 in 0,01 mm. V. narrow, lanceolate, with sigmoid median line. — *A. Nereis* LEWIS. Proc. Acad. N. Sc. Philadelphia 1861 p. 64. — *A. plicata var. japonica* CASTR. Challenger Exp. D. p. 40, Pl. XXX, f. 8.

Marine: Atlantic coasts of N. America (LEWIS).

Var. *dilatata* PANT. (1891). — Frustule strongly constricted. L. 0,139. Height of the valve 0,025; at the constriction 0,0105 mm. Junction-line crenulated. Striæ 25 in 0,01 mm. — *A. dilatata* PANT. II. p. 55, Pl. X f. 179.

Brackish water: Hungary, fossil (PANT.).

This form only differs from var. Nereis by its somewhat larger size.

Var. *borealis* GRUN. (1880). — Frustule slightly constricted. L. 0,079 to 0,085; B. 0,028 to 0,03 mm. Junction-line slightly arcuate, not sinuose. Striæ on the keel 23, on the valve and the connecting zone 26 in 0,01 mm. — *A. pal. var.? borealis* GRUN. A. D. p. 62, Pl. IV f. 85.

Brackish water: Sea of Kara (GRUN.), Cape Wankarema!

Var. *duplex* DONK. (1858). — Frustule in L. 0,02 to 0,066; B. 0,01 to 0,04 mm. Junction-line arcuate, not sinuose. Striæ very fine. V. narrow, lanceolate, with strongly sigmoid median line. — *A. dupl.* DONK. T. M. S. VI p. 29, Pl. III f. 13. — *A. pal. v. dupl.* V. H. Syn. p. 121, Pl. XXII f. 15, 16.

Brackish water: Greenland! North Sea (Sweden! England, DONK., Belgium V. H.) Hungary, fossil (PANT.).

Var. *hyalina* EULENST. (1880). — As Var. duplex but smaller. L. 0,017; B. 0,035 mm. — *A. hyalina* EUL. in V. H. Syn. Pl. XXII f. 17.

Brackish water: Cette (GRUN.).

A. paludosa is a very variable species, closely connected with *A. alata*. Nearly akin to *A. paludosa*, perhaps a variety, is *A. Kützingiana* GREV. (1863 Edinb. N. Ph. J. XVIII p. 184 f. 6) from Queensland. The frustule is deeply constricted. L. 0,128 mm. The junction-line is not sinuose.

2. **A. Dusenii** CL. N. SP. — Frustule membranaceous, strongly constricted in the middle, the segments being almost orbicular. L. 0,13; B. 0,11 at the constr. 0,07 mm. Zone with sigmoid longitudinal divisions, 2 in 0,01 mm., finely striate; striæ 17 in 0,01 mm. V. strongly compressed and elevated, without any junction-line. Striæ (at the keel) 12 in 0,01 mm., curved, towards the keel with distant puncta, 8 in 0,01 mm.

Brackish water (mouths of rivers): Cameroon (DUSÉN)!

3. **A. alata** KÜTZ (1844). — Frustule strongly silicious, constricted in the middle. B. 0,04. Junction-line not sinuose, but frequently with a row of large puncta. V. linear, with acuminate ends. L. 0,10 to 0,11; B. 0,02 mm. Median line strongly sigmoid. Basis of the keel linear, sigmoid.

Striæ 16 to 17 in 0,01 mm. finely lineate and, on the keel, with coarse puncta. — Kütz. Bac. p. 107 Pl. III f. 63. W. Sm. B. D. I p. 44 Pl. XV f. 124. V. H. Syn. p. 121 Pl. XXII f. 11, 12.

Brackish water: North Sea (Bohuslän! England! France! Belgium V. H.). Mediterranean Sea (Peragallo). California!

Var. *intermedia* Cl. — V. in L. 0,11 to 0,15; B. 0,03; Height 0,025 to 0,03 mm. Striæ 11 in 0,01 mm.

Brackish water: New York! San Domingo (Witt Coll)!

Var. *pulchra* Bail (1850). — Frustule strongly constricted. L. 0,27; B. 0,1 mm. Striæ 7 in 0,01 mm., on the keel with large puncta, 5 to 6 in 0,01 mm. — *A. pulchra* Bail. Smiths. Contr. II p. 38 Pl. II f. 16, 18 (bad). V. H. Syn. Pl. XXII bis f. 1, 2, 4.

Brackish water: Atlantic coasts of N. America! San Domingo (Witt Coll.)!

Var. *japonica* Cl. — V. in the zonal view strongly constricted. L. 0,085; B. 0,02 mm. Junction-line bisinuose on each side of the central nodule. Striæ 12 in 0,01 mm., coarsely punctate on the keel. — Pl. I f. 2.

Marine: Japan!

The smaller forms of *A. alata* appear to graduate into *A. paludosa*, so that there seems to be an uninterrupted series of forms from the gigantic Var. maxima to the very minute A. pal. var. hyalina. The Var. japonica may be regarded as a connecting link between *A. alata* and *A. ornata*. To the forms of *A. alata* belongs perhaps also *A. biharensis* Pant. III Pl. XLII f. 577.

4. **A. conspicua** Grev. (1861). — V. linear-lanceolate, strongly convex. L. 0,06 to 0,13; B. 0,02 to 0,024 mm. Median line strongly sigmoid. Junction-line indistinct. Striæ 7 in 0,01 mm., some of them near the median line coarser, finely lineate; lineolæ about 25 in 0,01 mm. — Grev. T. M. S. IX p. 86 Pl. X f. 16 (?). V. H. Syn. Pl. XXII bis f. 3.

Brackish water: Atlantic coasts of N. America! Brazil! Sierra Leone (Grun), Cameroon!

5. **A. ornata** Bail (1852). — Frustule membranaceous, strongly constricted. L. 0,067; B. 0,05 mm. Junction-line deeply denticulate. Striæ 20 to 22 in 0,01 mm., finely punctate. — Bail. Smiths. Contr. II p. 38 Pl. II f. 15 to 23. V. H. Syn. p. 121 Pl. XXII bis f. 5. *A. fimbriata* Castr. Voy. Challenger p. 40 Pl. XVII f. 15 (Surirella?).

Fresh water: Finland! Belgium (V. H.). North America (Michigan! Florida, Bail).

6. **A. crenulata** Temp. (1891). — Frustule deeply constricted. L. 0,037; B. 0,03 mm. Junction-line sinuose. Connecting zone with several longitudinal divisions, finely striate. Striæ 28 in 0,01 mm. V. lanceolate, with crenulated margins (denticulations 2 in 0,01 mm.), apiculate. L. 0,04; B. 0,014 mm. Median line strongly sigmoid. Basis of the keel biconstricted. Axial and central areas indistinct. Keel with transverse, punctate striæ, 16 in 0,01 mm. Lower part of the valve with numerous, strong, transverse lines. — Temp. Diatomiste I, p. 50 Pl. IX f. 9, 10.

Brackish water: New Guinea!

7. **A. Kjellmanii** Cl. (1880). — Frustule silicious, slightly constricted. L. 0,13; B. 0,04 mm. Junction-line undulated or not. Striæ coarser on the keel than on the valve, 12 or 13 (keel) to 17 (valve) in 0,01 mm. — Cl. A. D. p. 14 Pl. IV f. 83.

Marine: Sea of Kara! Cape Wankarema!

Var. *glacialis* Cl. (1883). — Frustule not constricted. L. 0,07; B. 0,015 mm. Striæ 14 (keel) to 19 (valve) in 0,01 mm. — Cl. Vega p. 477 Pl. XXXV f. 12.

Marine: Cape Wankarema!

Var. *kariana* Grun. (1880). — Frustule slightly constricted. L. 0,064 to 0,07; B. 0,036, at the constriction 0,027 mm. Junction-line slightly sinuose. Striæ 10 or 11 (keel) to 17 or 18 (valve) in 0,01 mm. — *A. kariana* Grun. A. D. p. 61 Pl. IV f. 82. Franz Josephs L. D. p. 53 (105).

Marine: Franz Josephs Land (Grun.).

Var. *subtilis* GRUN. (1884). — Frustule scarcely constricted. L. 0,04; B. 0,014 mm. Junction-line slightly undulated. Striæ 13 (keel) to 26 (valve) in 0,01 mm. V. in B. 0,08 mm. — *A. kariana v. subtilis* GRUN. Franz Josephs L. D. p. 105 (53) Pl. I f. 52, 53.

Marine: Franz Josephs Land (GRUN.).

Var. *striolata* GRUN. (1880). — Frustule rectangular, slightly constricted. L. 0,07; B. 0,023, at the constriction 0,015 mm. Junction-line not sinuose. Striæ 12 (keel) to 15 (valve) in 0,01 mm. those on the keel ending in small dots. — GRUN. A. D. p. 62 Pl. IV f. 81.

Brackish water: Sea of Kara (GRUN.).

8. **A. kryophila** CL. (1883). — Frustule slightly constricted. L. 0,13 to 0,16; B. 0,043 to 0,045; at the constriction 0,028 to 0,03 mm. Junction-line sinuose. Striæ on the keel 13 to 17 in 0,01 mm., ending in small puncta; striæ on the valve 10 to 14 in 0,01 mm. wider than on the keel. V. lanceolate, with strongly sigmoid median line. — CL. Vega p. 477 Pl. XXXV f. 11.

Marine: Cape Wankarema!

A. kryophila is perhaps not specifically distinct from *A. Kjellmanii*, the only difference being that the striæ on the keel are closer than those on the valve; otherwise the two forms are perfectly similar. Both differ from *A. paludosa* in large size, more strongly silicious valves, and coarser striæ.

9. **A. lata** GREV. (1863). — Frustule quadrate, strongly constricted. L. 0,075; B. 0,04, at the constriction 0,025 mm. Keel broad. Junction-line uniformly arcuate, not sinuose. Striæ on the keel 11 to 12 in 0,01 mm. ending in small puncta. Striæ on the valve of equal number, not distinctly punctate. Connecting zone with numerous, longitudinal divisions. — GREV. Edinb. N. Phil. J. XVIII p. 38 f. 14. — Pl. I f. 5.

Marine: Balearic Islands! Queensland (GREV.).

The above description is from specimens from the Balearic Islands. GREVILLE does not give the number of striæ.

10. **A. Meneghiniana** GREV. (1863). — Frustule broad, quadrate. L. 0,115 mm. Connecting zone with numerous longitudinal divisions. Junction-line uniformly arcuate, not sinuose. Striæ coarse 6 in 0,01 mm. — GREV. Edinb. N. Ph. J. XVIII p. 184 f. 7.

Marine: Queensland (GREV.).

11. **A. Brebissoniana** GREV. (1863). — Frustule strongly siliceous, deeply constricted, with broad truncate ends. L. 0,089 to 0,13; B. 0,066 mm. Junction-line not sinuose. Keel very elevated, bordered with a conspicuose hyaline margin, obsoletely striate, the striæ being visible only at the median line and at the junction-line. Striæ of the valve 7,5 in 0,01 mm., obscurely but coarsely punctate. — GREV. Edinb. N. Ph. J. XVIII p. 185 f. 8. — Pl. I f. 4.

Marine: South Pacific Ocean (GREV.), Sendaï, Japan, fossil (TEMPERE)!

12. **A. margine-punctata** CL. N. SP. — V. in L. 0,13; B. 0,04, at the constriction 0,015 mm. Keel very elevated, with a row of small marginal puncta, 8 in 0,01 mm., connected with similar rows of puncta at the basis of the keel. Lower part of the valve very narrow. Striæ on the keel 19 in 0,01 mm., curved and finely punctate. — Pl. I f. 3.

Marine: Java!

13. **A. Temperei** CL. (1890). — Frustule strongly constricted. L. 0,15; B. 0,055, at the constriction 0,027 mm. Junction-line obsolete, visible only near the central nodule. Keel with two rows of large puncta (4 in 0,01 mm.), striate; striæ 21 in 0,01 mm. V. with fine, scattered puncta. Connecting zone with numerous longitudinal divisions, transversely striate; striæ 20 in 0,01 mm. — CL. Diatomiste I p. 2 Pl. II f. 3.

Marine: Madagascar!

This is a very characteristic species, not closely connected with any other. The median line is strongly sigmoid.

14. **A. gigantea** GRUN. (1860). — Frustule strongly constricted. L. 0,12 to 0,16 mm. Keel with a hyaline margin, broader towards the ends. Junction-line uniformly arcuate, not sinuose. Keel with puncta forming obliquely decussating rows, 13 to 15 in 0,01 mm. Striæ of the valve curved, divergent from the central nodule, about 14 in 0,01 mm., not decussating. Median line strongly sigmoid. Connecting zone with numerous longitudinal divisions. — GRUN. Verh. 1860 p. 568 Pl. VI f. 12 (bad!). A. D. p. 63. — Pl. I f, 6. *A. gig. var. kerguelensis* GRUN. A. D. p. 63 (1880).

Marine: Mediterranean Sea! Adriatic! Macassar Straits! Kerguelens Land!

This is a very large diatom, with somewhat thin silicious membrane. When dry the keel under a low power is yellow, and the valve hyaline.

Var. *tahitensis* GRUN. (1880). — Frustule membranaceous. L. 0,06 (to 0,095); B. 0,04 mm. Keel strongly sigmoid. Striæ 18 to 22 in 0,01 mm. — A. D. p. 63.

Marine: China! Japan! Tahiti (GRUN.).

Var. *æquatorialis* CL. (1873). — L. 0,10 to 0,15 mm. Striæ 9 to 11 in 0,01 mm. — *Amphicampa æquatorialis* CL. D. Sea of Java p. 12 Pl. III f. 17. *Amphipr. balearica* GRUN. A. D. p. 63 (1880).

Marine: Balearic Islands! Adriatic! Java!

Var. *sulcata* O'MEARA (1871). — L. 0,09 to 0,14 mm. Striæ 12 to 13 in 0,01 mm., on the connecting zone 20 in 0,01 mm. — *A. sulcata* O'M. M. J. (N. S.) Vol. XI p. 22 Pl. III f. 3. *A. pelagica* BRUN. D. Esp. n. p. 8 Pl. XXII f. 3, 4 (1891).

Marine: Le Croisic! Balearic Islands! Seychelles! Cape Good Hope! Sumatra! Jamaica (Grove Coll.)!

Var. *decussata* GRUN. (1880). — L. 0,063 to 0,065 mm. Keel slightly sigmoid. Striæ 21 to 24 in 0,01 mm. — *A. decussata* GRUN. A. D. p. 63. V. H. Syn. Pl. XXII f. 13.

Marine: Courselles (GRUN.). Hungary, fossil (PANT.).

Var. *septentrionalis* GRUN. (1880). — L. 0,076 to 0,18 mm. Striæ 20 to 23 in 0,01 mm. — *A. sept.* GRUN. A. D. p. 63.

Marine: Finmark! Cape Wankarema!

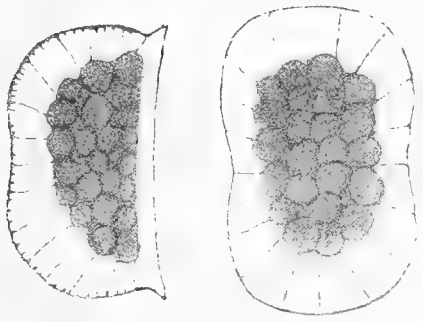
Auricula CASTR. (1873).

Valve more or less reniform or cymbiform, elevated into an asymmetrical, arcuate, but not sigmoid, keel. Median line not sigmoid, more or less biarcuate, with approximate central pores. Structure: transverse striæ, or more or less curved, irregular lines. Frustule usually globose, with complex connecting zone. Keels of both valves turned in the same direction.

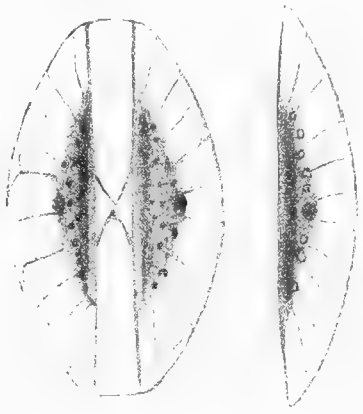
The first known species was the diatom, described 1857 by GREGORY as *Amphiprora complexa*. The genus Auricula was founded 1873 by CASTRACANE (Atti del accad. pont. dei Lincei XXVI p. 406) for *A. Amphitritis*, which is evidently nearly akin to *A. complexa*. In Van Heurcks Synopsis (Pl. XXII bis f. 9, 10) GRUNOW has proposed the name *Amphoropsis* for two forms, of which one, *A. decipiens*, is related to Auricula, and the other, *A. recta*, is by me considered as belonging to Tropidoneis. As A. decipiens in my opinion cannot be separated from Auricula, I propose to reserve the name Amphoropsis for a section of Tropidoneis.

The valve of Auricula is keeled as in Amphiprora, but the keel is not sigmoid. In some species, which approach to Amphiprora, the keel is separated from the lower part of the valve by a line of junction. In other forms there is a gradual slope from the median line to the margin.

I have examined some living frustules of A. complexa. It has along the ventral side a single chromatophore-plate enclosed in a plasmatic mass, from which fine plasma-threads radiate towards the walls.



A. complexa, 500 times magnified.

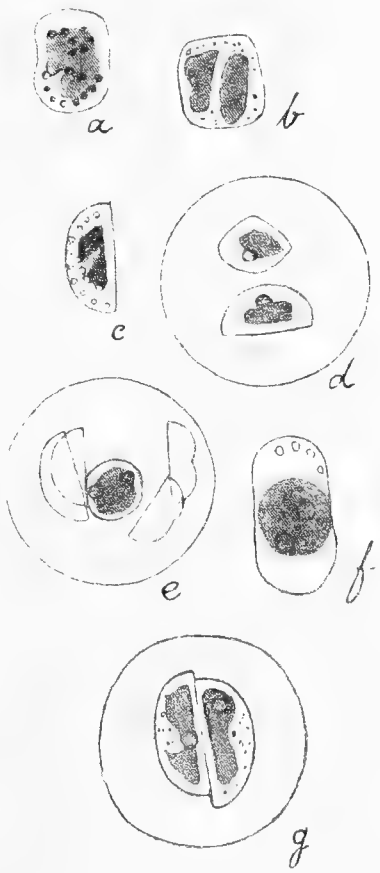


A. incerta, 500 times magnified.

Of *A. incerta* I have had an opportunity of examining numerous living specimens. This species has also a single chromatophore-plate along the ventral side of the zone, enclosed in a plasma-mass which sends fine plasma-threads to the walls of the frustule. If the living frustules be suddenly killed by a boiling concentrated solution of mercuric chloride in alcohol, and then by washing freed from mercuric salt, they may be stained with different dyes. Carmine colours the nucleus, which is placed above the plate and on its centre. Stained with chrysoidine numerous granules in the plasma-mass take an intensely yellow colour, and are probably elæoplasts, as fatty matters are intensely coloured by the dye.

Auricula minuta has also a single chromotophore-plate along the ventral side, and at the primordial stratum of the plasma a number of small granules, possibly geline-secreting organs.

Auxospores. In *A. minuta* a single globular auxospore is formed out of two frustules. In the annexed sketches *a* and *c* represent a frustule in living state, *b* a frustule in the state of division. Fig. *d* shews two frustules enclosed in a mucous mass, the first stage of the conjugation. In *e* the auxospore is formed and enclosed between the empty valves; *f* seems to represent an mature auxospore, and *g* two frustules, to judge from the size, probably formed out of the auxospore.



A. minuta, 500 times magnified.

Some extreme forms of Auricula have a very peculiar appearance, but by intermediate steps they are connected on one hand with Amphiprora, on the other with Amphora, so nearly indeed that no line of demarcation may be traced between Amphora and Auricula.

All species of Auricula are marine and pelagic. Some forms are thin and membranaceous. Others have strong valves, but thin connecting zones, so that entire frustules are rarely to be found in gatherings which have been cleaned by means of acids.

Artificial key.

1.	Valve more or less boat-shaped	2.
	— — — reniform	4.
2.	Striæ 10 to 11 in 0,01 mm.	*A. coarctata* Br.
	— 20 to 22 —	3.
3.	Zone with a few larger stigmas	*A. pulchra* Grev.
	— without stigmas	*A. decipiens* Grun.
4.	Keel strongly inflected in the middle	5.
	— not, or slightly, inflected	6.
5.	Striæ 15 to 16 in 0,01 mm.	*A. intermedia* Lewis.
	Striæ very fine	*A. insecta* Grun.
6.	Striæ transverse	8.
	— curved, divergent towards the median line	7.
7.	Striæ coarse (8 in 0,01 mm.)	*A. Amphitritis* Castr.
	— finer (20 in 0,01 mm.)	*A. complexa* Greg.
8.	Valve large (L. 0,17 mm.)	*A. javanica* Cl.
	— small (L. 0,02 to 0,03 mm.)	*A. minuta* Cl.

1. **A.** (?) **coarctata** Brun (1889). — V. lanceolate, acute. L. 0,115 to 0,135; B. 0,02; Height 0,025, at the constriction 0,013 mm. Median line highly elevated between the central nodule and the ends. Central area small, unilateral. Junction-line between the keel and the lower part of the valve very distinct, with a sinus on each side of the central nodule. Striæ 10 to 11 in 0,01 mm., convergent on both sides of the central nodule, punctate, puncta 12 to 13 in 0,01 mm. — *Amphiprora coarct.* Brun. D. foss. du Japon p. 14 Pl. III f. 12.

Marine: Japan, fossil and living (Brun)!

As the entire frustule is not known, it is impossible to decide whether this species, which has a great resemblance to a true Amphiprora, belongs to Auricula or to the sections Plagiotropis or Amphitropis of Tropidoneis. The incompletely described *Amphiprora nitida* Grev. (Edinb. N. Ph. J. XVIII p. 40 f. 18, 1856) has some resemblance to A. coarctata, but has not a complex zone.

2. **A. decipiens** Grun. (1882). — Frustule quadrate to rectangular, slightly constricted in the middle. L. 0,06 to 0,11; B. 0,05 mm. Junction-line distinct, sinuose. Central area indistinct. Striæ 20 in 0,01 mm., a little closer on the valve. Connecting zone, on the dorsal side, with broad divisions, about 3 in 0,001 mm., transversely striate; striæ 22 in 0,01 mm. Divisions narrow on the ventral side. — *Amphoropsis decipiens* Grun. in Cl. M. D. N:o 309. V. H. Syn. Pl. XXII bis f. 11. *Amphiprora plicata* Greg. D. of Clyde p. 505 Pl. XII f. 57 (1857)?

Marine, æstuaries: Scotland!

3. **A. pulchra** Grev. (1863). — Frustule membranaceous, quadrate, slightly constricted. L. 0,075; B. 0,045 mm. Connecting zone with numerous divisions, about 5 in 0,01 mm., transversely striate; striæ about 22 in 0,01 mm. On the zone, close to the valve, are 3 or 4 large isolated stigmas. Valve with transversely dilated central nodule and elevated keel, bordered with a row of puncta, 6 in 0,01 mm. Striæ 22 in 0,01 mm. — *Amphora pulchra* Grev. Edinb. N. Ph. J. XVIII p. 184 f. 2. — *Auricula pulc.* Pl. II f. 23.

Marine: Queensland (Grev.)! China! Macassar Straits (Grove coll.)! South Pacific Ocean (Van Heurcks coll.)!

The following incompletely described forms seem allied to this species: *Amphiprora lineata* Grev. (Edinb. N. Ph. J. XVIII p. 40 f. 19; 1863) and *Amph. Jolisiana* Grev. (l. c. p. 186 f. 11).

4. **A. insecta** Grun. (1876). — Frustule membranaceous, globose. L. 0,06 to 0,11; B. 0,04 to 0,05 mm. Median line strongly inflected towards the centre of the frustule. Central nodule

mucronate on inner side. Connecting zone complex, with 4 to 5 divisions in 0,01 mm. Along the keel is a row of puncta, 7 to 10 in 0,01 mm. Striæ 35 to 40 in 0,01 mm., extremely difficult to resolve. — *Amphora? insecta* A. S. Atl. XL f. 2, 3. *Amphora mucronata* H. L. Sm. Types N:o 38. Am. Qu. M. J. 1878 p. 17 Pl. III f. 9.

Marine and pelagic: Sweden, Gullmarsfjord on Zostera! Honduras (Grun.), Atlantic City (H. L. Sm.).

A probably allied, and very large, form is *Amphora? incerta* A. S. Atl. XL f. 1 from Baltschick. The specimen figured is too imperfect to admit of a description. It is probably the same species as *Amphiprora punctata* Pant. III Pl. XXXIX f. 547.

5. **A. complexa** Greg. (1857). — Frustule quadrate with rounded angles, constricted in the middle. L. 0,089 to 0,102; B. 0,07 mm. Connecting zone with 7 to 8 divisions (about 2 in 0,01 mm.) transversely striate. V. with reniform outline, and very excentric elevated keel, along which is a row of puncta, about 8 in 0,01 mm. Striæ of the valve curved and divergent from the central nodule, about 20 in 0,01 mm. — *Amphiprora complexa* Greg. D. of Clyde p. 508 Pl. XII f. 62. *Auricula Ostræa* Temp. a. Brun. D. foss. du Japon p. 25 Pl. IV f. 7 (1889)?

Marine, pelagic: Scotland! Balearic Islands! Rembang Bay (Debys Coll.)! Japan, fossil (Br. a. Temp.)? Barbados!

This species, remarkable for its excentric keel, is rarely found in entire frustules, the thin connecting zone being usually detatched in the course of preparation from the more silicious valves. A. Ostræa is in all respects similar to A. complexa, except as to the number of striæ, which according to Brun and Tempère are only 7 to 9 in 0,01 mm.

6. **Auricula minuta** Cl. N. Sp. — Frustule quadrate with rounded angles. L. and B. 0,02 to 0,05 mm. Zone thin with about 7 divisions in 0,01 mm. V. reniform, very slightly indented in the middle. Margin with a row of puncta (7 in 0,01 mm.) along the median line. Striæ about 25 in 0,01 mm. delicate, almost parallel in the middle, curved at the ends. — Pl. I f. 7, 8.

Marine: Sweden, Gullmarsfjord on Zostera and among Amphipleura (Berkeleya) Dillwynii, frequent!

7. **A. intermedia** Lewis (1865). — Frustule elongated, rectangular with rounded angles, very slightly constricted. L. 0,07; B. 0,03 mm. Median line strongly inflected towards the centre of the frustule. Along it is a row of puncta, 5 in 0,01 mm. V. in outline narrow, reniform. L. 0,07 to 0,11; B. 0,025 mm. Median line excentric, diverging from the central nodule towards the dorsal side of the valve. Striæ 15 to 16 in 0,01 mm. curved and divergent towards the median line. — *Amphora intermedia* Lewis. Proc. Philad. Ac. Nat. Sc. Pl. I f. 7 (1865). *Auricula japonica* Br. and Tempère, D. foss. du Japon p. 25 Pl. IV f. 8 (1889).

Marine: Adriatic! China! Japan, foss. (Br., Temp.), South Pacific Ocean (Van Heurcks Coll.)! Port Jackson! New Jersey (Lewis), Honduras (Grun.).

8. **A. javanica** Cl. N. Sp. — Valve linear-lunate, very slightly constricted in the middle. L. 0,17; B. 0,026 mm. Median line very excentric not inflected, close to the margin of the valve and not bordered by a row of puncta. Striæ 8, 5 in 0,01 mm., almost transverse, finely punctate. — Pl. II f. 22.

Marine: Sumbava (Kinker Coll.)!

9. **A. Amphitritis** Castrac. (1873). — V. reniform. L. 0,055; B. 0,025 mm. Keel very excentric, closer to the outer margin, to which its exterior wall is vertical. The interior wall seems to be elevated in the middle, and to slope gently towards the somewhat sinuose interior margin. Striæ about 8 in 0,01 mm., undulating, not distinctly punctate, on the interior wall of the keel alternately longer and shorter towards the keel, to which they diverge. — Castr. Atti del

accad dei n. Lincei 1873 p. 406 Pl. VII f. 2. Peragallo Villefranche D. p. 42 Pl. II f. 18. *A. Szontaghii* Pant. III Pl. VII f. 104 (1893).

Marine: Marocco! Balearic Islands! Adriatic!

To the genus *Auricula* may belong *Aur. Grunowii* Pant. III Pl. XXXI f. 453. *Amphiprora striata* Pant. III Pl. XXXIX f. 543 and *Amphiprora Pethöi* Pant. III Pl. XLI f. 565 all unknown to me.

Tropidoneis Cl. (1891).

Valve elongated, lanceolate, more or less convex and acute, frequently with a wing, or longitudinal band, on one or both sides. Median line straight, on a central, or excentric, keel; its central pores approximate. Axial area indistinct. Central area small, rounded, or transversely dilated. Structure, fine puncta, forming transverse, not radiate, striæ, and longitudinal, more or less straight, much finer, striæ. Connecting zone not complex.

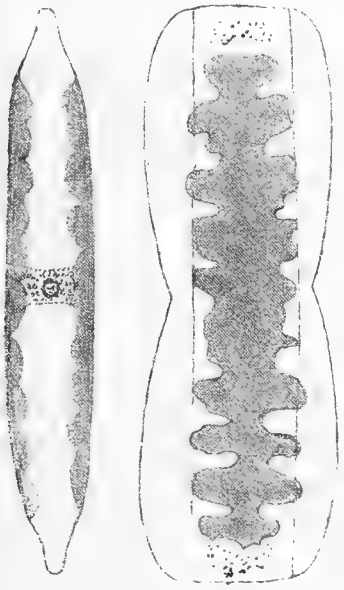
Tropidoneis elegans, 500 times magnified.

Cell-contents. The cell of T. vitrea contains two chromatophore-plates along the connecting zone, they follow the interior of the larger side of the valve; and send some divisions into the keel (Pfitzer: Bau und Entw., p. 93).

The plates of T. elegans are similar, but they have three deep constrictions nearly dividing them into almost equal patches, the margins of which are deeply indented. T. Lepidoptera has also two strongly indented or serrated plates along the connecting zone. At the ends of the frustule are numerous small granules in lively motion. T. conserta has an entirely different arrangement of the cellcontents, so that it seems questionable whether this species should not be placed in Auricula, the divisions of the zone being perhaps too delicate to be visible. T. conserta has along the neutral side of the zone a flat plasma-mass including two chromatophore-plates separated by a narrow, oblique fissure. The plasma-mass has a broad sinus at each end.

The first known species of this genus is *Amphiprora vitrea*, named 1853 by W. Smith. Other forms have since then been described by Gregory, Greville and others as *Amphiprora*, including both forms with sigmoid median line and complex zone, and with straight median line and not complex zone. Rabenhorst 1864 proposed (Fl. Eur. Alg. p. 257) for the former the generic name *Amphicampa* (later on changed by Pfitzer and Grunow to *Amphitropis*) and retained the genus *Amphiprora* for the latter. As, however, the first species of Amphiprora (*A. alata* Kütz), so described as to be distinctly recognized, belongs to the group with sigmoid median line, it seems to me that that name, rather than Amphicampa, should be retained for this group. In 1871 Pfitzer created the genus *Plagiotropis*, and family *Plagiotropidæ*, for forms with straight, excentric, keels lying diagonally in opposite directions, represented by *P. baltica* Pfitz. which is very probably the same as *Amphiprora vitrea* W. Sm. For forms with excentric keels lying in parallel directions Grunow 1880 (Van Heurck's Syn. Pl. XXII bis.) created the genus (or more correctly subgenus of Amphora) *Amphoropsis*, in which he includes both forms with complex, and not complex, zones. In the year 1891 I (Diatomiste I p. 51) proposed to unite in one genus, *Tropidoneis*, the forms of Amphiprora with straight median line, those of Plagiotropis, and of Amphoropsis with non-complex zone.

The forms of Tropidoneis have boat-like valves, more or less strongly keeled. The keels are straight (not sigmoid) and either central (*Orthotropis*), or excentric. In the latter case they are either turned in opposite directions (*Plagiotropis*), or in the same direction (*Amphoropsis*). To treat these groups as different genera seems to me not to be natural; as the excentricity of the keel is subject to variation. On one or both sides of the keel there is frequently an expansion, or *wing*, which in the valvular view has the appearance of a longitudinal line. On the broader side of the



Tropidoneis Lepidoptera, 500 times magnified.

Tropidoneis concerta, 500 times magnified.

valves of Plagiotropis there is frequently a longitudinal band, the nature of which is not quite clear to me. It may be a wing, or a crest, as in many Nitzschieæ, or perhaps a furrow.

Tropidoneis has evidently a close affinity with the Nitzschiæ of the Grunowian divisions Bilobatæ and Pseudo-amphiprora. Among the Raphidieæ it may be akin to the carinated forms of Gyrosigma, or the so called Donkiniæ. It is also closely related to the Naviculæ of the section *fusiformes* which, although their valves are not keeled, agree with Tropidoneis in the nature of the sculpture of their values, in then non-complex zones, and in the approximate central pores of their median lines.

The species of Tropidoneis do not inhabit fresh water. Forms of the section Plagiotropis are very frequent in brackish water. The large, wingless forms of Orthotropis are pelagic in their habits, and the winged, marine. They occur in all parts of the world from the arctic seas to the tropical.

The forms of Tropidoneis are in many cases very imperfectly known, so that several species are to be regarded as doubtful. The study of them is difficult, especially as regards the nature of the wings, which require a favourable position of the valves for their examination.

Artificial key.

I. Orthotropis, median line central or nearly central.

1. { Valve without wings . . . . . 2.
   { — with — . . . . . 5.
2. { Valve moderately high . . . . . *T. adriatica* Cl.
   { — very high . . . . . 3.

3. Valve thin . . . . . 4.
— solid . . . . . *T. solidula* Cl.

4. Frustule in zonal view elliptical . . . . . *T. antarctica* Cl.
— — — rectangular . . . . . *T. membranacea* Cl.

5. Valve nearly flat . . . . . *T. longa* Cl.
— elevated . . . . . 6.

6. Wing close to the keel . . . . . *T. approximata* Cl.
— not — . . . . . 7.

7. Central area indistinct or small . . . . . *T. Lepidoptera* Greg.
— distinct — . . . . . *T. maxima* Greg.

II. Plagiatropis Pfitzer, median line excentric; keels of the valves in contrary directions.

1. Striæ coarse and distant . . . . . *T. Zebra* Cl.
— close — . . . . . 2.

2. Striæ crossed by blank, longitudinal bands . . . . . *T. seriata* Cl.
— not — — — . . . . . 3.

3. Valve not striate along the margin . . . . . 4.
— striate to the margin . . . . . 5.

4. Transverse striæ about 15 in 0,01 mm. . . . . *T. japonica* Cl.
— — — 19 — . . . . . *T. semistriata* Grun.

5. Frustule constricted in the middle . . . . . 6.
— not or slightly . . . . . 9.

6. Wing or longitudinal band instinct . . . . . *T. samoensis* Grun.
— — — distinct . . . . . 7.

7. Valve broad . . . . . *T. sumbavensis* Cl.
— narrow . . . . . 8.

8. L. about 0,08 mm. . . . . *T. gibberula* Grun.
— 0,14 mm. . . . . *T. chinensis* Cl.

9. Valve narrow, almost linear . . . . . 10.
— broader, lanceolate . . . . . 11.

10. L. 0,2 to 0,27 mm. . . . . *T. elegans* Greg.
L. about 0,06 mm. . . . . *T. pusilla* Greg.

11. L. 0,06 mm. . . . . *T. Van Heurckii* Grun.
L. 0,09 to 0,2 mm. . . . . 12.

12. Longitudinal band, if present, not interrupted . . . . . 13.
— — interrupted in the middle . . . . . *T. lata* Cl.

13. Longitudinal striæ slightly finer than the transverse . . . . . *T. Kinkeriana* Cl.
— — much — — . . . . . *T. vitrea* W. Sm.

III. Amphoropsis Grun., median line excentric; keels of the valves turned in the same directions.

1. Keels without coarse ribs . . . . . *T. recta* Greg
— with — — . . . . . *T. concerta* Lewis.

1. **T. antarctica** Grun. (1878). — Frustule membranaceous, elliptical in outline. L. 0,19 to 0,24; B. 0,06 to 0,08 mm. Central area small, stauriform (the central nodule probably being a little transversely dilated). Transverse and longitudinal striæ 21 (16 to 18 Brun) in 0,01 mm., the median transverse striæ more distant than the others. — *Amphipr.? antarctica* Grun. in Cl. M. D. No. 125. *Navicula Challengeri* Grun. A. D. p. 64 (1880). *Stauroneis glacialis* Castrac. Voy. Challeng. D., p. 25. Pl. XXVII f. 11, 1886? *Amphipr. fragilis* Temp. u. Brun. D. fossiles du Japon, p. 14. Pl. IX f. 14 (1889).

Marine, pelagic: Antarctic Ocean! Japan, fossil (Brun.).

2. **T. membranacea** Cl. (1873). Frustule membranaceous, rectangular, very slightly constricted, with rounded angles. L. 0,25 to 0,35; B. 0,07 to 0,125 mm. Central area indistinct. Transverse striæ 20 to 24, longitudinal 30 to 32 in 0,01 mm. — *Amphiprora membranacea* Cl. D. of the Sea of Java p. 12, Pl. II, f. 18.

Marine, pelagic: Java! Sumbava (Kinker Coll.)! Colon (Deby Coll.)!

3. **T. solidula** Cl. N. Sp. — V. strongly silicious, in the zonal view linear, with straight dorsal margin, curved at the ends. L. 0,19; B. 0,02 mm. Central area indistinct. Transverse striæ 14 to 15 in 0,01 mm., composed of distinct puncta forming undulating longitudinal striæ, about 14 in 0,01 mm. — Pl. II f. 19, 20, 21.

Marine: Rembang Bay (Debys Coll.)!

4. **T. longa** Cl. (1873). — Frustule narrow, rectangular, with parallel margins, not constricted in the middle. L. 0,19 to 0,3; B. 0,025 to 0,036 mm. V. slightly convex, narrow, linear-lanceolate, acute. Wings distinct, on both sides of the median line. Central area large, transverse. Transverse striæ 16 in 0,01 mm. Longitudinal striæ about 28 in 0,01 mm. — *Amphiprora longa* Cl. D. of Arct. S. p. 20 Pl. III f. 15. — Icon. n. Pl. III f. 8.

Marine: Spitsbergen! Finmark! Greenland!

Var.? *gracilis* Grun. (1880). — V. in L. 0,2 to 0,28; B. 0,016 to 0,018 mm. Wings obsolete. Central area small, transversely dilated. Transverse striæ 16 to 17 in 0,01 mm., longitudinal finer. Frustule linear, somewhat constricted, B. 0,028 (ends) to 0,021 (middle) — *Amphipr. elegans v. gracilis* Grun. A. D. p. 64.

Marine: Adriatic (Grun.).

5. **T. Lepidoptera** Greg. (1857). — Frustule elongated, rectangular, strongly constricted in the middle. L. 0,12 to 0,20; B. 0,03 to 0,04, at the constriction 0,013 to 0,018 mm. Wings distinct, usually projecting above the central nodule. V. linear-lanceolate, with acute and frequently apiculate ends. L. 0,12 to 0,20; B. 0,018 to 0,022 mm. Central area indistinct, or small, and transversely lanceolate. Wing usually unilateral. Transverse striæ 20 to 21 in 0,01 mm., finely punctate. — *Amphiprora Lepidoptera* Greg. T. M. S. Vol. V. p. 76. Pl. I f. 39. D. of Clyde p. 505 Pl. XII f. 59 (not. *c*). Rabh. a. Jan. Honduras D. p. 3. Pl. III f. 5. V. H. Syn. p. 120 Pl. XXII f. 2, 3. *Amphipr. quarnerensis* Grun. Verh. 1860 p. 569 Pl. VII f. 1. *Amphipr. mediterranea* Grun. l. c. Pl. VII f. 3 (not V. H. Syn.)?

Marine: Finmark! North Sea (Sweden! England! France!) Adriatic! Macassar Straits! King George's Sound! Sumatra! Port Jackson! Galapagos Islands! Colon! Barbados!

Var. *samoensis* Grun. (1880). — Frustule elongated, strongly constricted in the middle. L. 0,2; B. 0,05 mm. Wings distinct, not projecting beyond the central nodule. V. lanceolate, acute. L. 0,2 to 0,26; B. 0,03 to 0,037 mm. Central area indistinct. Transverse striæ 15 to 16 in 0,01 mm. inside the wing, 14 in 0,01 mm. outside the wing. Wings on both sides of the median line. — *Amphipr. Lepidopt. var. samoensis* Grun. A. D. p. 65.

Marine: Samoa! Tahiti (Grun.), Honolulu (Grun.).

Var. *proboscidea* Cl. — V. linear-elliptical, apiculate. L. 0,075; B. 0,018 mm. Median line slightly excentric. Wing unilateral, at some distance from the median line. Central area small, orbicular. Striæ transverse, 16 in 0,01 mm., faint inside the wing.

Brackish water: Africa, Cameroon!

Var. *minor* Cl. — V. in L. 0,08; B. 0,013, at the constriction 0,01 mm. Wing unilateral. Striæ 20 in 0,01 mm.

Marine: St. Lunaire (Temp. Perag. Types N:o 292 as *T. Van-Heurckii*).

Var. *delicatula* Grev. (1863). — V. in L. 0,064 to 0,075; B. 0,015 mm. Striæ 26 in 0,01 mm. — *Amphipr. delic.* Grev. Edinb. N. Ph. J. XVIII p. 36 f. 15, 16.

Marine: Cette! Woodlark Island (Grev.), Labuan!

Amphiprora indica Grun. (Verh. 1860 p. 570, Pl. VI f. 13, Pl. VII f. 2) resembles Trop. Lepidoptera but is described as having a row of puncta along the median line. I have seen no specimen of this form, which Grunow does not mention in his synopsis of the Amphiproræ in A. D. — *Amphiprora didyma* W. Sm. (B. D. I p. 44, Pl. XV f. 125) has also puncta along the median line. This diatom may perhaps be a Nitztchia.

6. **T. approximata** Cl. N. Sp. — V. narrow, lanceolate, with acute ends, very convex. L. 0,2 to 0,3; B. 0,034 mm. Central area indistinct. Wing unilateral, close to the median line. Transverse striæ 19, longitudinal about 30 in 0,01 mm. — Pl. III f. 20, 21.

Marine: Rembang Bay (Deby Coll.)! Macassar Straits (Grove Coll.)! Colon (Deby Coll.)!

7. **T. adriatica** Cl. N. Sp. — Frustule narrow, linear, slightly constricted in the middle. L. 0,18; B. 0,025 mm. Wings indistinct. V. narrow lanceolate. L. 0,2; B. 0,018 mm. Central area small, transverse, narrowed towards the margin. Transverse striæ 15 to 16, longitudinal 27 in 0,01 mm. — Pl. III f. 22, 33.

Marine: Adriatic!

8. **T. maxima** Greg. (1857). — Frustule strongly constricted in the middle. L. 0,13 to 0,17; B. 0,04 to 0,07, at the constriction 0,022 mm. Wings very distinct, projecting beyond the central nodule. V. lanceolate, acute. L. 0,22 to 0,24; B. 0,032 to 0,033 mm. Wing unilateral. Central area distinct, narrow, transversely lanceolate. Transverse striæ 15, longitudinal 21 in 0,01 mm., a little more distant outside the wing. — *Amphiprora maxima* Greg. D. of Clyde p. 507, Pl. XII f. 61. V. H. Syn. p. 120 Pl. XXII f. 4, 5. Grun. A. D. p. 65.

Marine: North Sea! Mediterranean Sea! Adriatic! Java! Macassar Straits (Grove Coll.)!

Var. *subalata* Cl. — L. 0,15 mm. Wing not projecting beyond the central nodule. Transverse striæ 19 in 0,01 mm., more distinct in the middle, punctate; puncta forming undulating, longitudinal rows, about 16 in 0,01 mm.

Marine: Macassar Straits (Grove Coll.)!

Var.? *decussata* Cl. — V. in L. 0,16; B. 0,024 mm. Transverse striæ 15 in 0,01 mm., punctate; puncta forming fine decussating lines, about 19 in 0,01 mm. — Pl. III f. 24, 25.

Marine: Seyshelles (Van Heurck Coll.)!

Var. *dubia* Cl. a. Grun. (1880). — L. 0,072 to 0,09; B. 0,012 to 0,013 mm. Central area rounded. Transverse striæ 17 to 18 in 0,01 mm. — *Amphipr. maxima* var. *dubia* A. D. p. 65. Pl. V f. 89.

Marine: Finmark!

It seems to be generally considered that there are wings on both sides of the median line, but so far as I have seen, on examining a number of specimens, there is a wing only on one of the sides. The wings of one frustule are diagonal. The following insufficiently described and figured species seem to be akin to T. maxima: *Amphiprora oblonga* Grev. (T. M. S. XI p. 20, Pl. I f. 15, 1863), *Amphipr. eximia* Grev. (Edinb. N. Ph. J. XVIII p. 36 f. 13, 1863), *Amphipr. Wendtii* Witt (J. Mus. Godeffr. H. I p. 69 Pl. VIII f. 3, 1873).

9. **T. sumbavensis** Cl. N. Sp. — V. lanceolate, gibbous in the middle. L. 0,15; B. 0,03 mm. Central area unilateral, quadrate. Wing unilateral, very distinct. Transverse striæ 19 in 0,01 mm. Longitudinal striæ very fine.

Marine: Sumbava (Kinker Coll.)!

This form is evidently nearly akin to T. maxima.

10. **T. gibberula** Grun. (1882). — Frustule rectangular, with rounded angles, constricted in the middle. L. 0,07 to 0,09; B. 0,017 mm. Wing slightly projecting outside the central nodule. V. narrow, lanceolate, with subcapitate ends, inæquilateral, the broadest side having a gibbosity in the middle. B. 0,02 mm. Striæ 16 in 0,01 mm. finely punctate. — *Plagiotropis gibberula* Grun. in Cl. M. D. N:o 309. V. H. Syn. Pl. XXII bis f. 12, 13.

Marine: Firth of Tay! China (Deby Coll.)!

11. **T. pusilla** Greg. (1857). — Frustule rectangular, with rounded angles, scarcely constricted in the middle. L. 0,055; B. 0,012 mm. V. narrow, lanceolate, unilaterally gibbous. Central area indistinct. Striæ 15 in 0,01 mm. — *Amphipr. pusilla* Greg. D. of Clyde p. 504 Pl. XII f. 56.

Marine: North Sea (Coasts of Scotland! Belgium!)

12. **T. chinensis** Cl. N. Sp. — Frustule elongated, with rounded ends, constricted in the middle. L. 0,14; B. 0,03 mm., at the constriction 0,018 mm. V. narrow, lanceolate, acute, unilaterally gibbous. L. 0,14; B. 0,02 mm. Central area transversely lanceolate. Transverse striæ 18 in 0,01 mm., finely punctate. — Pl. III f. 5, 6, 7.

Marine: China (Deby Coll.)!

This form, which is somewhat doubtful as a species, resembles T. Lepidoptera.

13. **T. semistriata** Grun. (1879). — V. somewhat membranaceous, elongated, rectangular, slightly constricted. L. 0,075; B. 0,026 mm. V. lanceolate, acute. L. 0,09; B. 0,015 mm. Keel somewhat excentric. Transverse striæ 19 in 0,01 mm., not reaching the margin of the valve where is a broad blank band. — *Amphipr. semistriata* Grun. A. M. D. N:o 196. Icon. n. P. III f. 9, 10, 11.

Brackish water: South Africa!

14. **T. japonica** Cl. N. Sp. — V. strongly constricted in the middle. L. 0,11; B. 0,02 mm. Wing projecting beyond the central nodule. Transverse striæ 14 (wing) to 16 (keel) in 0,01 mm., not reaching the margin, where is a blank band. Longitudinal striæ fine, about 30 in 0,01 mm.

Marine: Sendaï, Japan, fossil (Brun Coll.)!

15. **T. elegans** W. Sm. (1856). — Frustule linear, rectangular, not constricted in the middle. L. 0,18; B. 0,04 mm. V. narrow, linear, very convex and inequilateral. L. 0,2 to 0,27; B. 0,013 mm. Wing on the broader part. Central area small, rounded. Transverse striæ 13 to 14 in 0,01 mm.; longitudinal striæ 23 in 0,01 mm. — *Amphipr. elegans* W. Sm. B. D. II p. 90. Greg. D. of Clyde, p. 505 Pl. XII f. 58, 58 b. V. H. Syn. p. 122 Pl. XXII f. 1, 6.

Marine: North Sea (Coast of Sweden! England! Belgium!) Mediterranean Sea! Adriatic!

Var. *Adriatica* Grun. (1880). — Frustule not constricted, narrowed towards the ends. L. 0,17 to 0,30; B. 0,035 to 0,05 mm. V. in B. 0,018 to 0,02 mm. Wing distinct. Central area small. Transverse striæ 13,5 in 0,01 mm. Longitudinal striæ finer but sharp. — *Amphipr. eleg. v. Adriatica* Grun. A. D. p. 64.

Marine: Adriatic (Grun.).

Var.? *Posewitzii* Pant. (1889). — L. 0,108; Height 0,0225, in the middle 0,0175 mm. Striæ 22,5 to 25 in 0,01 mm. punctate. — *Amphipr. (elegans var.?) Posew.* Pant. II, p. 56 Pl. X, f. 181.

Marine: Hungary, fossil (Pantocsek).

It does not appear very probable that this form belongs to A elegans. The figure in Pantocseks work, although not clear, seems to represent some form of. T. vitrea.

16. **T. Van Heurckii** Grun. (1880). — Frustule nearly rectangular, not constricted. L. 0,06; B. 0,02 mm. On the broader side is a longitudinal band (wing?) forming a line, abruptly bent at about one third of the length of the value. Striæ 22 in 0,01 mm. — *Plagiotropis Van Heurckii* Grun. V. H. Syn. Pl. XXII bis f. 6 to 8.

Brackish water: Belgium!

17. **T. vitrea** W. Sm. (1853). — Frustule elliptical, truncate, very slightly constricted in the middle. L. 0,085 to 0,145; B. 0,03 to 0,04 mm. V. lanceolate, very asymmetrical. B. 0,012 to 0,018 mm. Central area indistinct. The broader side of the valve with or without a longitudinal band. Transverse striæ 18 in 0,01 mm. — *Amphipr. vitrea* W. Sm. B. D. I, Pl. XXXI f. 270. *Plagiotropis vitrea* Grun. A. D. p. 67. V. H. Syn., Pl. XXII f. 7 to 9. *Plagiotr. baltica* Pfitze: Bau und Entw. p. 94, 1871? *Plagiotr. vitrea* var. *Lindigii* Grun. A. D. p. 67.

Brackish water: North Sea (coasts of Sweden! Belgium! England!) Atlantic coast of North America! West Indies! California!

Var. *mediterranea* Grun. (1880). — Frustule nearly rectangular, slightly constricted in the middle. L. 0,075 to 0,15; B. 0,015 to 0,02 mm. The broader side of the valve with a longitudinal, broad, indistinctly punctate band. Transverse striæ 20, longitudinal 24 in 0,01 mm. — *Plagiotro-*

pis (*baltica var.?*) *mediterranea* GRUN. A. D. p. 66. *Amphiprora* (*Plagiotr.*) *medit.* GRUN. in V. H. Syn. Pl. XXII f. 14.

Marine: Mediterranean Sea (GRUN.), Adriatic (GRUN.), Samoa (GRUN.), Connecticut, Morris Creek!

Var. *scaligera* GRUN. (1880). — Frustule scarcely constricted. L. 0,1 to 0,13; B. 0,025 to 0,045 mm. The longitudinal band with coarse, transverse ribs. Striæ 17 to 18 in 0,01 mm. — *Plagiotr.* (*baltica var.?*) *scaligera* GRUN. A. D. p. 66, Pl. V f. 90.

Marine: Finmark!

The longitudinal band in this species appears to be subject to great variation. In the type it is always scarcely perceptible; in the varieties, it forms a broad band. — *Amphiprora? superba* GREV. (Edinb. N. Ph. J. XVIII p. 39 f. 17, 1863) represents probably a large form akin to T. vitrea.

18. **T. seriata** CL. (1892). — V. in the zonal-view linear, with straight dorsal margin, curved only at the ends, not constricted in the middle, very elevated and distinctly asymmetrical. L. 0,4; Height 0,04 mm. Transverse striæ 12 in 0,01 mm. crossed by several, blank, longitudinal bands. — CL. Diatomiste I p. 75 Pl. XII f. 2 to 4.

Marine: Connecticut! Colon! Jamaica!

This species, evidently akin to T. elegans, is remarkable for its large size and the peculiar striation; the striæ forming several longitudinal rows.

19. **T. Zebra** CL. (1892). — V. strongly asymmetrical, lanceolate. L. 0,18; B. 0,03 mm. Central area indistinct. There is a broad, marginal band on the broader side of the value. Striæ 5 to 6 in 0,01 mm. inequidistant, finely punctate, puncta 21 in 0,01 mm. — [CL. Diatomiste I p. 75 Pl. XII f. 1.

Brackish water: Newark, N. Jers. fossil from the »Champlain epoch»! Brazil, S:t Vincent!

20. **T. samoensis** GREV. (1880). — Frustule strongly constricted in the middle. V. in length 0,095 to 0,12; B. 0,023 to 0,027 mm. Longitudinal band very obscure. Striæ 16 to 19 in 0,01 mm. somewhat more distant in the middle, punctate. — *Plagiot. samoensis* GRUN. A. D. p. 67.

Marine: Samoa (GRUN.), West Indies (GRUN.).

21. **T. Kinkeriana** CL. N. Sp. — V. strongly asymmetrical, not constricted in the middle. L. 0,2; Height 0,032 mm. The broader side of the valve with a very broad band. Central area small, but distinct. Transverse striæ 14, longitudinal 17 in 0,01 mm. — Pl. III f. 1, 2.

Marine: Sumbava (Kinker Coll.)!

22. **T. lata** CL. N. Sp. — V. not constricted. L. 0,135; Height 0,035 mm. On the broader side of the valve there is a band interupted in the middle. Transverse striæ 18 in 0,01 mm. punctate; puncta, about 23 in 0,01 mm., forming undulating, longitudinal rows. — Pl. III f. 3, 4.

Marine: Java, Rembang Bay (Deby Coll.)!

23. **T. recta** GREG. (1857). — Frustule rectangular, with rounded angles, slightly constricted in the middle. L. 0,08 to 0,09; B. 0,02 to 0,028 mm. V. strongly inequilateral, without distinct wing. Transverse striæ 21 to 24 in 0,01 mm. — *Amphipr. recta* GREG. T. M. S. Vol. V. p. 76 Pl. I f. 40. *Plagiotr. recta* GRUN. CL. M. D. N:o 310. *Amphoropsis recta* GRUN. V. H. Syn. Pl. XXII bis f. 9, 10.

Marine: Firth of Tay!

Var.? *subplicata* GRUN. (1880). — L. 0,051; B. 0,018 mm. Wing obscure. Transverse striæ 17 in 0,01 mm. — *Amphipr. plicata v. subplicata* GRUN. A. D. p. 65 Pl. V f. 88.

Brackish water: Sea of Kara (GRUN.).

24. **T. conserta** LEWIS. (1861). — Frustule membranaceous, rectangular, with rounded angles, slightly constricted in the middle. L. 0,08 to 0,10; B. 0,034 to 0.04 mm. V. lanceolate Keel with a number of coarse, radiate ribs. — *Amphipr. conserta* LEWIS. Proceed. Ac. Nat. Sc. of Philad. 1861, Pl. I f. 5.

Marine: Gullmarsfjord, Sweden! Atlantic coast of N. America (LEWIS.).

This species, which I have found at Fiskebäckskil (West-coast of Sweden) mong Zostera, is scarcely silicious, the frustules disappearing almost completely, if burnt on a glasscover.

This very interesting species, according to LEWIS lives in colonies, and forms curved filaments of 12 or more frustules. He figures such a colony in top-view, which shows that the frustules keep in contact by means of the wings.

Other species, which perhaps belong to Amphoropsis are *Amphipr.? paradoxa* GREV. (Edinb. N. Ph. J. XVIII p. 41 f. 21, 1863) remarkable for its coarsely moniliform striæ, and *Amph. Thwaitesiana* GREV. (l. c. p. 183 f. 9) notably distinguished by its strongly marked wings, which are striate, other parts of the valve not showing any striation.

Dictyoneis CL. (1890).

Valve elongated, panduriform or lanceolate. Median line straight with the terminal fissures usually in contrary directions. Valve with double structure; the upper stratum finely punctate, with puncta disposed in decussating rows; the interior stratum irregularly reticulate with rounded cellules. Marginal cellules frequently larger than the others, forming a row of false loculi. Connecting zone not complex.

The first known species of this genus is *Navicula marginata* LEWIS. The larger marginal cellules of several species give to the valves some appearance of *Mastogloia*, in which genus several forms of Dictyoneis have by various authors been placed. In the year 1877 GRUNOW expresses the opinion that the marginal cellules seem not to belong to a separate plate as in Mastogloia, but to the valve itself and proposes a new genus for *Mast.? reticulata* and the allied species. In the year 1890 I proposed (Diatomiste I p. 14) for this genus the name *Dictyoneis*, founded on the peculiar structure of the valve. Unfertunately I have in that paper committed an error, as I then supposed the stratum with coarse reticulations to be the upper instead of the lower.

The median line of most species of Dictyoneis is straight and ends in terminal fissures, turned in contrary directions. The central pores are moderately distant, except in D. naviculoides, where they are very approximate. On both sides of the median line are narrow structureless zones, which are more silicious than the other parts of the valve and are united to the central nodule.

The genus Dictyoneis is well distinguished from all the other naviculoid genera. Its systematical place is doubtful, as there are no intermediate forms connecting it with other diatoms. The structure of the outer stratum of the valve as well as the terminal fissures point perhaps to some relation to Pleurosigma.

The species are all marine and belong to warmer seas. Fossil forms occur at Oamaru and in Hungary.

This genus comprises forms, which are so closely connected, that the distinction of well defined species is very difficult, as is frequently the case with truly natural groups. Such characteristics as the outline of the valve, the coarseness of the reticulation etc. are very variable.

Artificial key.

1.	Marginal cellules larger than the others	3.
	— — not — —	2.
2.	Valves panduriform	*D. jamaicensis* GREV.
	— lanceolate	*D. naviculacea* CL.
3.	Valve not constricted	*D. Thumii* CL
	— slightly constricted	4.
	— strongly	6.

4.	Marginal cellules of unequal size	*D. panduriformis*
	— — equal —	5.
5.	Cellules of the valve 9 in 0,01 mm.	*D. subconstricta* Cl.
	— — — 17 —	*D. Pantocseki* Cl.
6.	Segments narrow, linear	*D. rugosa* Temp. a. Br.
	— broad —	7.
7.	Marginal cellules about 5 in 0,01 mm.	*D. marginata* Lewis.
	— — — 10 —	*D. mastogloides* Pant.

1. **D. naviculacea** Cl. (1890). — V. elliptic-lanceolate. L. 0,09; B. 0,23 mm. Central nodule very small, surrounded by a moderately large, orbicular area. Terminal fissures indistinct, turned in the same direction. Cellules of the valve of about equal size, 10 in 0,01 mm. Transverse striæ not seen. — Cl. Diatomiste I p. 15. Icon. n. Pl. V f. 34.

Marine: Pensacola, Florida!

This species, of which I have seen one specimen only, seems to be extremely rare.

2. **D. jamaicensis** Grev. (1868). — V. strongly constricted in the middle with cuneate or elliptic-lanceolate segments and obtuse ends. L. 0,08 to 0,12; B. 0,024 to 0,032, at the constriction 0,013 to 0,02 mm. Terminal fissures in opposite directions. Cellules of the valve about 11 in 0,01 mm., obscure around the central nodule. Transverse striæ 24 to 27 in 0,01 mm. — *Nav. jamaicensis* Grev. T. M. S. XIV p. 126 Pl. XII f. 23. *Nav. tortuosa* Leud.-Fortm. D. de Ceylan p. 34 Pl. II f. 26 1879 *Mastogloia? reticulata* Peragallo D. de Villefr. Pl. II f. 10, 1888. — Pl. V f. 32.

Marine: Mediterranean Sea! Adriatic! Red Sea (Van Heurck Coll.)! Ceylon! Sumatra (Deby Coll.)! Cebu (Grove Coll.)! New Guinea (Grove Coll.)! West Indies (Grev.).

Var. *gigantea* Cl. — L. 0,21; B. 0,045 at the constriction 0,022 mm. Cellules about 16 in 0,01 mm. Striæ 23 in 0,01 mm.

Marine: Oamaru, New Zealand, fossil (Grove Coll.)! — Pl. V f. 35, 36.

3. **D. marginata** Lewis (1861). — V. strongly constricted in the middle. L. 0,85 to 0,18; B. 0,024 to 0,044, at the constriction 0,008 to 0,022 mm. Segments cuneate to elliptical, with obtuse extremities. Terminal fissures in opposite directions. Marginal cellules of equal size, 4 to 5 in 0,01 mm. Cellules of the valve 8 to 12 in 0,01 mm.

The following forms may be distinguished.

1.	Marginal cellules forming a broad band	Var. *spectatissima.*
	— — — narrow —	2.
2.	Valve about 3 times longer than broad	3.
	— 4 — — —	Var. *intermedia.*
	— 5 to 6 — — —	4.
3.	Segments cuneate	Var. *typica.*
	— elliptic-lanceolate	Var. *Janischii.*
	— elliptical with rounded ends	Var. *Clevi.*
4.	L. 0,11 to 0,12 mm.	Var. *commutata.*
	L. 0,18 mm.	Var. *gigantea.*

Var. *typica* Cl. — V. about 3 times longer than broad, deeply constricted, with cuneate, obtuse segments. L. 0,085 to 0,15; B. 0,024 to 0,037, at the constriction 0,008 to 0,015 mm. Marginal cellules 4 to 5 in 0,01 mm., forming a narrow band; cellules of the valve 8 to 12 in 0,01 mm., forming irregular, transverse rows. Transverse striæ 26 to 27 in 0,01 mm. — *Navicula marginata* Lewis Proced. Acad. Nat. Sc. Philad. 1861 p. 64 Pl. II f. 1. *Nav. strangulata* Grev. T. M. S, XIV p. 126 Pl. XII f. 24; 1866. — *Nav. reticulata* Grun. Hedwigia VI p. 26. *Mastogloia? reticulata* Grun. M. M. J. 1877 p. 175 Pl. CXCV f. 4. *Navic. Kossuthii* Pant. I p. 26 Pl. XVI f. 120; 1886. *Dictyoneis marginata* Cl. Diatomiste I p. 16 1890. A. S. Atl. Pl. CLX f. 20, 23, 28, 29. CLXXXVIII f. 47.

Marine: Mediterranean Sea, Alexandria (Deby Coll.)! Levant (Grove Coll.)! Delaware (Lewis) Florida! West Indies! Colon! Gulf of Mexico! Java (Atl.) Fossil Szákal, S:t Peter, Hungary, (Pantocsek).

Var. *Janischii* Castr. (1886). — Segments elliptic-lanceolate, obtuse. L. 0,1; B. 0,025 to 0,03, at the constriction 0,015 mm. Marginal cellules 4 to 4, 5 in 0,01 mm. Cellules of the valve 10 to 11 in 0,01 mm. Transverse striæ 26 to 27 in 0,01 mm. — *Navic. Jan.* Castr. D. Voyage Challenger p. 29 Pl. XXX f. 5. *Mastogloia reticulata var. japonica* Brun. D. fossiles du Japon p. 72; 1889. *Dictyoneis marginata* A. S. Atl. CLX f. 17, 18, 19, 21. *D. marg. v. Jan.* A. S. Atl. CLXXXVIII f. 50.

Marine: Madagascar (Brun Coll.)! Cebu! Java (Atl.), Japan (Atl.), Samoa (Atl.). Galapagos Islands! Bermudas (Castr.) Florida! Campeachy Bay! Colon (Deby Coll.)! Oamaru fossil, (Atl.)

Var. *Clevei* Brun. (1889). — Segments broad, elliptical, with rounded ends. L. 0,11 to 0,125; B. 0,042, at the constriction 0,013 mm. Marginal cellules 3 to 4 in 0,01 mm. — *Mastogloia Clevei* Brun a. Temp. D. foss du Japon p. 39 Pl. IX f. 18. *D. margin. v. Clevei* A. S. Atl. CLXXXVIII, 46.

Marine: Java! Japan fossil and living, (Brun).

Var. *intermedia* Cl. — Segments narrow, elliptical. L. 0,12; B, 0,03, at the constriction 0,014 mm. Marginal cellules 4 in 0,01 mm. Cellules of the valve 10 in 0,01 mm. Transverse striæ 24 in 0,01 mm. — *Mastogloia Clevei* Brun. A. S. Atl. Pl. CLX f. 34, 35.

Marine: Nossi Bé (Brun Coll.)! Japan (Atl.).

Var. *commutata* Cl. — V. about 6 times longer than broad, gently constricted in the middle. Segments narrow, elliptical to elliptic-lanceolate. Ends obtuse. L. 0,11 to 0,12; B. 0,021 to 0,025, at the constriction 0,01 to 0,12 mm. Marginal cellules 5 to 6 in 0,01 mm. Cellules of the valve 12 in 0,01 mm. Transverse striæ 25 in 0,01 mm. — *Dictyoneis marginata f. elongata* A. S. Atl. CLX f. 30.

Marine: Manila (Deby Coll.)! Macassar Straits (Grove Coll.)! Sumbava (Kinker Coll.)! Campeachy Bay! Rio Janeiro (Deby Coll.)!

Var. *gigantea* Cl. — V. as in the Var. commutata. • L. 0,18; B. 0,044, at the constriction 0,022 mm. Marginal cellules 4 in 0,01 mm. Cellules of the valve 9 in 0,01 mm.

Marine: Oamaru, New Zealand, fossil (Grove Coll.)!

Var. *spectatissima* Grev. (1866). — V. strongly constricted, with cuneate, obtuse segments. L. 0,09 to 0,13; B. 0,03, at the constriction 0,013 mm. Marginal cellules broad, 4 in 0,01 mm. Cellules of the valve coarse, 8 in 0,01 mm. Transverse striæ 23 in 0,01 mm. — *Navic. spectatissima* Grev. T. M. S. Vol. XIV p. 84 Pl. IX f. 29. *Dictyoneis spect.* A. S. Atl. CLX f. 24 to 26, 32.

Marine: Zanzibar (Grev.) Seychelles (Van Heurcks Coll.)! Campeachy Bay (Atl.), Campeachy Bank (Atl.).

4. **D. Thumii** Cl. (1890). — V. linear-lanceolate, with obtuse ends. L. 0,11 to 0,15; B. 0,022 to 0,032 mm. Terminal fissures in contrary directions. Marginal cellules 4 to 5 in 0,01 mm., of equal size. Cellules of the valve about 11 in 0,01 mm. Transverse striæ 24 to 25 in 0,01 mm. — Cl. Diatomiste I p. 15. Icon. n. Pl. V f. 33. A. S. Atl. CLXXXVIII f. 44, 45.

Marine: Red Sea (Atl.) Seychelles (Van Heurck Coll.)! Java! Cebu! China! Brazil. (Atl.).

D. Thumii is nearly akin to *D. marginata var. commutata.* The fig. 31 Pl. CLX and fig. 49 Pl. CLXXXVIII in A. S. Atl. seem to represent intermediate forms, as also *Pseudodictyoneis hungarica* Pant. III Pl. I f. 8.

5. **D. subconstricta** Cl. N. Sp. — V. slightly constricted, with broad, elliptic-lanceolate segments. L. 0,055 to 0,083; B. 0,024 to 0,03, at the constriction 0,018 mm. Marginal cellules 4 in 0,01 mm. Cellules of the valve 9 in 0,01 mm. Transverse striæ 23 in 0,01 mm. — Pl. V f. 31.

Marine: Madagascar! Cebu! Campeachy Bay!

This form is nearly akin to *D. marginata var. Janischii* and is perhaps more correctly to be appreciated as a less constricted form of this variety.

6. **D. mastogloidea** Pant. (1886). — V. strongly constricted, with cuneate, obtuse ends. L, 0,078; B. 0,024; at the constirction 0,013 mm. Marginal cellules about 10 in 0,01 mm. Cellules of the valve 14 in 0,01 mm. — *Nav. mast.* Pant. I. p. 27 Pl. XXI f. 192.

Marine: Hungary, fossil (Pant.).

This species appears, to judge from the fig. in Pantocsek's work, to connect *D. marginata* and *D. jamaicensis*

7. **D. rugosa** Temp. a. Brun. (1889). — V. narrow, about 7 times longer than broad, gently constricted, and with linear, subtruncate segments. L. 0,2 to 0,225; B. 0,026 to 0,03, at the constriction 0,013 mm. Terminal fissures in contrary directions. Marginal cellules small, 5 in 0,01 mm. Cellules of the valve obscure. — *Mastogloia rugosa* Temp. a. Brun. D. foss. du Japon p. 39 Pl. IX f. 20. *Dictyoneis rugosa* Cl. Diatomiste I. p. 17. A. S. Atl. CLX f. 33.

Marine: Japan, fossil (Temp. Br.).

8. **D. Pantocsekii** Cl. (1890). — V. gently constricted, with tongue-shaped segments and obtuse extremities. L. 0,11; B. 0,034, at the constriction 0,027 mm. Median line with the terminal fissures in contrary directions and approximate central pores. Marginal cellules 5 in 0,01 mm., of equal size, forming an uninterupted marginal band. Cellules of the valve about 17 in 0,01 mm., arranged in irregularly undulating transverse and longitudinal rows. Transverse striæ 25 in 0,01 mm. — *Navic. mastogloidea* Pant. II Pl. XXVI f. 387. — *Dict. Pant.* Cl. Diatomiste I p. 16.

Marine: Hungary, fossil!

9. **D. panduriformis** Cl. (1881). — V. slightly constricted, with tongue-shaped segments and obtuse ends. L. 0,097; B. 0,027, at the constriction 0.019 mm. Terminal fissures in contrary directions. Marginal cellules about 4 in 0,01 mm., af unequal size, absent in the middle and at the ends. Transverse striæ 20 to 21 in 0,01 mm. — *Mastogloia panduriformis* Cl. N. R. D. p. I Pl. I f. 1. *Dict. pand.* Cl. Diatomiste I p. 16; 1890.

Marine: Galapagos Islands!

Pleurosigma W. Sm. (1852).

Valve linear to lanceolate, more or less sigmoid, symmetrical. Median line sigmoid with small central nodule and the ends turned in contrary directions. Axial area indistinct. Central area indistinct or small. Structure: small puncta disposed in transverse and oblique rows. No longitudinal lines. Frustule with narrow, simple zone, arcuate or not. — Cell-contents (of P. angulatum) two chromatophores, indented at their margins. The median part of each chromatophore branches into a large elongated lobe along the interior of one of the valves, and into two similar lobes on the other valve. Division begins by a fissure across the median lobe. After the division of the cell the parts of the chromatophore migrate to the inner side of the old valves (O. Müller, Ber. d. Deutsch. Bot. Ges. 1883 p. 478).

The sigmoid Naviculæ were named *Navicula Sigma* by Ehrenberg. Hassall (A. History of Brit. Freshw. Algæ 1845 p. 435) proposed for them the name *Gyrosigma*, which was adopted by Rabenhorst (Die Süssw. Diat. 1853) but not by other diatomists, who preferred the newer name *Pleurosigma* formed 1852 by W. Smith, who published the first monograph of the species (Ann. Mag. Nat. Hist. 2 ser. IX p. 1). The genus Pleurosigma, as accepted by all diatomists, includes forms with a structure of small puncta or alveoli, disposed in transverse rows, which are crossed by other rows, either longitudinal, or obliquely decussating. There are no intermediate forms between these two types, and I think they may justly be regarded as different genera. For the forms with the puncta in transverse and longitudinal rows, I adopt the name Gyrosigma, although,

as GRUNOW remarks, this name involves a tautology. For the forms with the puncta disposed in transverse and oblique rows, I reserve the name Pleurosigma. In Pleurosigma I also include such of the forms of the Grunowian genus *Rhoicosigma*, as have the same disposition of the striæ as the true Pleurosigma. I have also included in Pleurosigma the Donkiniæ with decussating striæ. The generic name *Staurosigma* may be abolished as it was founded in 1860 by GRUNOW for Ehrenbergs *Stauroneis Sigma*, which is nothing but a frustule of *P. Normanii var. fossilis* (Perag. Monogr. de Pleuros. p. 26). For the few asymmetrical forms of Pleurosigma DONKIN proposed in 1858 (Trans. Micr. Soc. Vol. VI) the generic name *Toxonidea*. I felt at first inclined to include these forms in the genus Pleurosigma, but as such a change would be of little importance and the name Toxonidea is so generally in use, I have decided to retain the latter genus.

Pleurosigma, as here defined, comprises a large number of closely connected forms and is not nearly related to any known genus, with the exception of Toxonidea. Among the Naviculæ some few forms (N. Placenta EHB., N. Quincunx CL.) have the same disposition of the alveoli, but in other respects they are different. The same disposition of the alveoli is found also on the keel of *Amphiprora gigantea*, and in a few Mastogloiæ.

All true Pleurosigma-forms are marine. A few are pelagic in their habits. They occur in all parts of the world.

The distinction of species is a matter of difficulty. GRUNOW has in his monograph (Arct. Diat. 1880) used as characteristics for the groups the angle at which the oblique rows of puncta cross each other. PERAGALLO (Monographie du genre Pleurosigma, Diatomiste 1890—91) has adopted the same method, which I think cannot well be maintained as a natural arrangement.

Artificial key.

1.	Valve very slightly or scarcely sigmoid	2.
	— sigmoid —	14.
2.	Median line straight, central	3.
	— — sigmoid —	10.
3.	Ends rostrate	*P. cuspidatum* CL.
	— not	4.
4.	Median oblique striæ more distant than the others	*P. nicobaricum* GRUN.
	— — — not — — —	5.
5.	Transverse and oblique striæ equidistant	6.
	— striæ closer than the oblique	7.
6.	Valve rhomboid-lanceolate	*P. directum* GRUN.
	— narrow linear-lanceolate	*P. nubecula* W. SM.
7.	Ends with a lunate mark	*P. Eudon* PANT.
	— without — —	8.
8.	Valve lanceolate	*P. galapagense* CL.
	— narrow, linear-lanceolate	9.
9.	Transverse striæ 19 in 0,01 mm.	*P. Peragalli* BRUN.
	— — 23 —	*P. ibericum* PER.
10.	Median oblique striæ more distant than the others	11.
	— — — not — — —	12.
11.	Valve narrow-lanceolate	*P. naviculaceum* BRÉB.
	— broadly	*P. hungaricum* BR. a. CL.
12.	Ends rostrate	*P. lanceolatum* DONK.
	— not	13.
13.	Ends acute	*P. pelagicum* PER.
	— obtuse	*P. marinum* DONK.
14.	Median line central	15.
	— — excentric	30.
15.	Valve 14 to 20 times longer than broad	*P. Clevei* GRUN. (*P. longum* var.)
	— 10 or less	16.

16. { Median oblique striæ more distant than the others . . . 17.
— — — not . . . 18.

17. { Valve linear-lanceolate . . . *P. australe* Grun.
— lanceolate . . . *P. Normanii* Ralf.

18. { Transverse and oblique striæ equidistant . . . 19.
— striæ closer than the oblique . . . 21.
— — more distant — . . . 24.

19. { Valve narrow . . . *P. delicatulum* W. Sm.
— broad . . . 20.

20. { Striæ 28 in 0,01 mm. . . . *P. javanicum* Grun.
— 18 to 22 — . . . *P. angulatum* Quek.

21. { Oblique striæ at an angle of 90° . . . 22.
— — — about 60° . . . *P. elongatum* W. Sm.

22. { Ends with a lunate mark . . . *P. kerguelense* Grun.
— without — . . . 23.

23. { Median line central at the ends . . . *P. longum* Cl.
— — excentric . . . *P. subrigidum* Grun.

24. { Ends obtuse . . . 25.
— acute . . . 28.

25. { Valve large, about 0,3 mm. in length . . . 26.
— small — 0,1 — or less . . . 27.

26. { Valve straight . . . *P. rigidum* W. Sm.
— sigmoid . . . *P. prælongum* Cl.

27. { Transverse striæ 24 in 0,01 mm. . . . *P. salinarum* Grun.
— — 27 — . . . *P. minutum* Grun.

28. { Valve linear, strongly sigmoid at the ends . . . *P. Brunii* Cl.
— lanceolate — — — . . . 29.

29. { Transverse striæ 17 in 0,01 mm. . . . *P. Gründleri* Grun.
— — 21 to 24 — . . . *P. Stuxbergii* Cl. a. Gr.

30. { Median line flexuose . . . *P. incertum* Per. (*P. falcatum* Donk).
— — not . . . 31.

31. { Median line enclosed between longitudinal lines . . . *P. Exul* Cl.
— — not — — — . . . 32.

32. { Central area large . . . *P. umbilicatum* Cl.
— small or indistinct . . . 33.

33. { Oblique striæ at an angle of 90° . . . 34.
— — — — less than 90° . . . 37.

34. { Valve broad, lanceolate . . . 35.
— narrow, linear-lanceolate . . . 36.

35. { Median oblique striæ more obtuse than the others . . . *P. majus* Grun.
— — — not — — . . . *P. Heros* Cl.

36. { Frustule arcuate . . . *P. Weissflogii* Grun. (*P. formosum var. Arcus*).
— not . . . *P. formosum* W. Sm.

37. { Valve linear . . . 38.
— lanceolate . . . 40.

38. { Valve carinated . . . *P. carinatum* Donk.
— not . . . 39.

39. { Median line strongly excentric . . . *P. obscurum* W. Sm.
— — excentric in the ends . . . *P. speciosum* W. Sm.

40. { Ends subrostrate . . . *P. Æstuarii* Bréb.
— not . . . 41.

41. { Valve rhomboidal . . . 42.
— narrow lanceolate . . . 43.

42. { Transverse striæ about 17 in 0,01 mm. . . . *P. rhombeum* Grun.
— — — 24 — . . . *P. latum* Cl.

43. { Striæ about 22 in 0.01 mm. . . . *P. acutum* Norm.
— 20 — . . . *P. maroccanum* Cl.

1. **P. Nubecula** W. Sm. (1853). — V. narrow lanceolate, not, or slightly, sigmoid, with subcute ends. L. 0,095 to 0,16; B. 0,016 to 0,02 mm. Median line straight, central. Transverse and

oblique striæ equidistant, 20 to 24 in 0,01 mm.; angle about 60°. — *P. Nubecula* W. Sm. B. D. I p. 64 Pl. XXI f. 201. Grun. A. D. p. 52. Per. V f. 26. *P. Nub. var. parvula* Grun. A. D. p. 52. *P. Thumii* Castr. in Per. p. 14 Pl. V f. 25 (1891).

Marine: Finmark! North Sea! Adriatic (Grun.), Sumatra (var. in L. 0,14; B. 0,014 mm. Striæ 26 in 0,01 mm.)! California!

Var. *intermedia* W. Sm. (1853). — L. 0,14 to 0,44; B. 0,02 to 0,022 mm. Striæ 20 to 22 in 0,01 mm. — *P. interm.* W. Sm. B. D. I p. 64 Pl. XXI f. 200. V. H. Syn. p. 116 Pl. XVIII f. 6. Per. p. 13 Pl. V f. 27, 28.

Marine: North Sea! Port Jackson!

Var. *amphipleuroides* Grun. (1867). — L. 0,13 to 0,3 mm. Striæ 24 to 27 in 0,01 mm. — *P. interm. v. amphipl.* Grun. Hedwigia 1867 p. 29.

Marine: Honduras (Grun.).

Var. *subrecta* Cl. (1880). — L. 0,28; B. 0,022 mm. Transv. and obl. striæ $^{16}/_{17}$, $^{17}/_{18}$, $^{18}/_{19}$ in 0,01 mm. — *P. subrect.* Cl. A. D. p. 14 Pl. III f. 72. Per. V, 30. *P. elongatum var. balearica* Per p. 7 Pl. II f. 22.

Marine: Greenland! Finmark! Sea of Kara! Balearic Islands!

Var. *mauritiana* Grun. (Ms). — L. 0,13 to 0,16; B. 0,012 to 0,013 mm. Transv. and obl. striæ 22,5 in 0,01 mm.

Marine: Mauritius (Grun.).

There is no difference between *P. Nubecula* and *P. intermedium* except in the size. By its varieties *P. Nubecula* is closely connected with *P. elongatum.*

2. **P. Peragalli** Brun. (1891). — V. narrow lanceolate, gradually tapering from the middle to the obtuse ends. L. 0,3; B. 0,04 mm. Central nodule small, rounded. Median line straight, central. Transverse striæ closer than the oblique. Transv. and obl. striæ $^{19}/_{15}$ (Per), $^{24}/_{19}$ (Brun's fig.) in 0,01 mm. — *P. Perag.* Brun. in Per. p. 9 Pl. III f. 20. D. esp. n. Pl. XX f. 6.

Marine: Japan, fossil (Brun.).

Var. *perangusta* Cl. — L. 0,3; B. 0,018 to 0,024 mm. Transv. and obl. striæ $^{18}/_{15}$, $^{19}/_{16}$ in 0,01 mm.

Marine: China (Deby Coll.)! Balearic Islands!

Var. *gracilior* Cl. — L. 0,18; B. 0,012 mm. Transv. and obl. striæ $^{23}/_{19}$ in 0,01 mm.

Marine: China (Deby Coll.)!

This species seems to be nearest akin to *P. subrigidum* and *P. longum.* It has exactly the shape of *P. intermedium*, but the striation is different.

3. **P. ibericum** Per. (1891). — V. narrow lanceolate, with slightly rostrate, obtuse ends. L. 0,09 to 0,12; B. 0,015 to 0,02 mm. Median line central, slightly flexuose, curved at the ends. Transv. and obl. striæ $^{22}/_{20}$, $^{24}/_{22}$ (Per.), $^{25}/_{25}$ in 0,01 mm. Median striæ less acute. — Per. p. 8 Pl. III f. 12.

Marine: Balearic Islands!

4. **P. cuspidatum** Cl. (1881). — V. broad, lanceolate, scarcely sigmoid, with produced and rostrate ends. L. 0,077 to 0,1; B. 0,022 to 0,025 mm. Median line straight, central. Transv. and obl. striæ $^{19}/_{19}$, $^{20}/_{21}$, $^{19}/_{20}$, $^{21}/_{22}$, $^{24}/_{24}$ in 0,01 mm. — *P. lanceolatum var. cusp.* Cl. N. R. D. p. 5 Pl. I f. 7. Per. V. f. 16.

Marine: Firth of Tay! Port Jackson!

5. **P. directum** Grun. (1880). — V. rhombic-lanceolate, subacute. L. 0,243; B. 0,04 mm. Median line straight, central. Transv. and obl. striæ 18,5 in 0,01 mm. Angle 60°. — Grun. A. D. p. 53. Cl. M. D. N:o 125. Per. V. f. 29.

Marine: Antarctic Ocean (Grun.).

6. **P. galapagense** Cl. N. Sp. — V. scarcely sigmoid, lanceolate, tapering from the middle to the subacute ends. L. 0,17; B. 0,046 mm. Median line straight, central. Transv. and obl. striæ $^{17}/_{14}$ in 0,01 mm. Angle about 90°. — Pl. IV f. 16.

Marine: Galapagos Islands!

This form is nearly akin to *P. nicobaricum*, but differs by the median striæ, which are not more distant than the terminal.

7. **P. Eudon** Pant. (1886). — V. scarcely sigmoid, lanceolate, tapering from the middle to the subacute ends. L. 0,28; B. 0,05 mm. Median line straight, central. Transv. and obl. striæ $^{13}/_{12}$ (on the fig. in Pant.). Ends of the valve with a lunate marking. — Pant. I p. 30 Pl. XXI f. 190. Per. III f. 21.

Marine: Hungary, fossil (Pant.).

8. **P. nicobaricum** Grun. (1867). — V. scarcely sigmoid, lanceolate, gradually tapering from the middle to the subacute ends. L. 0,14; B. 0,035 to 0,04 mm. Median line central, straight. Oblique striæ more distant in the middle. Transverse striæ coarser than the oblique (15 to 16 in 0,01 mm. according to Grun.). Transv. and obl. striæ $^{23}/_{20}$ in 0,01 mm. (Perag.). Median oblique striæ 20, terminal 24 in 0,51 mm. (Perag.). — *P. validum var.? nicob.* Grun. Novara p. 101 Pl. I. A. f. 20. *P. nicobar.* Grun. A. D. p. 51. Per. p. 10 Pl. IV f. 9. *P. affine var. nicob.* Grun. in V. H. Syn. Suppl. Pl. C. f. 34.

Marine: Nankoori, fossil (Grun.), Belgium (V. H.).

Var. *Sagitta* Brun. and Temp. (1889). — V. rhombic-lanceolate. L. 0,15 to 0,175; B. 0,03 to 0,036 mm. Median oblique striæ 12 to 14, terminal 17 to 20 in 0,01 mm. (Brun.). — *P. Sagitta* Brun. and Temp. D. foss. du Japon p. 49 Pl. IX f. 19. Per. IV f. 13.

Marine: Japan, foss. (Brun.).

Var. *hamulifera* Brun. (1889). — V. rhomboidal. L. 0,09 to 0,12; B. 0,025 to 0,03 mm. Median line central, straight, curved at the ends. Median oblique striæ more distant than the terminal striæ which are at an acuter angle. Transv. and obl. striæ $^{21}/_{21}$ (21 to 24 Brun) in 0,01 mm. — *P. hamuliferum* Brun. D. foss. du Japon p. 48 Pl. IX f. 5. Per. p. 13 Pl. V f. 31. *P. nicob. var. indica* Per. IV f. 12.

Marine: Japan (Brun.), China (Deby Coll.)! Sumatra (Per).

The original P. nicobaricum greatly resembles my *P. galapagense*, but according to Grunow (A. D.) it is nearly akin to *P. affine* and the fig. in V. H. Syn. evidently represents a form akin to *P. Normanii*. This is also the case with *P. Sagitta* Brun. As to *P. hamuliferum* I have not seen Brun's original specimens, and his description of the striation is incomplete. In Deby's collection I have seen a specimen closely resembling *P. hamuliferum* and evidently nearly akin to *P. Normanii*. It closely resembles *P. nicob. var. indica* Per. It seems probable that the original *P. nicobaricum* may be identical with *P. galapagense*, and that *P. nicob.* Grun. in V. H. Syn., Per, graduates into *P. Normanii*.

9. **P. naviculaceum** Bréb. (1854). — V. not, or slightly sigmoid, lanceolate, acute. L. 0,08 0,1; B. 0,015 to 0,02 mm. Median line strongly sigmoid. Median oblique striæ more distant than the terminal, which are at an acuter angle. Transv. and obl. striæ $^{18}/_{16}$, $^{19}/_{17}$, $^{20}/_{18}$. — *P. navic.* Bréb. Mém. de la Soc. du Cherb. 1854 f. 7. Grun. A. D. p. 51. V. H. Syn. Suppl. Pl. C. f. 35. *P. transversale* W. Sm. B. D. II p. 96 (1856). *P. japonicum* Castr. D. Challenger Ex. XXIX f. 14.

Marine: North Sea! Mediterranean! Ceylon! Java! Labuan!

Forma minuta. L. — 0,05; B. 0,015 mm. Transv. and obl. striæ $^{22}/_{20}$.

Marine: Sumatra! Bab el Mandeb.!

10. **P. hungaricum** Brun. and Cl. (1889). — V. broadly rhomboidal, slightly sigmoid, acute. L. 0,1 to 0,13; B. 0,045 to 0,06 mm. Median line strongly sigmoid. Central nodule orbicular. Median oblique striæ forming a larger angle than the terminal, which are more acute. Transv.

and obl. striæ $^{18}/_{15}$ ($^{20}/_{18}$ PERAG.) in 0.01 mm. — BRUN. and TEMP. D. foss. du Japon p. 48 Pl. IX f. 9. PER. p. 11 Pl. IV f. 14.

Marine: Hungary, Kekkö! Japan (BRUN.).

11. **P. pelagicum** PER. (1891). — V. scarcely sigmoid, lanceolate, acute. L. 0,16 to 0,17; B. 0,023 to 0,025 mm. Median line strongly sigmoid. Median oblique striæ not more distant than the others. Transv. and obl. striæ $^{21}/_{19}$, $^{22}/_{20}$. Angle about 65°. — *P. acutum var. australica* and *P. pelagicum* PER. p. 7 Pl. III f. 3.

Marine (pelagic.): Bay of Bengal! Java (Deby Coll.)!

This species was mistaken by me for *P. acutum* var. *austral.*, which is more like the fig. 2 Pl. III in PER. Monograph. It seems nevertheless akin to *P. acutum*, and to be related to that species as *P. naviculaccum* is to *P. Normanii*.

12. **P. lanceolatum** DONK. (1858). — V. scarcely sigmoid lanceolate, with slightly protracted acute ends. L. 0,08 to 0,1; B. 0,023 to 0,025 mm. Median line flexuose. Transv. and obl. striæ equidistant 20 to 22 in 0,01 mm. Angle about 60°. — DONK. T. M. S. 1858 p. 22 Pl. III f. 4. GRUN. A. D. p. 53. PER. p. 12 Pl. V f. 14. *P. transversale β* ROPER M. J VI p. 25 Pl. III f. 11. *P. æstuarii* PER. V. f. 13?

Marine: Coasts of Scotland and England!

Var. *tahitensis* GRUN. (1880). — L. 0,118; B. 0,016 mm. Striæ 22 in 0,01 mm. — *P. lanc. var. tahit.* GRUN. A. D. p. 53.

Marine: Tahiti (GRUN.).

The median striæ of *P. lanceolatum* are a little more distant than the terminal, which points to an affinity with *P. naviculaceum*. On the other hand it is nearly related to *P. æstuarii*, into which species it seems to graduate.

13. **P. marinum** DONK. (1858). — V. very slightly sigmoid, lanceolate, with obtuse ends. L. 0,11 to 0,18; B. 0,02 to 0,03 mm. Median line undulating, excentric towards the ends. Central nodule rounded. Transv. and obl. striæ $^{21}/_{18}$, $^{23}/_{20}$, $^{24}/_{23}$, $^{25}/_{21}$ (Barbados). — DONK. T. M. S. VI p. 22 Pl. III f. 3. PER. III f. 11. *P. mar. var. Antillarum* PER. p. 8 Pl. III f. 19. *P. mar. var. barbadensis* GRUN. A. D. p. 50.

Marine: Coasts of England and Scotland! Port Jackson! Labuan! Barbados!

Var. *italica* PER. (1891). — L. 0,3 to 0,32; B. 0,068 mm. Central nodule quadrate. Transv. and obl. striæ $^{16}/_{14}$ (PER.), $^{18}/_{15}$ (PER), $^{19}/_{17}$, $^{19.5}/_{16}$. — *Pl. ital.* PER. p. 8 Pl. III f. 10.

Marine: Gulf of Naples! Adriatic!

14. **P. Clevei** GRUN. (1880). — V. slightly sigmoid, very narrow, with attenuate ends. L. 0,14 to 0,21; B. 0,0095 to 0,01 mm. Median line central. Transv. and obl. striæ $^{23}/_{24}$ in 0,01 mm. — GRUN. A. D. p. 52 Pl. III f. 70. PER. V. fig. 17, 18.

Marine: Sea of Kara (GRUN.).

Var. *sibirica* GRUN. Ms. — V. gradually tapering from the middle to the subacute ends. L. 0,2; B. 0,011 mm. Transv. and obl. striæ 28 in 0,01 mm.

Marine: Cape Wankarema (GRUN.).

Var. *cornuta* GRUN. Ms. — V. narrow lanceolate, attenuate into long narrow beaks. L. 0,12; B. 0,0075 mm. Transv. and obl. striæ 25 in 0,01 mm.

Marine: Coast of Northumberland (GRUN.).

Var. *fossilis* BRUN. (1891). — Similar to var. cornuta. L. 0,2; B. 0,015 mm. Transv. and obl. striæ $^{25}/_{22}$ in 0,01 mm. — PER. p. 13 Pl. V f. 19.

Marine: Japan, fossil (BRUN.).

15. **P. delicatulum** W. SM. (1852) — V. narrow lanceolate, slightly sigmoid, gradually tapering from the middle to the acute ends. L. 0,15, to 0,28; B. 0,02 to 0,03 mm. Median line

slightly excentric towards the ends. Transv. and obl. striæ 25 in 0,01 mm. — *P. delic.* W. Sm. Ann. Mag. Nat. H. [2] IX p. 6 Pl. I f. 5. B. D. I p. 64 Pl. XXI f. 202. Per. p. 13 Pl. V f. 20 to 22.

Brackish water: North Sea! Caspian Sea (Grun.), Red Sea (Grun.)! Massachusetts! Honduras (Grun.).

Var. *obtusiuscula* Grun. Ms. — More obtuse. L. 0,165; B. 0,0195 mm. Striæ 22,5 in 0,01 mm.

Marine: Granton Quarry (Grun.).

Var. *africana* Grun. (1879). — L. 0,18 to 0,19; B. 0,014 to 0,018 mm. Transv. and obl. striæ $^{23}/_{24}$ in 0,01 mm. — Grun. in Cl. M. D. N:o 197.

Brackish water: South Africa!

Var. *americana* Cl. — L. 0,28; B. 0,02 mm. Transv. and obl. striæ 19 in 0,01 mm.

Brackish water: Quincy, Mass.!

16. **P. elongatum** W. Sm. (1852). — V. slightly sigmoid, elongated, gradually attenuate to the acute ends. L. 0,13 to 0,38; B. 0,024 to 0,03 mm. Median line central, slightly sigmoid. Transv. and obl. striæ $^{18}/_{16}$, $^{19}/_{18}$, $^{20}/_{17}$, $^{20}/_{18}$, $^{20}/_{19}$ in 0,01 mm. — W. Sm. Ann. M. Nat. H. [2] IX p. 6 Pl. I f. 4. B. D. I, Pl. XX f. 199. Per. III f. 5 to 8. *P. angulatum var. elongat.* V. H. Syn. p. 115 Pl. XVIII f. 7. *P. elongatum var. gracilis* Grun. Casp. Sea Alg. p. 115 Pl. III f. 7. Per. II f. 20, 21.

Brackish water: Spitsbergen! North Sea! Atlantic coast of North America! Mediterranean Sea! Adriatic! Java! Sumatra! China! Tahiti! Halle in Saxony! Baltic! Caspian Sea (Grun.) Médoc (Per.).

Var. *gracilescens* Grun. (1880). — V. very narrow, gently sigmoid, with acute ends. L. 0,204; B. 0,016 mm. Median line central. Transv. and obl. striæ $^{18.5}/_{16.5}$ in 0,01 mm. — *P. gracilescens* Grun. A. D. p. 50. Per. p. 7 Pl. III f. 9.

Marine: Seychelles (Grun.).

P. elongatum is very nearly akin to *P. delicatulum*, but the transverse striæ are a little closer than the oblique and it has a perfectly central median line. Still these characteristics seem not to be constant, as I have forms of the shape of *P. delicatulum* with the striation of *P. elongatum* (specimens from Java and Sumatra have the form of P. delicatulum and transv. obl. striæ $^{20}/_{17}$, $^{19}/_{17}$).

Var. *fallax* Grun. (1880). — V. gently sigmoid, narrow linear or lanceolate. L. 0,1 to 0,17; B. 0,022 to 0,024 mm. Median line sigmoid, central. Transv. and obl. striæ $^{23}/_{20}$, $^{24}/_{22}$, $^{23}/_{21}$ in 0,01 mm. — Grun. A. D. p. 50 Pl. III f. 66. Per. II f. 23.

Marine: Finmark, Sea of Kara (Grun.), Sumatra (Deby coll.)!

Specimens from Sumatra are much more narrow than the fig. in A. D. and resemble greatly *P. delicatulum*, but have the median line perfectly central.

Var. *kariana* Grun. (1880). — L. 0,2 to 0,21; B. 0,02 to 0,022 mm. Median line perfectly central. Transv. and obl. striæ $^{23}/_{19}$, $^{23}/_{20}$ in 0,01 mm. — *P. delic. var.? kariana* Grun. A. D. p. 50 Pl. III f. 69. *P. karianum* Per. p. 6.

Marine: Sea of Kara (Grun.).

This form connects *P. elongatum* with *P. longum.*

17. **P. longum** Cl. (1873). — V. narrow, linear-lanceolate, slightly sigmoid, with acute ends. L. 0,18 to 0,3; B. 0,018 to 0,021 mm. Median line central. Transv. and obl. striæ $^{19}/_{15}$, $^{20}/_{16}$, $^{21}/_{17}$ in 0,01 mm. — Cl. D. of Arct. Sea p. 19 Pl. III f. 14. Grun. A. D. p. 49 Pl. III f. 71. Per. II f. 2.

Marine: Greenland! Spitzbergen!

Var. *americana* Per. (1891). — V. narrow lanceolate, with acute ends. L. 0,35 to 0,4; B. 0,02 to 0,025 mm. Median line very slightly excentric at the ends. Transv. and obl. striæ $^{18}/_{14}$ (Per.) $^{17}/_{15}$ in 0,01 mm. — *P. decorum var. americ.* Per. p. 5 Pl. I f. 9.

Marine: Connecticut!

Var. *inflata* PER. (1891). — V. lanceolate, sigmoid, acute. L. 0,32: B. 0,04 mm. Transv. and. obl. striæ $^{14}/_{18}$ in 0,01 mm. — *P. decorum var. infl.* PER. p. 5 Pl. I f. 10.

Marine: Corsica (PER.).

18. **P. kerguelense** GRUN. (1880). — V. linear, elongated, slightly sigmoid, with obtuse ends. L. 0,27 to 0,38; B. 0,023 to 0,026 mm. Median line central, slightly sigmoid. Ends of the valve with a lunate marking. Transv. and obl. striæ $^{16}/_{13}$ in 0,01 mm. — GRUN. A. D. p. 49. PER. II f. 1.

Margine: Kerguelens Land!

19. **P. subrigidum** GRUN. (1880). — V. linear, gently sigmoid, with obtuse ends. L. 0,29 to 0,32; B. 0,028 to 0,03 mm. Median line central, slightly sigmoid at the ends. Transv. and obl. striæ $^{16.5}/_{13}$ (GRUN.) $^{19}/_{17}$, $^{18}/_{15}$. — GRUN. A. D. p. 49. PER. II f. 3.

Marine: North Sea! Mediterranean Sea! Sumatra (Deby coll.)!

All the above species from *P. Clevei* to *P. subrigidum* form a closely connected series. *P. subrigidum* is, by its striation and the excentricity of the median line towards the ends, connected with *P. speciosum*.

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20. **P. salinarum** GRUN. (1878). — V. linear to narrow lanceolate, slightly sigmoid, obtuse. L. 0,104 to 0,13; B. 0,015 to 0,017 mm. Median line central, slightly sigmoid. Central nodule elongated. Transv. and obl. striæ $^{22}/_{25}$, $^{23}/_{26}$, $^{24}/_{27}$, $^{25}/_{28}$. — *P. delicatulum var. salin.* GRUN. Casp. Sea Alg. p. 116. *P. sal.* GRUN. A. D. p. 54. PER. VI f. 16.

Brackish water: Sweden, Lysekil! Kissingen (GRUN.), Caspian Sea (GRUN.), Bengal! Sumatra!

Var. *pusilla* GRUN. (1880). — L. 0,074 to 0,094; B. 0,012 to 0,018 mm. Transv. and obl. striæ $^{23}/_{25}$, $^{23}/_{26}$. — *P. pusillum* GRUN. A. D. p. 54. PER. VI, f. 15.

Fresh water: Bengal (GRUN.).

Var. *paradoxa* PER. (1891). — L. 0,044; B. 0,017 mm. Transv. and. obl. striæ $^{18}/_{20}$, $^{19}/_{21}$ in 0,01 mm. — *P. parad.* PER. p. 16 Pl. VI f. 13.

Marine: Connecticut, Morris Creek (PER.).

21. **P. prælongum** CL. N. Sp. — V. linear, slender, slightly sigmoid, with obtuse ends. L. 0,3 to 0,4; B. 0,03 to 0,035 mm. Median line central, slightly sigmoid. Transv. and obl. striæ $^{20}/_{23}$, $^{21}/_{24}$ in 0,01 mm. — Part II Pl. I f. 2.

Marine: Greenland! Spitsbergen! Finmark! Sea of Kara! Elephanta, Bombay (Grove coll.)!

This large form, widely distributed in the Arctic Seas, may be *P. Longine* W. SM. (Brightwell; M. J. VII p. 180 Pl. IX f. 7, 1859. PER. VIII f. 3) from the arctic regions. At least the outline and the median line are exactly similar. I know of no arctic form agreeing with the description of BRIGHTWELL. PERAGALLO believes that *P. Longine* may be a form of *P. robustum*, but the latter species occurs only in warmer seas and has an excentric median line.

22. **P. rigidum** W. SM. (1853). — V. linear lanceolate, almost straight, with truncate ends. L. 0,3 to 0,36; B. 0,04 to 0,054 mm. Median line central. Transv. and obl. striæ $^{18}/_{21}$, $^{19}/_{21}$, $^{20}/_{21}$, in 0,01 mm. — W. SM. B. D. I p. 64 Pl. XX f. 198. V. H. Syn. Pl. XIX f. 3. PER. VI f. 4 to 6.

Marine: North Sea! Mediterranean Sea! Adriatic! Red Sea! Samoa! West Indies! Colon! Magellhaëns Straits!

Var. *gigantea* GRUN. (1860). — More lanceolate, with obtuse ends. L. 0,44; B. 0,068 mm. Median line very slightly undulating, central, frequently bordered by a row of small dots. Transv. and obl. striæ $^{17}/_{18}$, $^{17}/_{20}$, $^{18}/_{20}$ in 0,01 mm. — *P. giganteum* GRUN. Verh. 1860 p. 558 Pl. VI f. 1 A. D. p. 53. PER. VI f. 2. *P. validum* Shadb. T. M. S. II p. 16 Pl. I f. 8 (1854)?

Marine: Java! Philippines! Samoa!

Var. *incurva* BRUN. (1891). — V. strongly sigmoid. — PER. p. 15 Pl. VI f. 7.

Marine: Japan, fossil (BRUN).

23. **P. Gründleri** Grun. (1880). — V. lanceolate, gently sigmoid, gradually tapering to the subacute ends. L. 0,36 to 0,46; B. 0,062 to 0,072 mm. Median line slightly sigmoid, central. Transv. and obl. striæ $^{17}/_{18}$ in 0,01 mm. — Grun. A. D. p. 54. Per. p. 15 Pl. VI f. I.

Marine: Campeachy Bay (Grun.).

This species is according to Peragallo nothing but a variety of *P. rigidum*. It seems me to be more nearly related to *P. strigosum*.

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24. **P. australe** Grun. (1867). — V. linear, lanceolate, sigmoid, with obtuse ends. L. 0,08 to 0,11; B. 0,017 mm. Median line central, sigmoid. Central nodule large, rounded. Median striæ more distant than the terminal. Transv. striæ 21 to 23 in 0,01 mm.; obl. striæ 18 to 20 in the middle and 20 to 23 in 0,01 mm. at the ends. — Grun. Novara p. 21 Pl. I f. 18. A. D. p. 51. Per. IV f. 24 to 27. *P. æstuarii* var. Cl. D. of Java II f. 19. *P. æquatoriale* Cl. M. D. N:o 145, 146, 1878. *P. inflatum* Shadb. T. M. S. II p. 16 Pl. I f. 9 (1854)?

Marine (pelagic): Balearic Islands! Sumatra! Java! New Zealand (Grun.).

P. australe is very nearly connected with *P. naviculaceum* and with *P. Normanii*.

25. **P. Normanii** Ralfs (1861). — V. gently sigmoid, lanceolate, with subacute ends. L. 0,13 to 0,22; B. 0,027 to 0,036 mm. Median line sigmoid, central. Transv. striæ 19 to 21 in 0,01 mm. Obl. striæ 17 to 18 in the middle and 20 to 21 in 0,01 mm. at the ends. — Ralfs in Pritch. Inf. p. 919. *P. affine* Grun. A. D. p. 51 (1880). V. H. Syn. Pl. XVIII f. 9. Per. IV f. 5, 8. *P. affine var. Norm.* Per. IV f. 6, 7.

Marine: Spitsbergen! Davis Strait! North Sea! Mediterranean Sea! Red Sea! Java! Sumatra! Samoa! Atlantic coast of North America! Colon!

Var. *fossilis* Grun. (1880). — L. 0,15 to 0,22; B. 0,03 to 0,035 mm. Transv. striæ 17 in 0,01 mm. Obl. striæ 13 in the middle and 16 to 17 in 0,01 mm. at the ends. — *P. affine var. fossilis* Grun. A. D. p. 51. Per IV f. 16 to 18. *P. virginiacum* H. L. Smith (accord. to Perag.). *P. æstuarii var. intermedia* Grun. Novara p. 102. *P. neogradense* Pant. III Pl. XXI f. 315 (1893)?

Marine (fossil): Virginia! Nankoori (Grun.).

Var. *marylandica* Grun. (1880). — Rhomboidal-lanceolate, acute. L. 0,24 to 0.28; B. 0,03 to 0,044 mm. Transv. striæ 14 to 18 in 0,01 mm. Obl. striæ 13 to 17 in 0,01 mm. in the middle and closer at the ends. — *P. affine var. maryl.* Grun. A. D. p. 51. Per. p. 10 Pl. IV f. 15.

Marine (fossil): Nottingham, Maryland!

P. Normanii is one of the most common species, and connected with *P. australe* and *P. strigosum*, which latter has the same shape, and from which it may be distinguished by its median oblique striæ, which cross each other at the angle of 90° and become acuter towards the ends. It would be advisable to unite into one species *P. naviculaceum*, *P. australe* and *P. Normanii*. Peragallo mentions a form called *P. affine var interrupta* (Pl. IV f. 1, 2) which has an excentric median line. This form, as well as the specimen fig. 4, seems to me to be more akin to *P. decorum var. dalmaticum*.

26. **P. angulatum** Quekett (1848). — V. rhomboidal-lanceolate, angular in the middle, with acute ends. L. 0,17 to 0,36; B. 0,036 to 0,05 mm. Median line central, slightly sigmoid. Central nodule small, rhombic. Transv. and obl. striæ equidistant 18 to 22 in 0,01 mm. Angle 60°. — *Navic. angulata* Quek. on the microscope p. 438 Pl. VIII f. 4 to 7 (according to W. Sm.). *P. angulatum* W. Sm. B. D. I p. 65 Pl. XXI f. 205. V. H. Syn. p. 115 Pl. XVIII f. 2 to 4. Per. V f. 3 to 5. *Nav. Thuringiaca* Kütz. (according to Grunow).

Marine: North Sea! Barbados!

Forma *undulata* Grun. (1880). V. with slightly undulate margins. — Grun. A. D. p. 51. Per. Pl. V f. 6.

Marine: Bohuslän, Sweden! Belfast (Per.).

Var. *quadrata* W. Sm. (1853). — V. rhomboidal, broad, slightly sigmoid. L. 0,19; B. 0,048 mm. Median line central. Central nodule small, elongated. Transv. and obl. striæ $^{19}/_{18}$ in 0,01 mm. — *P. angulatum* W. Sm. Ann. M. Nat. H. [2] IX p. 7 Pl. I f. 7 (1852). *P. quadr.* W. Sm. B. D. I p. 65 Pl. XX f. 204. Per. V f. 7, 8. *P. ang. var. quadr.* V. H. Syn. p. 115 Pl. XVIII f. 1.

Marine: North Sea!

Var. *strigosa* W. Sm. (1852). — Lanceolate, slightly sigmoid, gradually tapering to the subacute ends. L. 0,15 to 0,28; B. 0,03 mm. Transv. and obl. striæ equidistant, 18 to 22 in 0,01 mm. Angle about 60°. — *P. strigosum* W. Sm. Ann. M. Nat. H. [2] IX p. 7 Pl. I f. 6. B. D. I p. 64 Pl. XXI f. 203; XXIII f. 203. Per. V f. 1, 2. *P. ang. var. strig.* V. H. Syn. p. 115 Pl. XIX f. 2.

Marine: North Sea! Mediterranean Sea! Adriatic! Red Sea! Ceylon! Java! South Africa! Brazil! Florida!

Var. *finmarchica* Cl. (1884). — Gently sigmoid, more obtuse. Median line excentric towards the ends. L. 0,17 to 0,2; B. 0,03 mm. Transv. and obl. striæ $^{16}/_{15}$, $^{18}/_{17}$ in 0,01 mm. — *P. Normanii* Cl. A. D. p. 14. Grun. A. D. p. 52 Pl. III f. 67. *P. Finm.* Grun. Franz Josephs Land D. p. 105 (53).

Marine: Finmark!

Var.? *convexum* Grun. (1880). — V. very convex. L. 0,225; B. 0,02 mm. Median line somewhat excentric at the ends. Transv. and obl. striæ $^{20}/_{18}$ in 0,01 mm. — *P. strig. var.? convexa* Grun. A. D. p. 50.

Marine: Puerto Caballo (Grun.).

27. **P. minutum** Grun. (1878). — V. lanceolate, gently sigmoid. L. 0,05 to 0,065; B. 0,011 to 0,014 mm. Median line nearly central. Transv. and obl. striæ $^{26}/_{28}$, $^{27}/_{28}$, $^{27}/_{29}$ in 0,01 mm. — Grun. in Cl. M. D. 136. Icon. n. Pl. IV f. 19. *P. æstuarii var. minuta* Grun. A. D. p. 52. Per. V f. 15.

Brackish and marine: Sweden (Malmö! Lysekil, Grun.). Caspian Sea (Grun.), Balearic Islands (Per.).

This little form was placed by Grunow in the vicinity of *P. æstuarii*, with which it seems to me not to have any close relation, as it differs by its non-rostrate ends, the nearly central median line, and the finer striation. It may perhaps be a dwarf-form of *P. angulatum* (*strigosum*).

28. **P. (Rhoicosigma) Stuxbergii** Cl. and Grun. (1880). — V. narrow, lanceolate, gently sigmoid, acute. L. 0,19 to 0,38; B. 0,028 to 0,032 mm. Median line central. Central nodule small, rhomboid. Transv. and obl. striæ $^{23}/_{27}$, $^{24}/_{27}$, $^{25}/_{31}$ in 0,01 mm. — A. D. p. 54 Pl. IV f. 74. Grun. Franz Josephs Land D. p. 105 (53) Pl. I f. 56. Per. VI f. 9, 10.

Marine: Franz Josephs Land (Grun.), Sea of Kara! Cape Wankarema!

Var. *minor* Grun. (1884). — L. 0,08 to 0,11; B. 0,016 to 0,017 mm. Transv. and obl. striæ $^{24}/_{32}$ in 0,01 mm. — Grun. Franz Josephs Land D. p. 105 Pl. I f. 57. Per. VI f. 11.

Var. *rhomboides* Cl. (1880). — V. rhomboid-lanceolate, acute. L. 0,085 to 0,135; B. 0,02 to 0,03 mm. Median line central, almost straight. Transv. and obl. striæ $^{21}/_{23}$, $^{22}/_{24}$, $^{24}/_{25}$ in 0,01 mm. — *P. rhomb.* Cl. A. D. p. 14, 54, Pl. IV f. 73. Per. VI f. 14.

Marine: Sea of Kara! Cape Wankarema!

Var. *latiuscula* Per. (1891). — V. lanceolate, slightly sigmoid, with somewhat obtuse ends. L. 0,16; B. 0,026 mm. Transv. and obl. striæ $^{22}/_{20}$ in 0,01 mm. — *P. latiusculum* Per. p. 15 Pl. VI f. 12.

Marine: North Sea (Per.).

P. Stuxbergii, remarkable for its very fine oblique striæ, is not related to *P. delicatulum*, but to *P. acutum*. The var. rhomboides seems to connect it with *P. angulatum v. strigosa*.

29. **P. Brunii** Cl. (1891). — V. linear, strongly sigmoid, suddenly attenuated to the acute ends. L. 0,42 to 0,45; B. 0,31 to 0,033 mm. Median line central. Central nodule small. Transand oblique striæ $^{27}/_{32}$ in 0,01 mm. — Per. p. 16 Pl. VI f. 8.

Marine (pelagic): Bay of Bengal! Java!

30. **P. javanicum** Grun. (1878). — V. narrow, lanceolate, gently sigmoid, acute. L. 0,125 to 0,144; B. 0,019 to 0,022 mm. Median line nearly central in the middle, excentric towards the ends. Transv. and obl. striæ equidistant, about 28 in 0,01 mm. — *P. angulatum var. jav.* Grun. in Cl. M. D. 145. *P. javanicum* Grun. A. D. p. 52 (1880). Per. V f. 10.

Marine (pelagic): Java! China!

This species has the outline of *P. strigosum*, but is thinner (dry, yellowish) and more acute. It is most nearly akin to *P. acutum*. As *P. hyalinum*, Grunow describes in A. D. (p. 52) a similar, pelagic form from Triest (L. 0,085; B. 0,0105 mm.), the striation of which is too delicate for measuring.

31. **P. acutum** Norm. (1861). — V. lanceolate, gently sigmoid, acute. L. 0,24 to 0,3; B. 0,02 to 0,028 mm. Median line sigmoid, very excentric towards the ends. Transv. and obl. striæ $^{22}/_{21}$, $^{22}/_{19}$, $^{23}/_{20}$ in 0,01 mm. — Norm. Pritch. Inf. p. 920. Per. III f. 1, 4. *P. acutum var. australasicum* Grun. in Cl. M. D. 286 (1882).

Marine (pelagic): Europe (Norm.), Croisic (Per.), Java (Deby Coll.)! St Vincent, Australia! Yeddo Bay (Brun Coll.)!

This species is nearly akin to *P. javanicum* and *P. Stuxbergii*, from which latter it differs by its less acute oblique striæ and the excentricity of its median line towards the ends. The fig. 2 in Peragallo's monograph has the outline and median line of *P. Stuxbergii*, but the striation of *P. acutum*. The fig. 3 in the same monograph is another, allied form, described here as *P. pelagicum* Per. and formerly mistaken by me for *P. acutum var. australasicum* Grun., which latter now seems to me to be identical with *P. acutum*.

32. **P. (Rhoicosigma?) maroccanum** Cl. (1891). — V. narrow, lanceolate, gently sigmoid, gradually attenuated to the acute ends. L. 0,2 to 0,3; B. 0,02 to 0,037 mm. Median line somewhat excentric, sigmoid. Transv. and obl. striæ $^{19}/_{18}$, $^{20}/_{19}$ in 0,01 mm. Angle about 70°. — *Rhoicosigma marocc.* Per. p. 32 Pl. IX f. 22.

Marine: Marocco! Gulf of Naples!

This form is doubtful as a species and requires further examination.

33. **P. æstuarii** Bréb. (1849). — V. lanceolate, gently sigmoid, with slightly rostrate ends. L. 0,07 to 0,08; B. 0,017 mm. Median line more sigmoid than the valve, excentric. Transv. and obl. striæ equidistant, 19 to 21 in 0,01 mm. — *Navic. æst.* Kütz. Sp. Alg. p. 890. *P. æst.* W. Sm. B. D. I p. 65 Pl. XXXI f. 275. Grun. A. D. p. 52. Per. p. 12 Pl. V f. 11 to 13. *P. candidum* Schum. Preuss. D. II Nachtr. Pl. II f. 57 (1867). *P. angulatum var. æst.* V. H. Syn. p. 115 Pl. XVIII f. 8.

Marine: North Sea! Adriatic (Grun.), Caspian Sea (Grun.), California!

This species has the striation of *P. angulatum* but, by the flexure of the median line, seems to be nearer akin to *P. lanceolatum*.

34. **P. latum** Cl. (1880). — V. rhomboid-lanceolate, slightly sigmoid, gradually tapering to the subobtuse ends. L. 0,074 to 0,085; B. 0,02 mm. Median line slightly sigmoid, excentric towards the ends. Transv. and obl. striæ $^{24}/_{22}$ in 0,01 mm. — Cl. A. D. p. 14, 51 Pl. III f. 68.

Marine: Finmark! California!

This form requires a closer examination.

35. **P. rhombeum** Grun. (1880). — V. rhomboidal, sigmoid, often angular in the middle, and with obtuse ends. L. 0,12 to 0,26; B. 0,03 to 0,07 mm. Median line strongly sigmoid towards

the ends. Central area rather large, irregularly rhomboid. Transv. and obl. striæ $^{17}/_{15}$, $^{18}/_{16}$, $^{19}/_{17}$, $^{19}/_{18}$, $^{19}/_{19}$ in 0,01 mm. — *P. quadratum var.? rhombeum* Grun. A. D. p. 50. *P. rhomb.* Per. III f. 13, 14.

Marine: Java! Labuan! Port Jackson! Aukland (Grun.), Samoa! China! Oakland, California!

P. rhombeum greatly resembles *P. quadratum* and *angulatum*, but differs by the more excentric median line and the coarser striation.

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36. **P. obscurum** W. Sm. (1852). — V. narrow linear, with unilaterally narrowed and rounded ends. L. 0,09 to 0,15; B. 0,01 mm. Median line strongly asymmetrical, near the ends close to the curved margin. Transv. and obl. striæ equidistant, 25 (Per.) to 29 (W. Sm.) in 0,01 mm. — W. Sm. Ann. M. Nat. H. [2] IX p. 8 Pl. I f. 11. B. D. I p. 65 Pl. XX f. 206. Per. I f. 14, 15. *P. macilentum* Per. p. 13, Pl. V f. 24 (1891).

Marine: England (W. Sm.), Balearic Islands (Per.).

Var. *barbadensis* Cl. L. 0,14 to 0,18; B. 0,015 mm. Transv. and obl. striæ $^{19}/_{20}$, $^{20}/_{21}$ in 0,01 mm.

Marine: Barbados!

37. **P. (Rhoicosigma) falcatum** Douk. (1861). — V. linear, with unilaterally narrowed and rounded ends. L. 0,15 to 0,18; B. 0,015 mm. Median line flexuose in the middle, strongly excentric, following the curved margins of the ends. Striæ fine, oblique. — Donk. M. J. I p. 7 Pl. I f. 1. *Rhoic. falcat.* Grun. Hedw. VI p. 20 (1867). Per. IX f. 25, 27.

Marine: Northumberland (Donk.).

Doubtful; specimens in Grove's collection are *Gyrosigma arcticum* Cl.

38. **P. (Rhoicosigma?) incertum** Per. (1891). — V. slender, sigmoid, acute. L. 0,33; B. 0,019 mm. Median line slightly sinuose, very excentric towards the ends. Transv. and obl. striæ $^{19}/_{17}$ in 0,01 mm. — Per. p. 32 Pl. IX f. 21.

Marine: Atlantic coast of North America!

39. **P. (Rhoicosigma) Weissflogii** Grun. (1880). — V. linear, with unilaterally narrowed and rounded ends. L. 0,118 to 0,134; B. 0,018 to 0,019 mm. Median line excentric, and strongly sigmoid, closely following the curved margins for a considerable distance. Median oblique striæ cross each other in an angle of 90°; the terminal more acute. Transv. and obl. striæ $^{21}/_{15}$ in 0,01 mm. — *Rhoic. Weissfl.* Grun. A. D. p. 54. Per. IX f. 23, 24.

Marine: Seychelles (V. H. coll.)!

40. **P. umbilicatum** Cl. N. Sp. — V. linear, with unilaterally rounded and very slightly rostrate ends. L. 0,065 to 0,10; B. 0,015 mm. Median line strongly sigmoid, for a long distance closely following the convex margin of the valve. Central area unusually large, transverse and rounded. Transv. and obl. striæ equidistant, 22 in 0,01 mm. — Pl. IV f. 22.

Marine: Labuan!

This species is in form nearest to *P. Weissflogii*, but differs by the large area, and the close striation.

41. **P. Exsul** Cl. N. Sp. — V. linear-lanceolate, gently sigmoid, with subacute ends. L. 0,18; B. 0,018 mm. Median line strongly sigmoid and excentric, enclosed between two longitudinal lines. Central nodule small, rounded. Transv. and obl. striæ $^{22}/_{23}$ in 0,01 mm. — Pl. IV f. 17.

Marine: Gulf of Naples (Deby Coll.)!

This species, of which I have seen only one specimen, has the outline of *P. formosum*, but has much closer striation, and longitudinal lines close to the median line.

42. **P. (Donkinia) carinatum** Donk. (1858). — V. very convex, unilaterally tapering from the middle to the acute ends. L. 0,1 to 0,13; B. 0 01 to 0,013 mm. Median line almost diagonal in the middle and then closely following the convex margins. Transv. and obl. striæ $^{19}/_{18}$, $^{21}/_{20}$ in 0,01 mm. — Donk. T. M. S. VI p. 23 Pl. III f. 5. *Donkinia car.* Ralf in Pritch. Inf. p. 921 (1861). Per. IX f. 6.

Marine: Sea of Kara! Davis Strait! North Sea! Balearic Islands! Japan, fossil (Brun coll.)!

43. **P. speciosum** W. Sm. (1852). — V. linear, with unilaterally rounded ends. L. 0,18 to 0,27; B. 0,023 to 0,025 mm. Median line strongly excentric towards the ends. Transv. and obl. striæ $^{18}/_{16}$, $^{19}/_{17}$, $^{20}/_{17}$, $^{20}/_{18}$, $^{20}/_{19}$ in 0,01 mm. — W. Sm. Ann. Mag. N. H. [2] IX p. 6 Pl. I f. 3. B. D. I p. 63 Pl. XX f. 197. Per. II f. 13 to 16.

Marine: North Sea! Mediterranean Sea! Red Sea! Java! Sumatra! Labuan! China! Port Jackson! Barbados!

Var. *gracilis* Per. (1891). — More narrow. L. 0,25; B. 0,015 mm. Transv. and obl. striæ $^{20}/_{19}$ in 0,01 mm. Per p. 6 Pl. II f. 19.

Marine: Sumatra (Per.).

Var.? *Javanica* Per. (1891). — L. 0,07; B. 0,02 to 0,23 mm. Transv. and obl. striæ $^{20}/_{19}$ in 0,01 mm. — Per. p. 6 Pl. II f. 17, 18.

Marine: Java, Sumatra (Per.).

Var.? *abrupta* Per. (1891). — Same as var. javanica, but with obliquely truncate ends. — Per. p. 6, Pl. II f. 11.

Marine: Java, Sumatra (Per.).

Var. *mediterranea* Grun. (1880). — Linear, with unilaterally rounded ends. L. 0,21 to 0,32; B. 0,018 to 0,026 mm. Median line strongly excentric, coincident for a considerable distance with the convex margin. Transv. and obl. striæ $^{16.5}/_{13.5}$, $^{18}/_{14}$, $^{16}/_{14}$ in 0,01 mm. — *P. obscurum var. medit.* Grun. A. D. p. 49. Per. II f. 5.

Marine: Mediterranean Sea! Seychelles (Grun.), Java!

Var. *pulchra* Grun. (1860). — V. and median line as in var. medit. L. 0,3 to 0,6; B. 0,023 to 0,04 mm. Transv. and obl. striæ $^{15}/_{10}$, $^{14}/_{11}$, $^{15}/_{11}$, $^{16}/_{22}$ in 0,01 mm. — *P. pulchr.* Grun. Verh. 1860 p. 556 Pl. VI f. 2. Per. I f. 8.

Marine: North Sea! Red Sea (Grun.), Java! Sumatra!

Var.? *tortuosa* Cl. (1881). — V. lanceolate, slightly sigmoid, with unilaterally rounded ends. L. 0,076; B. 0,012 to 0,013 mm. Median line strongly sigmoid and very excentric. Transv. and obl. striæ $^{22}/_{20}$ in 0,01 mm. — *P. tort.* Cl. N. R. D. p. 5 Pl. I f. 6. Per. II f. 12.

Marine: Balearic Islands!

44. **P. majus** Grun. (1880). — V. lanceolate, gradually tapering from the middle to the obtuse ends, slightly sigmoid. L. 0,2 to 0,4; B. 0,024 to 0,052 mm. Median line nearly straight in the middle, excentric towards the ends. Oblique striæ form in the middle of the valve an obtuser angle than on other parts of the valve. Transv. and obl. striæ $^{15.5}/_{13.5}$ (Grun.) $^{17}/_{13}$, $^{17}/_{14}$, $^{18}/_{15}$, $^{20}/_{18}$ in 0,01 mm. — *P. speciosum var.? major* Grun. A. D p. 49. *P. affine var. interruptum* Per. Pl. IV f. 1 to 3. *Pl. majus* Icon. n. Pl. IV f. 15.

Marine: Mediterranean Sea! Sumatra!

45. **P. Heros** Cl. N. Sp. — V. lanceolate, slightly sigmoid, gradually tapering from the middle to the obtuse ends. L. 0,4; B. 0,085 mm. Median line straight, somewhat excentric towards the ends. Transv. and obl. striæ $^{14}/_{10}$ in 0,01 mm. — Pl. IV f. 20.

Marine: Macassar Straits (Grove's Coll.)!

This form is closely allied to *P. majus*, being somewhat broader. The striæ are coarser and in the same direction in the middle as elsewhere. It is also nearly akin to *P. formosum v. longissima*, which is more sigmoid and has a more excentric median line.

46. **P. formosum** W. Sm. (1852). — V. narrow, linear-lanceolate, gently sigmoid, gradually and unilaterally narrowed towards the ends. L. 0,14 to 0,53; B. 0,02 to 0,05 mm. Median line sigmoid, excentric, generally for a considerable distance coincident with the convex margin. Oblique striæ crossing each other at an angle of 90°. Transv. and obl. striæ $^{14}/_{10}$, $^{18}/_{14}$, $^{20}/_{16}$ in 0,01 mm. — W. Sm. Ann. M. Nat. H. [2] IX p. 5 Pl. I f. 1. B. D. p. 63 Pl. XX f. 195. Grun. A. D. p. 48. V. H. Syn. p. 116 Pl. XIX f. 4. Per. I f. 3 to 5. *P. australicum* O. Witt. Mus. Godeff, p. 70 Pl. VIII f. 7 (1873). *P. decorum* W. Sm. I p. 63 Pl. XXI f. 196. Grun. A. D. p. 49. V. H. Syn. p. 116 Pl. XIX f. 1. Per. I f. 11 to 13. *P. tahitense* O. Witt. Mus. Godeffr. p. 67 Pl. VIII f. 13 (1873).

Marine: North Sea! Mediterranean Sea! Red Sea! Java! China! Behrings Island! Sandwichs Islands! Galapagos Islands! West Indies!

Var. *dalmatica* Grun. (1880). — V. narrow, slender, acute, slightly sigmoid. L. 0,25 to 0,32; B. 0,03 mm. Median line slightly excentric. Transv. and obl. striæ $^{15}/_{12}$, $^{19}/_{14}$ in 0,01 mm. — *P. decor. var. dalm.* Grun. A. D. p. 49. Per. II f. 6 to 9?. Icon. n. Pl. IV f. 21.

Marine: Balearic Islands! Adriatic (Grun.)!

Var. (*Rhoicosigma*) *Arcus* Cl. — V. arcuate. L. 0,2; B. 0,02 mm. Transv. and obl. striæ $^{18}/_{13}$ in 0,01 mm. — Pl. IV f. 18.

Marine: Macassar Straits (Grove Coll.)!

Var. *balearica* Per. (1891). — V. linear, with unilaterally rounded ends. L. 0,35 to 0,54; B. 0,034 to 0,06 mm. Transv. and obl. striæ $^{13}/_{8}$, $^{14}/_{9}$, $^{15}/_{9}$ in 0,01 mm. — Per. p. 4 Pl. I f. 6, 7.

Marine: Mediterranean Sea (Per.), Singapore (Grove Coll.)!

Var. *longissima* Grun. (1880). — V. lanceolate, sigmoid. L. 0,4 to 0,78; B. 0,085 to 0,073 mm. Median line sigmoid, excentric at the ends. Transv. and obl. striæ $^{14}/_{10}$, $^{14}/_{11}$, $^{15}/_{12}$, $^{16}/_{13}$, $^{17}/_{13}$ in 0,01 mm. — Grun. A. D. p. 48. Per. p. 4 Pl. I f. 1, 2.

Marine: Puerto Caballo (Per.), Colon! Campeachy Bay! Samoa! China! Java! Galapagos Islands!

All the forms from *P. speciosum* are very nearly connected and might be united into one single species, characterized by the oblique striæ crossing each other at an angle of about 90°. Between *P. formosum* and *P. decorum* there is absolutely no specific difference, and by numerous varieties *P. formosum* graduates into *P. pulchrum* and *P. speciosum*. By the var. *dalmatica* *P. formosum* is connected with *P. subrigidum*, *P. longum* and *P. Peragalli*, which latter is intermediate in the passage to *P. Nubecula*. — *Donkinia reticulata* Norm. (Grev. in T. Bot. Soc. Ed. vol. VIII p. 237 Pl. III f. 13, 14. Pritch. Inf. 1861 p. 921) is probably akin to the last described species. It is a large form (L. 0,16 mm.) with very excentric median line and highly carinated valves. Oblique striæ about 8 in 0,01 mm. This form, found in Western Australia, is entirely unknown to me. A somewhat similar form occurs in Oamaru deposit but I have seen only some incomplete specimens. L. 0,2. Striæ 10 in 0,01 mm.

Toxonidea Donkin (1858).

Valve asymmetrical, thin. Median line arcuate, excentric. Axial area indistinct. Central area indistinct. Structure the same as in Pleurosigma. Zone not complex.

This genus comprises asymmetrical forms of Pleurosigma. The cell-contents are not known, but will probably offer some interesting peculiarities.

1. **T. insignis** Donk. (1858). — V. strongly asymmetrical, with almost straight dorsal and very convex ventral margin. Ends subrostrate. L. 0,12 to 0,13; B. 0,025 to 0,03 mm. Median line strongly excentric, coincident at the ends for some distance with the dorsal margin. Transv.

and obl. striæ $^{24}/_{23}$, $^{23}/_{21}$ in 0,01 mm. — Donk. T. M. S. p. 21 Pl. III f. 2. V. H. Syn. p. 114 Pl. XVII f. 10. Per. IX f. 18, 19.

Marine: Coasts of Scotland and England! Belgium (V. H.)! Balearic Islands! Sumatra (Deby Coll.)!

Var. *madagascarensis* Grun. (1891). — Dorsal margin concave. L. 0,017; B. 0,03 mm. Median line close to the dorsal margin. Transv. and obl. striæ $^{20}/_{19}$ in 0,01 mm. — *T. madag.* Per. p. 28 Pl. IX f. 13.

Marine: Madagascar (Per).

Var.? *undulata* Norm. (1861). — Dorsal margin gibbous in the middle, ventral triundulate. L. 0,15; B. 0,032 mm. Transv. and obl. striæ $^{20}/_{19}$ in 0,01 mm. — *T. undulata* Prit. Inf. p. 920 Pl. VIII f. 46 (1861). Per. IX f. 12.

Marine: North Sea (Norm.).

T. insignis seems to graduate into *T. Gregoriana*.

2. **T. Gregoriana** Donk. (1858). — V. linear to semilanceolate, with unilaterally rounded ends, curved in the same direction. Dorsal margin straight, ventral slightly convex. L. 0,13 to 0,25; B. 0,022 to 0,03 mm. Median line arcuate, at the ends coincident with the margins. Transv. and obl. striæ $^{20}/_{19}$, $^{21}/_{21}$ in 0,01 mm. — Donk. T. M. S. VI p. 19 Pl. III f. 1. Per. IX f. 16.

Marine: Coasts of Scotland and England!

Var. *balearica* Cl. (1878). — Dorsal margin slightly concave. L. 0,17 to 0,22; B. 0,02 to 0,025 mm. Transv. and obl. striæ $^{17}/_{18}$, $^{17}/_{19}$ in 0,01 mm. — *T. balearica* Cl. M. D. 154. Per. IX f. 14, 15.

Marine: Mediterranean Sea!

3. **T. Challengerensis** Castr. (1886). — V. linear, narrow, inflated in the middle and at the ends. L. 0,3; B. 0,004 mm. — Castr. D. Exp. Chall. p. 39 Pl. XXVI f. 14, 15. Per. IX f. 17.

Marine: Tahiti (Castr.).

Caloneis Cl. N. G.

Valve usually convex, of various shape, linear, lanceolate, panduriform, rarely sigmoid and asymmetrical. Striæ usually parallel, and divergent in the ends (rarely convergent), not distinctly (rarely finely) punctate, crossed by one or several longitudinal lines, which in some species increase to broad, lateral areas. Connecting zone not complex.

This genus comprises the groups *abbréviées*, *formosées*, *limosées* and *lineariées* of Navicula in the synopsis of Van Heurck, as well as the *quadriscriatæ* of Grunow. All these groups are intimately connected, however dissimilar the outline of the different species may be. Smaller forms of Caloneis with indistinct longitudinal lines closely resemble small Pinnulariæ, and certain of the panduriform species seem to be very closely connected with some marine, panduriform Pinnulariæ.

Pfitzer, who has examined the cell-contents of *C. Silicula* places this specis in his genus *Neidium*, but it has no near affinity with that genus. According to Pfitzer (Bau und Entw. p. 39) there are as in Neidium two chromatophores, lying closely along the inside of the connecting zone. which do not migrate to the valves, but are divided in situ by fissures parallel to the longitudinal axis of the cell. It thus appears that there are interior characteristics also, which distinguish Caloneis from Navicula. — The cell-contents (of *C. blanda*, *C. Liber* and *C. formosa*) have also two chromatophore-plates along the connecting zone. Their margins are entire.

The form of the valve is as a rule linear, or lanceolate, and straight. A sigmoid species, *C. staurophora*, has hitherto been regarded as a *Pleurosigma*. This species has the ordinary form of a Pleurosigma, but the following important characteristics induce me to place it in Caloneis:

first, the presence of longitudinal lines and secondly, the striæ, which are not distinctly punctate, the striæ of all the species of Pleurosigma being punctate.

An asymmetrical tendency is slightly apparent in several forms of *C. Liber*, and is very decided in *C.* (*Alloioneis*) *curvinervis*. Among the Amphoræ are many forms with longitudinal lines, but no known species of that genus is closely connected with Coloneis. — There are various transitions among the forms of Caloneis. Some species are slightly constricted in the middle or biconstricted, and thus connect the non-constricted forms with the panduriform or strongly biconstricted.

Closely connected with Caloneis is the genus *Pseudoamphiprora*, among the species of which *P. impleta* comes nearest. The principal distinction between these two genera consists in the nature of the striæ, which are punctate in *Pseudoamphiprora*. The transverse expansion of the central nodule of Pseudo-amphiprora is met with in some species of Caloneis, as for instance *C. Wardii*. — The terminal fissures in most forms of the type *C. Liber* are not very divergent from the direction of the median line, and being situated on the concave end of the valve, they have the appearance of short flexuose lines (see A. Schmidt's Atl. Pl. L.). In *C. abnormis* they are turned in contrary directions. In the forms of the type *C. Powellii* and in the panduriform species they are small and indistinct.

The striæ are as a rule transverse, in some forms slightly radiate, and are usually divergent at the ends, not convergent as in Pinnulariæ. They are generally smooth or not distinctly punctate, excepting in the doubtful *C. dispersa*, which has distinctly punctate striæ. — In addition to the nature of the striæ, the longitudinal lines are a very characteristic feature of Caloneis. In many species the valves are divided by these lines into an inner plane, or even concave, portion; and an outer portion which is convex and sloping. In other species the inner portion appears to be more elevated. Without transverse sections of the valves it is extremely difficult to ascertain which is the case; but as a rule the plane, or inclination, of the part of the valve which is within the longitudinal lines is different from that of the outside parts. Transitions of all kind occur, from the narrow true lines of *C. Liber* and others to the broad bands of *C. Castracanei*, *C. mirabilis* etc., shewing that, whether narrow or broad, these lines are of the same nature. — In *C. Madagascarensis* there are, in addition, other fainter, longitudinal lines, formed by knots on the striæ; and this fact seems to point to an affinity between *Caloneis* and *Tropidoneis* (T. lepidoptera, T. longa).

Artificial key.

1.	Central nodule stauroid	*C. Wardii* CL.
	— — not —	2.
2.	Central area a transverse fascia	3. [1]
	— — not — —	19.
3.	Valve sigmoid	*C. staurophora* GRUN.
	— straight	4.
4.	Linear or almost linear	5.
	Lanceolate, constricted or biconstricted	11.
5.	Striæ radiate	*C. Clevei* LAGST.
	— parallel	6.
6.	Axial area rather broad	7.
	— — narrow or indistinct	8.
7.	Marine species	*C. latefasciata* GRUN. (*C. formosa var. interrupta*).
	Freshwater species	*C. patagonica* CL.
8.	Margins parallel	9.
	— slightly undulate	*C. Silicula* var.
9.	Striæ 15 in 0,01 mm.	*C. consimilis* A. S.
	— finer	10.

[1] To this division belongs *C. nubicola* GRUN., which for vant of figure and complete description cannot be enrolled in the key.

10. Striæ about 21 in 0,01 mm. . . . *C. æmula* A. S.
— — 25 — — . . . *C. fasciata* Lagst.

11. Valve lanceolate . . . 12.
— constricted . . . 14.
— biconstricted . . . 16.

12. Ends capitate . . . *C. Beccariana* Grun.
— not — . . . 13.

13. Valve trochiform . . . *C. bodosensis* Pant.
— elliptical-lanceolate . . . *C. bottnica* Cl.

14. Axial area indistinct . . . *C. galapagensis* Cl.
— — distinct or rather broad . . . 15.

15. Striæ 6 in 0,01 mm. . . . *C. scintillans* Br. a. Temp.
— 9 — . . . *C. Hardmaniana* Cl.
— 15 — . . . *C. galapagensis var. japonica.*

16. Striæ 6 to 11 in 0,01 mm. . . . 17.
— about 20 in 0,01 mm. . . . 18.

17. Median segment large . . . *C. ophiocephala* Cl.
— — small . . . *C. formicina* Grun.

18. Longitudinal lines median . . . *C. claviger* Cl.
— — indistinct *C. columbiensis* Cl. (*C. Schumaniana var. Heribaudi* Périag.).

19. Valve constricted . . . 20.
— not — . . . 30.

20. Valve constricted in the middle . . . 21.
— biconstricted . . . 25.

21. Striæ 7 to 12 in 0,01 mm. . . . 22.
— about 22 — . . . *N. Liber var. Janischiana.*

22. Area indistinct . . . *C. Liber var. Bleischiana.*
— distinct . . . 23.

23. Central and axial area united in a narrow lanceolate space . . . 24.
Central area quadrate . . . *C. Powellii var. Bartholomei.*

24. Longitudinal lines broad . . . *C. Musca* Greg.
— — narrow . . . *C. Kinkeriana* Trcan

25. Small forms (L. 0,03 to 0,04 mm.) . . . 26
Larger — . . . 27.

26. Ends broad . . . *C. lobata* Schwartz.
— acuminate . . . *C. egena* A. S.

27. Axial area broad . . . *C. biclavata* Cl. a. Grove.
— — narrow . . . 28.

28. Striæ about 8 in 0,01 mm. . . . *C. biconstricta* Grove a. Sturt.
— — 13 — . . . 29.
— — 19 — . . . *C. Schumanniana var. trinodis.*

29. Longitudinal lines double . . . *C. eximia* Grun.
— — single, inframarginal . . . *C. adenensis* Cl.

30. Valve lanceolate, margins convex . . . 31.
— linear — parallel . . . 49.

31. Central area with lunate marks . . . 32.
— — without — . . . 33.

32. Freshwater species . . . *C. Schumanniana* Grun.
Marine — . . . *C. samoensis* Grun.

33. Valve asymmetrical . . . *C. curvinervia* Grun.
— symmetrical . . . 34.

34. Only the portion around the median line striate . . . *C. dispersa* Grove a. Start.
Marginal portion of the valve striate . . . 35.

35. Longitudinal lines broad . . . 36.
— — fine . . . 38.

36. Longitudinal lines dilated to broad, lunate areas . . . *C. kryophila* Cl.
— — linear bands . . . 37.

37. Longitudinal bands and central areas united . . . *C. Castracanei* Grun.
— — — — not . . . *C. biseriata* Pet.

38. Axial and central areas indistinct . . . 39.
— area narrow, central area distinct . . . 40.
— and central areas united to a lanceolate space . . . 44.

39. Striæ 12 to 13 in 0,01 mm. . . . *C. tahitensis* Grun.
— 20 to 21 — . . . *C. virginea* Cl.

40. Central area large . . . 41.
— — small . . . 42.

41. Elliptical, obtuse . . . *C. brevis* Greg.
Lanceolate, acute . . . *C. Duseni* Cl.

42. Terminal fissures in contrary directions . . . *C. abnormis* Grun.
— — the same — . . . 43.

43. L. 0,025 mm. . . . *C. ladogensis* Cl.
L. 0,05 mm. . . . *C. Holstii* Cl.

44. Longitudinal lines marginal or inframarginal . . . 45.
— — median . . . 46.

45. Breadth 0,009 mm. . . . *C. Lagerheimii* Cl.
— 0,02 to 0,03 mm. . . . *C. latiuscula* Kütz.

46. Longitudinal lines single . . . *C. amphisbæna* Bory.
— — double or triple . . . 47.

47. Striæ 9 to 10 in 0,01 mm. . . . 48.
— 12 — — . . . *C. bivittata* Pant.

48. Longitudinal double-lines approximate . . . *C. permagna* Bail.
— — distant . . . *C. madagascarensis* Cl.

49. Striæ very fine, 28 in 0,01 mm. . . . *C. lepidula* Grun.
— distinct . . . 50.

50. Central area with longitudinal marks or rows of puncta . . . 51.
— — without — — — . . . 55.

51. Axial area narrow, central area rounded . . . *C. Liber* var.
— and central areas united to a linear or lanceolate space . . . 52.

52. Valve with broad ends . . . 53.
— narrowed towards the ends . . . 54.

53. L. 0,05 to 0,06 mm. . . . *C. obtusa* W. Sm.
L. 0,108 mm. . . . *C. Kainitzii* Pant.

54. Striæ 7 or 8 in 0,01 mm. . . . *C. sectilis* A. S.
— 10 to 12 — . . . *C. samoensis* Grun.
— 20 — — . . . *C. alpestris* Grun.

55. Longitudinal lines fine . . . 56.
— — broad . . . 65.

56. Axial area indistinct . . . 57.
Axial and central areas united in a linear or lanceolate space . . . 64.

57. Central area small or indistinct . . . 58.
— — orbicular . . . *C. Anderssoni* Cl.

58. Striæ 8 to 10 in 0,01 mm. . . . 59.
— 11 to 20 — . . . 61.

59. Longitudinal lines double . . . *C. probabilis* A. S.
— — single . . . 60.

60. Striæ parallel . . . *C. robusta* Grun.
— slightly radiate . . . *C. Eugeniæ* Cl.

61. Valve gibbous in the middle and at the ends . . . *C. Silicula* Ehb.
— with parallel margins . . . 62.

62. Freshwater species . . . *C. bacillaris* Greg.
Marine — . . . 63. [1])

63. Longitudinal lines median . . . *C. Liber* W. Sm.
— — marginal . . . *C. Spathula* Brun.

64. Longitudinal lines median . . . *C. formosa* Greg.
— — inframarginal . . . *C. Frater* Cl.

[1]) In this division *C.? elongatula* Pant. may probably also be included.

65. { Axial area broad . . . . . *C. supergradata* Brun
— — narrow or indistinct . . . . . 66.

66. { Central area orbicular . . . . . 67.
— — quadrate . . . . . 68.
— — indistinct . . . . . 70.

67. { Valve narrow . . . . . *C. blanda* A. S.
— broad, almost hexagonal . . . . . *C. quadriseriata* Cl. a. Grun.

68. { Longitudinal lines marginal . . . . . *C. Campbellii* Pet.
— — median . . . . . 69.

69. { Longitudinal lines rather narrow . . . . . *C. Powellii* Lewis.
— — — broad . . . . . *C. amica* Cl. a. Grun.

70. { Striæ about 21 in 0,01 mm. . . . . *C. venusta* Pant.
— 5 to 10 — . . . . . 71.

71. { Striæ 5 in 0,01 mm. . . . . *C. Zanardiniana* Grun.
— 8 — . . . . . *C. Wittii* Grun.
— 12 — . . . . . *C. sejuncta* A. S.

1. **C. lepidula** Grun. (1880). — V. narrow, linear, with broad, rounded ends. L. 0,02; B. 0,006 mm. Axial area indistinct; central small, orbicular. Striæ parallel, 27 to 30 in 0,01 mm. Longitudinal lines marginal. — *Nav. lep.* Grun. in V. H. Syn. p. 108 Pl. XIV f. 42.

Fresh water: Belgium (V. H.).

2. **C. bacillaris** Greg. (1856). — V. linear, with rounded ends. L. 0,023 to 0,05; B. 0,005 to 0,006 mm. Axial area very narrow; central area small, sometimes unilaterally dilated to a fascia. Striæ 20 to 22 in 0,01 mm. almost parallel. — *Nav. bacillaris* Greg. M. J. IV Pl. I f. 24. V. H. Syn. Pl. XII f. 27.

Fresh water: Scotland (Greg.), Illinois (Grove Coll.)!

3. **C. fasciata** Lagstr. (1873). — V. linear to linear-lanceolate, with broad rounded ends. L. 0,023 to 0,037; B. 0,005 to 0,008 mm. Axial area indistinct or narrow. Central area a broad fascia. Longitudinal lines indistinct, striæ parallel 24 to 26 in 0,01 mm. — *Nav. fasciata* Lagst. Spitsb. D. p. 34 Pl. II f. 11. V. H. Syn. Pl. XII f. 34. *Nav. fonticola* Grun. V. H. Syn. Pl. XII f. 32 (1880). *Nav. fontinalis* Grun. V. H. Syn. p. 103 Pl. XII f. 33. *Nav. Bacillum var. inconstantissima* Grun. in V. H. Syn. Pl. XII f. 28. *Nav. Lacunarum* Grun. V. H. Syn. Pl. XII f. 31. *Stauroneis Bacillum* Grun. Verh. 1863 p. 155 Pl. IV f. 16. *Nav. (molaris var.?) abyssinica* Grun. in Martelli Florula Bogosensis p. 152 Pl. I f. 4 (1886).

Fresh or slightly brackish water: Spitsb.! Iceland! Scotland! Sweden! Finland! Belgium! Abyssinia (Grun.). N. Zealand! N. America, Hoboken, N. Jers! Dakota! Brazil! Ecuador! Argentina!

This little form has some resemblance to some small Pinnulariæ of the section Parallelistriatæ, so that Grunow (V. H. Syn. Pl. XII f. 34 text) considers the form from Spitsbergen to be a Pinnularia. I think it is more akin to *Nav. Bacillum*. The longitudinal lines are not distinct in most specimens, but I have seen such lines faintly on specimens from slightly brackish water at Piteå (Gulf of Bothnia), which I am unable to distinguish from the larger form, named by Grunow *Nav. Lacunarum*. As I can see no difference between *Nav. fasciata* and Grunows *Nav. fonticola*, *Nav. fontinalis* and *Nav. Lacunarum* I have united them.

A probably allied form is *Nav. Creguti* Hérib. a. Perag. (D. d'Auvergne p. 119 Pl. IV f. 17 and var. *lanceolata* f. 18) fossil in the Auvergne Deposits. The valve is more lanceolate, in L. 0,028 to 0,035 mm. The striæ are stated to be 12 to 15 in 0,01 mm. *Stauroneis acutiuscula* of the same author (p. 78 Pl. III f. 20) with 20 striæ in 0,01 mm. also fossil from Auvergne may be a form of *Coloneis fasciata*, or possibly of *Stauroneis (Pleurostauron) parvula* Grun., which I am unable to decide without original specimens.

4. **C. Beccariana** Grun. (1886). — V. gibbous in the middle, with broad capitate ends. L. 0,026 to 0,074; B. 0,007 mm. Axial area narrow, central area a broad, transverse fascia. Striæ

21 in 0,01 mm. parallel. Longitudinal lines faint, median. — *Nav. Beccariana* Grun. in Martelli Florula Bogosensis p. 153 Pl. I f. 5. Cal. B. Icon. n. Part. II Pl. I f. 7.

Brackish water: Calcutta! Abyssinia (Grun.).

5. **C. Clevei** Lagst. (1873). — V. convex, linear, with broad, subrostrate ends. L. 0,052 to 0.065; B. 0,011 to 0,014 mm. Axial area indistinct; central area a transverse fascia. Striæ 24 in 0,01 mm. (17,5 to 20 according to Lagerst.) slightly convergent in the middle and at the ends. Longitudinal lines distinct, submarginal. — *Nav. Cl.* Lagst. Spitsb. D. p. 34 Pl. I f. 10.

Fresh water: Spitsbergen!

6. **C. columbiensis** Cl. N. Sp. — V. elongated, biconstricted, with cuneate ends. L. 0,044; B. 0.007 mm. Axial area narrow, somewhat broader in the middle, between the central nodule and the ends. Central area a broad, transverse fascia. Striæ almost parallel, 19 in 0,01 mm. Longitudinal lines indistinct. — Pl. III f. 34.

Fresh water: Columbia River, Oregon (Weissflog Coll.!)

I am unable to identify this form with any other, and it seems doubtful whether it belongs to this group of Navicula or to Pinnularia.

7. **C. lobata** Schwartz (1877). — V. small, short and stout, biconstricted, with broad, rounded-truncate ends. L. 0,03; B. 0,015 mm. Axial area narrow linear. Striæ fine, crossed by a median, longitudinal line. — *Nav. lobata* Schw. in Rab. A. E. N:o 2481 (with fig.).

Marine? Vera Cruz.

I have not found this species in N:o 2481 of Rab. Dec. for which reason I am unable to decide if it be the same as *Nav. lobata* in Cl. West. Ind. D. p. 7 Pl. I f. 8. They agree in size and outline but on the West Indian form no longitudinal lines have been observed.

8. **C. Silicula** Ehb. (1843). — V. elongated, gibbous in the middle with more or less clavate, obtuse ends. L. 0,033 to 0,08; B. 0,006 to 0,015 mm. Axial area indistinct or narrow; central area small and rounded, or a broad transverse fascia. Striæ 16 to 18 in 0,01 mm. almost parallel or slightly divergent in the middle and at the ends. Longitudinal lines marginal.

A. *Forms with small central area.*

Var. *alpina* Cl. — V. small, gibbous in the middle. L. 0,033 to 0,042; B. 0,0055 to 0,0075 mm. Axial area indistinct; central area very small. Striæ 19 to 22 in 0,01 mm. — *Nav. limosa* Lagerst. Spitsb. D. Pl. I f. 6. *Nav. Silicula* Grun. in V. H. Syn. Pl. XII f. 21.

Fresh water: Spitsbergen! Norway, Dovre! Russian Lapland! Sweden, Arbrå, Helsingland! Greenland!

Var. *gibberula* Kütz. — V. gibbous in the middle, with subcuneate ends L. 0,05 to 0,08; B. 0,01 to 0,015 mm. — *Nav. gibberula* Kütz. Bac. Pl. III f. 50 (1844). W. Sm. B. D. I Pl. XVII f. 160. *Nav. limosa* Kütz Bac. p. 101 Pl. III f. 50 (1844). Donk. B. D. Pl. XII f. 6 b. *Nav. limosa genuina* Grun. Verh. 1860 Pl. V f. 8 b. *Nav. limosa v. gibberula* V. H. Syn. Pl. XII f. 19.

Var. *genuina* Cl. — V. slightly gibbous in the middle, with subclavate, rounded ends. L. 0,05 to 0,08; B. 0,015 mm. Axial area narrow. — *Nav. Silicula* Ehb. Am. p. 131. M. G. VI, 1 f. 16 etc. *Nav. limosa* Donk B. D. Pl. XII f. 6 a. V. H. Syn. Pl. XII f. 18.

The var. gibberula and genuina are very slightly different and graduate into each other completely. They occur in fresh, sometimes slightly brackish water: Sweden! Finland! England! Germany! Belgium (V. H.) Switzerland! Greenland! N. America! New Zealand!

Var. *undulata* Grun. (1880). — V. elliptical, with very slightly undulated margin L. 0,05; B. 0,013 mm. — *Nav. limosa v. undulata* Grun. V. H. Syn. Pl. XII f. 22.

Var. *inflata* Grun. (1860). — V. elliptical-linear, very slightly gibbous in the middle. L. 0,05; B. 0,011 mm. — *N. lim. var. inflata* Grun. Verh. 1860 Pl. V f. 8 c. *N. limosa var. subinfl.* Grun. V. H. Syn. Pl. XII f. 20.

Var. *curta* Grun. (1880). — V. linear-elliptical, with cuneate ends. L. 0,03; B. 0,012 mm. *Nav. lim. v. curta* Grun. in V. H. Syn. Pl. XII f. 23.

Var. *capitata* Lagst. (1873). — V. strongly inflated in the middle and with broad, subtruncate ends. L. 0,06; B. 0,0075 mm. — Lagst. p. 31. Pl. I fig. 7 a.

Fresh water: Spitsbergen (Lagst.).

In Verh. 1860 Grunow describes two more varieties, named *truncata* and *bicuneata*, which however seem to be forms of Neidium.

B. *Forms with transverse fascia.*

Var. *minuta* Grun. (1880). — V. strongly gibbous in the middle, with clavate or cuneate ends. L. 0,022 to 0,033; B. 0,006 mm. Axial area indistinct. Striæ 21 to 22 in 0,01 mm. — *Nav. ventricosa var. minuta?* Grun. in V. H. Syn. Pl. XII f. 26.

Fresh water: Spitsbergen! Finland, Kuopio! Belgium (V. H.).

Var. *ventricosa* [Ehb. 1830?] Donk. (1873). — Linear gibbous in the middle and at the rounded ends. L. 0,04 to 0,06; B. 0,009 to 0,011 mm. Axial area narrow. Striæ 18 to 20 in 0,01 mm. parallel or slightly radiate. — *Nav. ventricosa* Ehb. Abh. 1830 p. 67? Donk. B. D. p. 74 Pl. XII f. 7. V. H. Syn. p. 103 Pl. XII f. 24. *Nav. Horvathii* Grun. Verh. 1860 Pl. VI f. 18. Var. *Haslinszkyi* Pant. II p. 47 Pl. XI f. 193 (1889). — *Nav. ventricosa var. subundulata* Grun. A. D. p. 29 Pl. I f. 16. *Nav. neogena* Pant. III Pl. XVII f. 252; Pl. XXV f. 372 (1893)?

Fresh or brackish water: Sweden! Finland! Sea of Kara (Grun.), England (Donk.) Japan!

Var. *truncatula* Grun. (1880). — V. elliptical, with rounded ends, not gibbous. L. 0,04; B. 0,01 mm. Axial area narrow. — *Nav. ventric. v. truncat.* Grun. V. H. Syn. Pl. XII f. 25.

Var. *Kjellmaniana* Grun. (1880). — V. gibbous in the middle with more narrow and rounded ends. L. 0,063; B. 0,0115 mm. Axial area narrow. Striæ 16 to 17 in 0,01 mm., slightly radiate. — *Nav. vent. v. Kjellm.* Grun. A. D. p. 29 Pl. I f. 17.

Marine: Finmark!

V. *Jenisseyensis* Grun. (1880). — V. slightly gibbous in the middle. Ends rounded. L. 0,0445; B. 0,01 mm. Striæ 19 in 0,01 mm., parallel, slightly divergent at the ends. — *Nav. ventric. v. Jeniss.* Grun. A. D. p. 29 Pl. I f. 18.

Fresh water: Jenissey (Grun.).

Var.? *subventricosa* Grun. (1880). — V. gibbous in the middle, with broad, rounded ends. L. 0,066; B. 0,0095 mm. Central nodule slightly dilated transversely. Axial area very narrow. Striæ 22 to 23 in 0,01 mm., convergent at the ends. — *Nav. subventricosa* Grun. A. D. p. 29 Pl. I f. 19.

Brackish water: Sea of Kara (Grun.).

9. **C. tahitensis** Grun. (1863). — V. lanceolate, inflated in the middle, with obtuse ends. L. 0,054 to 0,065; B. 0,002 mm. Axial and central areas indistinct. Striæ 12 to 13 in 0,01 mm., slightly radiate, finely punctate. Longitudinal lines median. — *Nav. Tah.* Grun. Verh. 1863 p. 152 Pl. V. f. 15. Nov. p. 19.

Fresh water: Tahiti (Grun.).

This species is unknown to me, perhaps it is only a variety of N. Silicula.

10. **C. patagonica** Cl. (1881). — V. convex, linear with cuneate ends. L. 0,057 to 0,09; B. 0,009 to 0,013 mm. Axial area narrow, but distinct. Central area a broad fascia, reaching to the margins. Striæ 13 to 14 in 0,01 mm., almost parallel, but radiate at the ends, crossed near the margin by a faint longitudinal line. — *Nav. viridis var. patag.* Cl. Färskv. D. från Grönl. och Arg. p. 12 Pl. XVI f. 3.

Fresh water, on moist rocks: Sierra Famatina, Rep. Arg.! Pichincha, Ecuador!

This remarkable freshwater-species may easily be mistaken for a *Pinnularia*, but the terminal striæ are radiate, not convergent as in the last named genus.

11. **C.? elongatula** PANT. (1889). — V. linear, with rounded ends. L. 0,021; B. 0,008 mm. Axial area indistinct; central small, orbicular. Striæ 20 in 0,01 mm. parallel. Longitudinal lines? — *Nav. elongatula* PANT. II p. 45 Pl. III f. 40.

Brackish water: Hungary, foss. (PANT.).

The fig. of this species in PANTOCSEKS work is not sufficient for determining the systematical place of this form, which seems to be related to *C. Silicula*. I have found in the deposit of Gyongyös Pata (Hungary) a form, which agrees with *N. elongatula* in outline and in the number of striæ, but is 0,04 mm. in length. In this form the striæ on both sides of the central nodule are interrupted by a short lunate, longitudinal line.

12. **C. Schumanniana** GRUN. (1880). — V. strongly inflated in the middle, with rounded obtuse ends. L. 0,037 to 0,05; B. 0,009 to 0,013 mm. Axial area indistinct or narrow. Central area lanceolate with a lunate marking on each side of the central nodule. Striæ 17 in 0,01 mm., radiate at the ends (very finely punctate?). Longitudinal lines indistinct. — *Nav. Trochus* SCHUM. P. D. I p. 189 f. 52. GREG. M. J. IV Pl. I f. 2 (1856). *Nav. Schumanniana* GRUN. V. H. Syn. p. 99 Pl. XI f. 21.

Fresh water: Sweden, Ringsjön in Skåne! Ladoga! Königsberg, fossil!

Var. *trinodis* LEWIS (1861). — V. divided by two constrictions into three segments of equal size. Ends cuneate. L. 0,034 to 0,042; B. 0,011 mm. Striæ 18 to 20 in 0,01 mm. strongly radiate in the middle, almost parallel in the terminal segments. — *Nav. trinodis* LEWIS Proc. Ac. n. sc. Philad. p. 66 Pl. II f. 6 (1861). — *Nav. biconstricta* GRUN. Casp. S. Alg. p. 15 Pl. III f. 6 (1878).

Fresh and brackish water: Caspian Sea (GRUN.) N. America, Hudson River! Delaware! Dakota! Lake Pistaku, Illin.! Lost spring Ranch, Calif.!

13. **C.? bodosensis** PANT. (1893). — V. trochiform, obtuse. L. 0,077; B. 0,02 mm. Axial area lanceolate, dilated in the middle to a transverse fascia, and with an elongated marking on both sides of the central nodule. Striæ 17 in 0,01 mm. almost parallel. — *Nav. bodos.* PANT. III Pl. III f. 35.

Habitat?: »Bodos» (PANT.).

Var. *Heribaudi* PER. (1893). — V. in L. 0,07 to 0,09; B. 0,016 mm. biconstricted. Striæ 17 in 0,01 mm. — *Nav. Her.* Perag. in Hérib. D. d'Auvergne p. 112 Pl. IV f. 8.

Fresh water: Puy de Dôme. Varennes (Brun Coll.)!

14. **C. alpestris** GRUN. (1860). — V. linear, slightly gibbous in the middle, with rounded or subcuneate ends. L. 0,06 to 0,076; B. 0,006 to 0,009 mm. Axial and central area united in a narrow lanceolate space, having on each side of the central nodule a lunate marking. Striæ 20 in 0,01 mm. nearly parallel; slightly divergent at the ends. Longitudinal lines distinct, submarginal. — *Nav. alpestris* GRUN. Verh. 1860 p. 545 Pl. V f. 4. V. H. Syn. Pl. XII f. 30.

Fresh water, alpine regions: Swedens Lake Mälaren (in postglacial mud!), Austrian alps, (GRUN.), Savoy!

Nav. alpestris var. tatrica GUTW. p. 20 Pl. I f. 17 — is no var. of *C. alpestris* and appears to be a Frustulia or Neidium, impossible to decide from the figures.

15. **C. nubicola** GRUN. (1880). — V. slightly triundulated. Central area dilated transversely to a fascia, with lunate markings on both sides of the central nodule. — *Nav. nubicola* GRUN. in V. H. Syn. Index to Pl. XII f. 30.

Fresh water: Turkestan (GRUN.).

16. **C. Kainitzii** PANT. (1893). — V. elongated, gibbous in the middle, with broad, obtuse ends. L. 0.108; B. 0,02 mm. Axial area broad, linear-lanceolate, with an elongated marking on

each side of the median line. Striæ slightly radiate in the middle, elsewhere parallel, 19 in 0,01 mm. — *Nav. Kain.* PANT. III Pl. III f. 41.

Habitat?: »Köpecz» (PANT.).

17. **C. obtusa** W. SM. (1853). — V. very convex, subrectangular, with broad, truncate ends. L. 0,05 to 0,06; B. 0,016 to 0,017 mm. Axial and central areas united in a moderately broad lanceolate space, in the middle of which is on each side of the central nodule a lunate marking, Striæ 17 in 0,01 mm. parallel or slightly divergent towards the ends. Longitudinal lines submarginal. — *Nav. obtusa* W. SM. B. D. I p. 50 Pl. XVI f. 140 (1853). GRUN. Verh. 1860 p. 536 Pl. IV f. 39? *N. Hebes* RALFS Priteh. Inf. p. 896 (1861). DONK. B. D. p. 23 Pl. III f. 12.

Fresh water, especially in nothern regions. Greenland! Sweden, Lappland and Gotland! Russian Lappland! Norway, Dovre! Scotland!

This species is very characteristic and not closely akin to any known form. It seems to be an inhabitant of northern regions and is not mentioned by BRUN as occuring in Switzerland, nor by Belloc as occuring in the Pyrenées.

18. **C. Liber** W. SM. (1853). — V. linear, sometimes with slightly concave or convex margins, and rounded or subcuneate ends. L. 0,05 to 0,19; B. 0,008 to 0,032 mm. Axial area indistinct or very narrow. Central area indistinct or small. Striæ 13 to 20 in 0,01 mm. parallel, divergent at the ends. Longitudinal lines median, single or double.

A. Forms with linear, sometimes slightly constricted valves, and without lunate markings in the central area.

a) *Longitudinal lines single.*

Var. *linearis* GRUN. (1860). — V. narrow, linear, with parallel margins and rounded ends. L. 0,054 to 0,12; B. 0,008 to 0,011 mm. Areas indistinct. Striæ 20 to 29 in 0,01 mm. Longitudinal lines median, frequently indistinct. — *Nav. linearis* GRUN. Verh. 1860 p. 546 Pl. III f. 2. V. H. Syn. p. 105 Pl. XII f. 35. A. S. Atl. L. f. 38, 40.

Marine: Atlantic coasts of Europe, Africa and America (GRUN.), Ceylon! Singapore (BRUN Coll.!) Galapagos Islands! Peru (GRUN.), Honduras (GRUN.), Gulf of Mexico (ATL.).

Var. *genuina* CL. — V. linear, with parallel or slightly convex margins and more or less broad ends. L. 0,08 to 0,17; B. 0,013 to 0,024 mm. Axial area very narrow; central area small, orbicular, frequently somewhat asymmetrical. Striæ 13 to 20 in 0,01 mm. — *Nav. Liber* W. SM. B. D. I p. 48 Pl. XVI f. 133. DONK. B. D. p. 62 Pl. IX f. 5. A. S. Atl. L. f. 16, 17, 18. A. S. N. S. D. II f. 45. V. H. Syn. p. 104 Pl. XII f. 36. *Nav. maxima* GREG. M. J. IV Pl. V f. 2 (1856). D. of Cl. p. 487 Pl. IX f. 18. A. S. Atl. L. f. 19 to 21, 37. N. S. D. II f. 44. *Nav. fortunata* Leud. Fortm. D. de Ceylan Pl. III f. 27 (1879).

Marine: Greenland! Spitsbergen! Finmark! Behrings' Island! North Sea! Mediterranean Sea! Red Sea! Seychelles! Cape of Good Hope! Ceylon! Singapore! Sidney! Port Jackson! Tasmania! Philippines! Japan! Campeachy Bay!

Forma tenuistriata CL. — L. 0,065 to 0,07; B. 0,015 mm. Striæ 25 to 26 in 0,01.

Marine: Labuan! Sandwichs Islands!

Forma convexa CL. — Convex. L. 0,11 to 0,13; B. 0,012 mm. Axial area somewhat broader. Striæ 16 to 20 in 0,01 mm. — *Nav. Hauckii* CL. N. R. D. p. 9 Pl. II f. 27 (1881).

Marine: Gulf of Naples! Adriatic!

Var. *Holuboi* PANT. (1886). — V. linear, with rostrate capitate ends. L. 0,159; B. 0,025 mm. Striæ 20 in 0,01 mm. — *Nav.* (*maxima var.?*) *Hol.* PANT. I p. 25 Pl. XVIII f. 165.

Marine: Hungary, fossil (Pant.).

Var. *relegata* CL. — V. slightly constricted in the middle, with cuneate ends. L. 0,15; B. 0,025 mm. Axial area linear-lanceolate. Striæ 12 to 13 in 0,01 mm., crossed by a median longitudinal line.

Marine: Redondo, Calif. fossil (Grove Coll.)!

b) *Longitudinal lines double.*

Var. *bicuneata* GRUN. (1860). — V. broad, linear, with cuneate ends. L. 0,11 to 0,19; B. 0,018 to 0,032 mm. Striæ 15 to 17 in 0,01 mm. — *Nav. bicuneata* GRUN. Verh. 1860 p. 546 Pl. III f. 4. A. S. N. S. D. Pl. II f. 44 (smaller form). *N. maxima* DONK. B. D. p. 60 Pl. IX f. 4. *N. Bleischii* A. S. Atl. L. f. 22, 23, 25.

Marine: North Sea! Baltjik, fossil (Atl.), Sumatra (Deby Coll.!) Samoa (Atl.), Seychelles! Colon (Deby Coll.)! Porto Seguro (Deby Coll.)!

Forma lanceolata. — V. shorter, with acuminate ends. L. 0,08 to 0,09; B. 0,032 mm. Striæ about 13 in 0,01 mm. — *Nav. excentrica* A. S. Atl. L. f. 6, 7.

Marine: Celebes (Atl.) Mazatlan (Atl.).

Var. *excentrica* GRUN. (1860). — V. broadly linear to linear-elliptical, with rounded or cuneate ends. L. 0,09 to 0,14; B. 0,017 to 0,027 mm. Median line often slightly undulating. Central area frequently slightly dilated unilaterally. Striæ 20 to 22 in 0,01 mm. — *Nav. excentrica* GRUN. Verh. 1860 p. 545 Pl. III f. I. *N. delata* A. S. N. S. D. p. 91 Pl. II f. 43 (1874). Atl. L. f. 30. *N. formosa v. fossilis* PANT. II p. 45 Pl. XX f. 310 (1889).

Marine: North Sea! Mediterranean Sea! Java (Kinker Coll.)! Japan (Atl.) Samoa! Colon (Deby Coll.)! Hungary, fossil (Pant.).

B. *Forms constricted in the middle. Central area without lunate markings.*

Var. *Janischiana* RABH. (1862). — V. slightly constricted in the middle, with cuneate ends. L. 0,14; B. 0,035 mm. Median line slightly flexuose. Central area small, asymmetrical. Striæ 22 in 0,01 mm. Longitudinal lines faint, single. — *Nav. Jan.* Jan. Rab. Hond. p. 10 Pl. II f. 15.

Marine: Colon (Deby Coll.)!

Var. *Bleischiana* JAN. a. RABH. (1862). — V. strongly constricted in the middle, with cuneate ends. L. 0,14 to 0,17; B. 0,025 (min.) to 0,042 (max.) in 0,01 mm. Areas indistinct. Striæ 12 in 0,01 mm. Longitudinal lines single, very distinct. — *Nav. Bl.* JAN. a. RABH. Hond. p. 9 Pl. II f. 10. *Cal. liber var. Bleisch.* Icon. n. Pl. IV f. 1.

Marine: Honduras (Jan. Rabh.) Nice (Deby, Brun, Van Heurck Coll.)! Redondo Calif. fossil (Grove Coll.)!

C. *Forms with lunate markings on the central area.*

Var. *elongata* GRUN. (1874). — Linear, with parallel margins and broad rounded ends. L. 0,07 to 0,12; B. 0,018 to 0,009 mm. Axial area narrow; central area small with lunate markings on both sides of the central nodule. Striæ 15 to 18 in 0,01 mm. Longitudinal lines faint, median. — *Nav. elongata* GRUN. in A. S., N. S. D. p. 91 Pl. II f. 42. A. S. Atl. L. f. 27.

Marine: North Sea! Mediterranean! Red Sea! Ceylon! Singapore! Japan! Galapagos Islands! Florida!

Var. *umbilicata* GRUN. (1877). — V. linear, frequently slightly gibbous in the middle, with rounded ends. L. 0,13 to 0,16; B. 0,015 to 0,02 mm. Axial area narrow, but distinct, somewhat dilated in the middle, with linear markings on both sides of the central nodule. Striæ 12 to 15 in 0,01 mm. Longitudinal lines distinct. — *Nav. maxima var. umbilic.* A. S. Atl. L. f. 32, 33. *Nav. max. v. asiatica* TEMP. BR. D. f. du Japon p. 72 (1889).

Marine: North Sea (Atl.) Bab el mandeb! Ceylon! Japan, fossil (Brun.) Colon (Deby Coll.!).

19. **C. robusta** GRUN. (1877). — V. linear, narrowed towards the ends. L. 0,28 to 0,33; B. 0,04 to 0,035 mm. Axial area narrow, but distinct, slightly dilated around the central nodule. Striæ 9 to 11 in 0,01 mm. Longitudinal lines median, strong. — *Nav. robusta* GRUN. in A. S. Atl. L. f. 1—2.

Marine: Zanzibar (Deby Coll.)! Java (Kinker Coll.)! Sumatra! Singapore! Samoa! Redondo, Calif. fossil (Grove Coll.)!

Var. *perlonga* PANT. (1889). — V. slightly gibbous in the middle. L. 0,4 to 0,5; B. 0.005 mm. Striæ 10 in 0,01 mm. — *Nav. perlonga* PANT. II p. 52; III Pl. XIV f. 209.

Marine: Hungary, fossil (Pant.).

Var. *subelliptica* CL. — V. linear-elliptical, frequently with subrostrate ends. L. 0,15 to 0,19; B. 0,037 to 0,04 mm. Areas broader. Striæ 11 to 12 in 0,01 mm. — A. S. Atl. L. 4, 5.

Marine: Raised Marsh (Atl.), Redondo and Santa Monica Calif., fossil (Deby Coll.)! Porto Seguro (Deby Coll.)!

This large and beautiful form is nearly connected with *C. Liber* and may be regarded as one of its many varieties.

20. **C. probabilis** A. S. (1877). — V. linear with subcuneate ends. L. 0,16 to 0,18; B. 0,028 to 0,03 mm. Axial area narrow. Central area small, subrhomboid. Median line slightly flexuose. Striæ 10 in 0,01 mm. Longitudinal lines double. — *Nav. prob.* A. S. Atl. L. f. 46.

Marine: Campeachy Bay (Atl.), Florida; Java (Grove Coll.)!

Also nearly akin to C. liber (var. bicuneata).

21. **C. Eugeniæ** CL. (1881). — V. linear, with rounded ends, very convex. L. 0,075 to 0,085; B. 0,017 mm. Axial area indistinct. Central area small, rhombic-orbicular. Median line slightly sinuose. Striæ 7 to 9 in 0,01 mm., slightly radiate in the middle, somewhat convergent at the ends, not distinctly punctate. Longitudinal lines distinct, submarginal. — *Nav. Eug.* CL. N. R. D. p. 7 Pl. II f. 16.

Marino: Galapagos Islands!

22. **C. virginea** CL. (1878). — V. lanceolate with acute or subrostrate and obtuse ends. L. 0,058 to 0,09; B. 0,027 to 0,025 mm. Axial area very narrow, slightly dilated unilaterally at the central nodule. Central pores approximate. Striæ 20 to 21 in 0,01 mm. parallel. Longitudinal lines faint, submarginal. — *Nav. virg.* CL. West Ind. D. p. 5 Pl. I f. 2. *Nav. parallela* CASTR. Voy. Challenger p. 31 Pl. XXVIII f. 12 (1886)?

Marine: West Indies, Virgin Islands! Bahamas (Grove Coll.)!

23. **C. eximia** GRUN. Ms. — V. divided by two deep constrictions into three segments of equal size. L. 0,11 to 0,12; B. 0,025 mm. Axial area narrow. Central area small, orbicular. Striæ 14 in 0,01 mm. radiate in the middle. Longitudinal lines double; the exterior stronger — Pl. IV f. 2.

Marine: Seychelles (Van Heurck Coll.)! Cebu (Grove Coll.)!

24. **C. clavigera** CL. N. Sp. — V. elongated, divided by two slight constrictions into one smaller median, and two larger terminal, segments. L. 0,115; B. ,0015 (max.) mm. Axial area narrow. Central area a broad fascia. Striæ 20 in 0,01 mm., parallel, divergent at the ends. Longitudinal lines median. — Pl. IV f. 3.

Marine: Colon (Deby Coll.)!

This form may be regarded as a variety of *N. Liber*, with transverse fascia.

25. **C. (Pleurosigma) staurophora** GRUN. (1880). — V. sigmoid, lanceolate, gradually tapering from the middle to the acute ends. L. 0,1125; B. 0,014 mm. Median line central, sigmoid. Central area a broad, transverse fascia, reaching the margins. Striæ 14 in 0,01 mm. parallel, not punctate. Longitudinal lines closer to the median line than to the margin. Inside the longitudinal lines the striæ are fainter than outside. — *Pleurosigma staurophorum* GRUN. A. D. p. 61. Perag. VIII f. 45.

Marine: Davis Strait (Grun.)

Var. *asiatica* TEMP. a. BRUN (1889) — L. 0,19 to 0,22; B. 0,025 to 0,028 mm. Striæ 16 to 18 in 0,01 mm. — *Pleur. asiaticum* D. f. du Japon p. 56 Pl. IX f. 1. Perag. VIII f. 44.

Marine: Japan, fossil.

26. **C. latefasciata** Grun. (1880). — V. linear, with broad, rounded ends. L. 0,06 to 0,093; B. 0,012 to 0,017 mm. Axial area gradually enlarged from the ends to the middle. Central area a broad, transverse fascia. Striæ 16 to 20 in 0,01 mm. parallel. Longitudinal lines broad, submarginal. — *Nav. latef.* Grun. A. D. p. 29 Pl. I f. 21.

Marine: Arctic America! Greenland! Sea of Kara! Cape Deschneff! Adriatic (Grun.).

27. **C. galapagensis** Cl. (1881). — V. constricted in the middle, with tongue-shaped segments. L. 0,067 to 0,092; B. 0,025, at the constriction 0,009 to 0,011 mm. Axial area narrow. Central area a broad, transverse fascia. Median line with small and indistinct terminal fissures. Striæ 15 to 16 in 0,01 mm., not distinctly punctate, parallel. Longitudinal lines submarginal. — *Nav. Galapagens.* Cl. N. R. D. p. 14 Pl. III f. 40.

Marine: Galapagos Islands!

Var. *contracta* Grun. (1890). — L. 0,062; B. 0,01 mm. Striæ 18 in 0,01 mm. — *Nav. contracta* A. S. Atl. CLX f. 13.

Marine: Campeachy Bay (Atl.).

Var. *japonica* Cl. (1890). — L. 0,06 to 0,10; B. 0,019 to 0,023, at the constriction 0,01 to 0,014 mm. Axial area in each segment narrow lanceolate. Striæ 14 to 16 in 0,01 mm. Longitudinal lines marginal or inframarginal. — *Nav. galap. v. jap.* A. S. Atl. CLX f. 16. *Nav. correpta* A. S. Atl. CLX f. 15.

Marine: China (Van Heurck Coll.)! Japan (Deby Coll., Brun Coll.)!

28. **C. consimilis** A. S. (1874). — V. linear, with parallel margins, narrowed towards the ends. L. 0,069 to 0,105; B. 0,013 mm. Axial area narrow; central area a transverse fascia. Striæ 13 to 16 in 0,01 mm. parallel. Longitudinal lines submarginal. — *Nav. consimilis* A. S N. S. D. p. 91 Pl. II f. 46.

Marine: North Sea! Balearic Islands!

29. **C. æmula** A. S. (1874). — V. linear, with parallel margins and rounded ends. L. 0,029 to 0,041; B. 0,07 mm. Axial area very narrow or indistinct. Central area a broad fascia. Striæ 19 to 23 in 0,01 mm. parallel. Longitudinal lines marginal or submarginal. — *Nav. æmula* A. S. N. S. D. p. 91 Pl. II f. 47. *Nav. subdivisa* Grun. A. D. p. 29 Pl. I f. 20 (1880).

Marine: Sea of Kara (Grun.), Baltic (Grun.), Normandy (Grun.), Adriatic! Cape Deschneff! Arctic America! Greenland! Campeachy Bay (A. S.), Virgin Islands, West Indies!

Var. *major* Cl. a. Grove (1891). — L. 0,07; B. 0,085 mm. Striæ 18 in 0,01 mm. slightly radiate in the middle. — *Nav.* (*Caloneis*) *æmula var.? major* Cl. a. Grove Diatomiste I p. 67 Pl. X f. 8.

Marine: Macassar Straits!

30. **C. Wardii** Cl. N. Sp. — V. linear, with cuneate ends. L. 0,04 to 0,09; B. 0,015 mm. Central nodule dilated transversely into a stauros, reaching the margin. Axial area narrow, linear. Longitudinal lines distinct, closer to the margin than to the median line. Striæ parallel, 19 in 0,01 mm. slightly divergent at the ends. — Pl. III f. 39, 40, 41.

Brackish water: Bristol, Conn. (Ward)! Hudson River (Ward)!

31. **C. formosa** Greg. (1856). — V. narrow lanceolate, with obtuse ends. L. 0,08 to 0,013; B. 0,015 to 0,026 mm. Axial and central area uniting into a narrow and irregularly lanceolate space, usually slightly dilated unilaterally in the middle. Striæ 14 in 0,01 mm., almost parallel, slightly radiate at the ends. Longitudinal lines median. — *Nav. formosa* Greg. T. M. S. IV p. 42 Pl. V f. 6. A. S. Atl. L. fig. 9, 10, 12, 13, 14, 15. *Nav. oregonica* Ehb. Ber. 1870 Pl. II: 1 f. 10. *Nav. liburnica* Grun. V. H. Syn. p. 102 Pl. XI f. 3.

Brackish and marine: Greenland! North Sea! Baltic! Atlantic coasts of N. America! Cape Horn! Mediterranean Sea! Sierra Leone! Ceylon! Sidney! Sandwich Islands! California! Caspian

Sea (Grun.), Saxony! Great Salt Lake! Oregon, fossil! Guatemala, fossil! Mexico, fossil! Argentina, Rioja! Cameroon, Africa!

Var. *holmiensis* Cl. (1881). — L. 0,075 to 0,125; B. 0,02 to 0,03 mm. Area wider. Striæ 11 to 12 in 0,01 mm. Longitudinal lines faint or indistinct. — *Nav. holm.* Cl. N. R. D. p. 8 Pl. II f. 18. *N. formosa* V. H. Syn. Pl. XI f. 2.

Brackish water: Baltic, (Vaxholm, Åbo)!

Var. *interrupta* Cl. — L. 0,07; B. 0,013 mm. Axial area narrower. Central area a transverse fascia. Striæ 16 in 0,01 mm., parallel. Longitudinal lines median.

Brackish water: Yarra, S. Australia!

Var. *quadrilineata* Grun. (1879). — L. 0,044; B. 0,09 mm. Area narrow, lanceolate. Striæ about 17 in 0,01 mm. Longitudinal lines double. — *N. quadrilineata* Grun. Cl. M. D. N:o 204.

Brackish water: Oakland, Calif. (Grun.).

32. **C. (Alloioneis) curvinervia** Grun. (1878). — V. lanceolate, slightly asymmetrical, with obtuse ends. L. 0,068 to 0,115; B. 0,022 to 0,028 mm. Median line excentric, with arcuate components. Axial and central areas uniting in a narrow and asymmetrical lanceolate space. Striæ 8 to 9 in 0,01 mm. slightly radiate. Longitudinal lines distinct, median. — Grun. in Cl. W. Ind. D. p. 8 Pl. II f. 13.

Brackish water: Elephant Point, India (Grun.) Island of Rhea near Singapore!

33. **C. amphisbæna** Bory (1824). — V. elliptical, with capitate to rostrate ends. L. 0,06 to 0,08; B. 0,0225 to 0,03 mm. Axial and central area uniting in a large rhombic-lanceolate space. Striæ 16 to 17 in 0,01 mm. radiate to the ends. Longitudinal lines median. — *Navic. amphisb.* Bory Encycl. meth. T. 2 (according to Ehrenb.). *Frustulia depressa* Kütz. Dec. N:o 72 (1833) according to Lagerst. — *Nav. amphisbæna* W. Sm. B. D. I Pl. XVII f. 147 a. (1853). Grun. Verh. 1860 p. 534 Pl. IV f. 36. Donk. B. D. p. 36 Pl. V f. 13. V. H. Syn. p. 102 Pl. XI f. 7.

Fresh water: Sweden! England! Belgium (V. H.) Switzerland (Brun), Caspian Sea (Grun.).

Var. *fuscata* Schum. (1867). — V. rectangular, with rostrate ends. L. 0,04 to 0,045; B. 0,017 mm. Striæ 16 in 0,01 mm. — *Nav. fuscata* Schum. Pr. D. II N. p. 57 Pl. II f. 43. Grun. A. D. p. 31 Pl. I f. 27.

Brackish water: Baltic (Schum.), Kara Sea (Grun.). Caspian Sea (Grun.).

Var. *subsalina* Donk. (1873). – V. elliptical with rostrate-apiculate ends. L. 0,07; B. 0,025 mm. Striæ 17 in 0,01 mm. — *Nav. subsalina* Donk. B. D. p. 24 Pl. IV f. 2. *Nav. amphisbæna* W. Sm. B. D. I Pl. XVII f. 147 *β*. *Nav. amph. v. subs.* V. H. Syn. p. 102 Pl. XI f. 6. Danne. Balt. D. Pl. II f. 14.

Brackish water: Greenland! Spitzbergen! Finmark! Bohuslän! north coasts of Britain (Donk), Baltic! Saxony, Mansfelderseen! Rostock, fossil!

Forma major. — V. lanceolate, with gradually attenuated ends. L. 0,1; B. 0,03 mm. — V. H. Syn. Pl. XI f. 4.

Brackish water: Belgium (V. H.).

Var. *Vukotinovicii* Pant. (1886). — V. lanceolate, subrostrate. L. 0,077 to 0,095; B. 0,029 to 0,032 mm. Area large, lanceolate. Striæ 12,5 to 15 in 0,01 mm., closer near the ends. — *Nav. Vuko.* Pant. I p. 29 Pl. I f. 7, II p. 54, Pl. XII p. 220.

Brackish water: Hungary, fossil!

Var. *liburnica* Grun. (1860). — V. broadly lanceolate. L. 0,05 to 0,11; B. 0,022 to 0,035 mm. Axial area narrow, slightly dilated in the middle. Striæ 16 to 17 in 0,01 mm. Longitudinal lines more approximate to the margin than to the median line. — *Nav. lib.* Grun. Verh. 1860 p. 547 Pl. III f. 25.

Brackish: Adriatic (Grun.), Colon (Deby Coll.)! Calcutta (Deby Coll.)!

Var. *Fenzlii* GRUN. (1863). — Lanceolate, sometimes with subrostrate ends. L. 0,07 to 0,12; B. 0,028 to 0,042 mm. Area narrow, dilated around the nodule. Striæ 11 to 14 in 0,01 mm. Longitudinal lines median. — *Nav. elegans* GRUN. Verh. 1860 p. 534 Pl. IV f. 37. *Nav. Fenzlii* GRUN. Verh. 1863 p. 153. *Nav. amphisb. v. Fenzlii* GRUN. in V. H. Syn. p. 102 Pl. XI f. 5. *N. Grunowii* O'MEARA B. D. p. 362 Pl. XXXI f. 17.

Brackish water: Neusiedler See, Hungary (Grun.), Rostock, fossil! Ceylon (Weissflog Coll.)! Calcutta (Deby Coll)! Batavia! Jamaica! St Martin, W. Ind.! Guatemala, fossil! St. Monica, fossil (Dr. Rae Coll.)!

All these forms are closely connected, so that it seems to me impossible to regard them as distinct species. They are also nearly akin to the two following species, *C. bivittata* and *C. permagna*, of which the latter is, by intermediate forms, connected with *C. formosa*.

34. **C. bivittata** PANT. (1889). — V. lanceolate. L. 0,08 to 0,15; B. 0,031 to 0,04 mm. Axial and central area uniting in a broad, lanceolate space. Striæ 10 (middle) to 12 or 13 (ends) in 0,01 mm., slightly radiate. Longitudinal lines double. — *N. (oregonica var.?) bivittata* PANT. II p. 43 Pl. V. f. 83.

Brackish and marine: Hungary, fossil! Atlantic City, N. Jers. foss. (Deby Coll.)!

35. **C. permagna** BAIL (1850). — V. rhombic-lanceolate, sometimes with slightly triundulated margins. L. 0,15 to 0,22; B. 0,055 to 0,035 mm. Axial and central areas uniting in a more or less broad, irregularly lanceolate space. Striæ 9 to 10 in 0,01 mm. slightly radiate. Longitudinal lines broad or double, median. — *Pinnul. perm* BAIL. Smiths. Cont. 1850 p. 40 Pl. II f. 28, 38. *Nav. permagna* RALFS Pritch. Inf. p. 907. LEWIS Proc. Ac. n. sc. Philad. 1861 p. 70 Pl. II f. 11. GREVILLE T. M. S. XIV p. 127 Pl. XII f. 18 to 21, 1866. V. H. Syn. p. 102 Pl. XI f. 1.

Brackish water: Anvers (V. H.). N. America (New-York to Florida and Gulf of Mexico)!

This large and beautiful species passes over by intermediate forms to *N. formosa*, and seems also to be nearly akin to *C. bivittata*.

36. **C. Dusenii** CL. N. Sp. — V. rhombic-lanceolate, with subacute ends. L. 0,135; B. 0,038 mm. Axial area narrow. Central area moderately large, orbicular, without any markings. Striæ 13 in 0,01 mm., radiate, in the ends slightly convergent. Longitudinal lines approximate to the areas. — Pl. IV f. 4.

Brackish water (mouths of rivers): Cameroon, Africa!

This species is named in honour of Mr DUSÉN, a swedish traveller in Western Africa, who procured me an interesting gathering from that country. This beautiful form greatly resembles *C. permagna*, but differs by the closener of its longitudinal lines to the areas.

37. **C. madagascarensis** CL. (1890). — V. broadly lanceolate. L. 0,095; B. 0,05 mm. Median line with distant central pores. Axial and central areas uniting in a narrow, lanceolate space. Median line bordered by thick silicious ribs. Striæ 9 in 0,01 mm. radiate throughout, indistinctly punctate. Longitudinal lines three, of which the median is the strongest (and differs from the others). — *N. madag.* CL. Diatomiste I p. 23 Pl. IV f. 2.

Marine: Madagascar! Columbo, Ceylon (Letourneur Coll.)! Java!

This is a remarkable species, having some resemblance to *C. amphisbæna var. Fenzlii*, from which it is however quite distinct. Of the three longitudinal lines the median has the appearence of a narrow furrow, separating the flatter axial part of the valve from the sloping exterior part. The other lines are formed by small knots on the striæ.

38. **C. biclavata** CL. a. GROVE (1891). — V. convex, gibbous in the middle and with clavate ends. L. 0,12 to 0,16; B. 0,018 mm. Axial area broad, dilated around the central nodule to an irregularly rounded space. Striæ 10 in 0,01 mm., divergent in the ends, else almost parallel. Longitudinal lines distinct, median. — CL. a. GROVE Diatomiste I p. 66 Pl. X f. 7.

Marine: Macassar Straits (Grove Coll.)!

This is a remarkable form, not closely connected with any other known species. Perhaps *Stauroneis Bribissonii* Castr. (Voy. Chall. Diat. p. 24 Pl. 15 fig. 4) may be the same, but the figure and description of that form are insufficient for identification.

39. **C. samoensis** Grun. (1877). — V. linear to elliptic-linear, narrowed towards the ends. L. 0,085 to 0,115; B. 0,018 to 0,025 mm. Axial and central areas united in a narrow, irregularly lanceolate, space, having on each side of the central nodule a lunate or linear marking. Striæ 10 to 12 in 0,01 mm. slightly radiate at the ends. Longitudinal line median or submarginal. — *Nav. samoensis* A. S. Atl. L. f. 43, 44. *Nav. mammalis* Castr. Chall. Voy. D. p. 30 Pl. XX f. 2 (1886)?

Marine: Ceylon! Amboina (Kinker Coll.), Java (Kinker Coll.)! Philippines! Labuan! Port Jackson! Samoa!

Var.? *bimaculata* Pant. (1889). — V. elliptic-lanceolate. L. 0,064; B. 0,019 mm. Area lanceolate with markings on both sides of the central nodule. Striæ 14 to 15 in 0,01 mm. Longitudinal lines? — *Nav. bim.* Pant. II p. 42 Pl. XXIII f. 346.

Marine: Hungary, fossil (Pant.).

40. **C. sectilis** A. S. (1877). — V. linear with rounded ends. L. 0,144; B. 0,023 mm. Axial and central areas uniting in a broad linear space, with a row of puncta along the median line. Striæ 7,5 in 0,01 mm., parallel. Longitudinal lines submarginal. — *Nav. sectilis* A. S. Atl. L. f. 3.

Marine: Whatabevot, India (Atl.) Hungary, fossil (Pant.).

Var. *boryana* Pant. (1889). — L. 0,01 to 0,13; B. 0,02 to 0,024 mm. Area with a row of puncta on both sides of the central nodule. Striæ 8 to 9 in 0,01 mm. Longitudinal lines marginal or inframarginal. — *Nav. Boryana* Pant. II, XXVIII f. 407.

Marine: Gulf of Naples! Bory, Hungary, fossil! Galapagos Islands (Weissflog Coll.)!

Nav. pavida Pant. III Pl. XXX f. 438 appears to be an allied but smaller form.

41. **C. Anderssonii** Cl. (1881). — V. linear. with subcuneate ends. L. 0,075; B. 0,019 mm. Axial area narrow, dilated around the central nodule, to an orbicular space without markings. Striæ 6,5 to 7 in 0,01 mm., radiate at the ends, not punctate. Longitudinal lines inframarginal. *N. And.* Cl. N. R. D. p. 11 Pl. III f. 28. *Cal. And.* Icon. n. Part. II Pl. I f. 8.

Marine: Galapagos Islands.

The fig. in Cl. N. R. D. is not quite exact, the axial area being too broad.

42. **C. Frater** Cl. N. Sp. — V. convex, linear, with parallel margins and rounded cuneate ends. L. 0,1; B. 0,012 mm. Axial and central areas united in a narrow, lanceolate space, without markings. Striæ 8 in 0,01 mm., smooth, slightly radiate in the middle and at the ends. Longitudinal lines inframarginal. — Pl. III f. 26.

Marine: Galapagos Islands!

43. **C. Spathula** Brun (1891). — V. linear, narrowed towards the ends. L. 0,15 to 0,16; B. 0,01 to 0,012 mm. Axial area linear, very narrow; central area indistinct. Striæ 12 in 0,01 mm. parallel, divergent at the ends finely punctate. Longitudinal line marginal or inframarginal — *Nav. spat.* Brun. D. Esp. n. p. 40 Pl. XV f. 10.

Marine: Japan, fossil (Brun Coll.)!

44. **C. adenensis** Cl. N. Sp. — V. elongated, slightly biconstricted, with cuneate ends. L. 0,07; B. 0,013 mm. Axial area narrow, irregularly dilated between the central nodule and the ends. Central area large, orbicular. Striæ 13 (middle) to 15 (ends) in 0,01 mm., radiate in the middle, transverse at the ends, not distinctly punctate. Longitudinal lines inframarginal. — Pl. III f. 33.

Marine: Between Aden and Bab el mandeb (Weissflog Coll.)!

45. **C. abnormis** Grun. (1878). — V. lanceolate, with broad, obtuse ends. L. 0,028 to 0,055; B. 0,007 to 0,009 mm. Axial area very narrow; central area small, orbicular. Median lines straight, with approximate central pores, and terminal fissures turned in contrary direction. Striæ 30 (Grunow) to 34 in 0,01 mm. transverse. Longitudinal lines faint, submarginal. — *Nav. abnormis* Grun. in Cl. M. D. N:o 142. A. D. p. 46. *Cal. abn.* Icon. n. Part. IV Pl. I f. 6, 7.

Marine: Bohuslän, Sweden!

46. **C. brevis** Grev. (1857). — V. elliptical, with rostrate, obtuse ends. L. 0,06 to 0,08; B. 0,022 to 0,03 mm. Median line with distant central pores. Axial area narrow, dilated in the middle to a large, orbicular space. Striæ 14 in 0,01 mm., almost parallel, not distinctly punctate. Longitudinal lines indistinct. — *Nav. brevis* Greg. D. of Clyde p. 478 Pl. IX f. 4. A. S. N. S. D. Pl II f. 15. Donk. B. D. p. 19 Pl. III f. 4. V. H. Syn. p. 97 Pl. XI f. 19. — *Nav. crassa* Greg. M. J. III p. 41 Pl. IV f. 18 (1855)?

Marine: Spitsbergen! Greenland! Finmark! North Sea! North Siberian Sea, Cape Deschniff! Löfånger, Ångermanland, Sweden, (integlacial deposit)! Sydney (Thum.)!

Var. *vexans* Grun. (1880). — Elliptic-lanceolate, with broad, obtuse ends. — *Nav. brevis v. vexans* Grun. A. D. p. 30. A. S. N. S. D. Pl. II f. 14. *Nav. brev. v. elliptica* V. H. Syn. p. 97, Pl. XI f. 18.

Marine and brackish: Sea of Kara! Finmark! Japan (striæ 18 in 0,01 mm. Weissflog. Coll.)!

Var. *distoma* Grun. (1880). — V. elliptical, with broad ends. Central pores of the median line distant. Central nodule large, thick. Longitudinal lines distinct, single or double.

Forma latior: Broadly elliptical. L. 0,078; B. 0,026 mm. Striæ 13 to 14 in 0,01 mm. — *Nav. (brevis var.?) diatoma f. lat.* Grun. A. D. p. 31 Pl. I f. 25.

Brackish water: Sea of Kara (Grun.), Japan!

Forma angustior: Narrow elliptical. L. 0,068; B. 0,019 mm. Striæ 15 to 16 in 0,01 mm. — *Nav. (brevis var.?) diatoma f. ang.* Grun. A. D. p. 31 Pl. I f. 26.

Brackish water: Jamal, Sea of Kara (Grun.).

Forma bicuneata Cl. — V. with parallel margins and cuneate ends. L. 0,085; B. 0,029 mm. Striæ 14 to 15 in 0,01 mm

Marine: Japan, fossil (Brun Coll.)! Sydney! China!

Nav. brevis and its varieties are nearly akin to *N. amphisbæna.*

47. **C. bottnica** Cl. N. Sp. — V. elliptic-lanceolate. L. 0,05; B. 0,018 mm. Central pores distant. Axial area broad, gradually dilated towards the middle, where it expands to a transverse fascia. Striæ 22 in 0,01 mm. slightly radiate towards the ends. Longitudinal line faint, marginal. — Pl. III f. 42.

Slightly brackish water: Gulf of Bothnia at Piteå!

48. **C. Lagerheimii** Cl. N. Sp. — V. elliptic-lanceolate convex, with obtuse ends. L. 0,042; B. 0,009 mm. Axial and central areas uniting in a lanceolate-linear space. Striæ 17 in 0,01 mm. very slightly radiate towards the ends. Longitudinal lines indistinct marginal, or inframarginal.

Fresh water: Ecuador, Quito (Lagerheim)!

49. **C. latiuscula** Kütz (1844). — V. elliptical to lanceolate. L. 0,075 to 0,09; B. 0,023 to 0,03 mm. Axial and central areas uniting in an irregularly lanceolate space. Striæ 18 to 21 in 0,01 mm. parallel, finely punctate. Longitudinal lines marginal or inframarginal. — *Nav. latiuscula* Kütz Bac. p. 93 Pl. V f. 40. Grun. Verh. 1860 p. 534 Pl. IV f. 38. Donk. B. D. p. 27 Pl. IV f. 7. *Nav. patula* W. Sm. B. D. I p. 49 Pl. XVI f. 139 (1853). V. H. Syn. Suppl. B f. 29.

Fresh water, larger lakes: Scotland; Sweden: Venern! Mälaren! Baltic, freshwater deposits of the Ancylus-epoch! Gotland! Switzerland (Lac des 4 cantons, Lac Leman)!

Var. *africana* Cl. — V. elliptic-linear, with broad and rounded ends. L. 0,13; B. 0,25 mm. Longitudinal lines crossing the striæ in their middle. Striæ 15 in 0,01 mm. — Pl. IV f. 5.

Brackish water: Cameroon!

The var. africana merits perhaps to be considered as a distinct species.

50. **C. Holstii** Cl. (1881). — V. elliptical, with parallel margins and cuneate ends. L. 0,052 to 0,06; B. 0,016 to 0,02 mm. Axial area very narrow; central area small, rounded. Striæ 14 in 0,01 mm. almost parallel, not distinctly or finely punctate. Longitudinal lines marginal. — A. S. Atl. L. f. 48 (without name). *Nav. Holstii* Cl. D. f. Grönl. and Argentina p. 11 Pl. XVI f. 1.

Fresh water: Greenland! Albany, Maine, fossil! Oregon (Atl.).

51. **C. Ladogensis** Cl. (1891). — V. broad, lanceolate, with subrostrate ends. L. 0,025; B. 0,014 mm. Axial area indistinct; central area small rounded, somewhat transverse. Striæ 17 in 0,01 mm. slightly radiate, finely punctate. Longitudinal lines marginal, faint. — *Nav. Ladog.* Cl. D. of Finl. p. 35 Pl. II f. 3.

Fresh water: Ladoga, on the surface of the lake!

52. **C.? dispersa** Gr. and Sturt (1887). — V. almost flat, elliptic-lanceolate, with subacute ends. L. 0,08; B. 0,027 mm. Median line straight, terminating close to the margin. Axial area narrow, dilated in the middle to a small rounded space. Striæ 27 in 0,01 mm., finely punctate, puncta forming undulating longitudinal lines. The striæ are confined to an irregular, lanceolate space around the axial area, the part outside of this space being irregularly and coarsely punctate. Longitudinal lines inframarginal. — *Nav. disp.* Gr. and Sturt. Queck. M. Cl. III (2) p. 132 Pl. X f. 10.

Marine: Oamaru, N. Zeeland, fossil!

This is remarkable species, which I have placed here only with hesitation. The longitudinal line is visible only in strongly oblique light. A somewhat similar form occurs at Monterey, which I know by a sketch sent by Grunow, who calls it *Mastogloia? decorata*. This form is smaller (L. 0,033; B. 0,013 mm.) and has a larger quadrate central area and probably coarser striæ.

53. **C.? sejuncta** A. S. (1874). — V. linear, with parallel margins and rounded cuneate ends. L. 0,04; B. 0,01 mm. Axial and central areas indistinct. Striæ 12 in 0,01 mm. transverse. Longitudinal lines broad, submarginal. — *Nav. sejuncta* A. S. N. S. D. p. 87 Pl. I f. 18.

Marine: North Sea, Campeachy Bay (A. S.).

I have not seen this species, which A. Schmidt seems to consider akin to *Diploneis nitescens*. It seems to me more probable that it belongs to the group of *C. Powellii*. No indication of the nature of the striæ exists. If punctate this form may be a Diploneis; if smooth it belongs to the group of *C. Powellii*.

54. **C. blanda** A. S. (1874). — V. linear, with rounded ends. L. 0,05 to 0,13; B. 0,01 to 0,018 mm. Axial area narrow. Central area orbicular, large. Striæ 8 to 10 in 0,01 mm. parallel, radiate at the ends, not distinctly punctate. Longitudinal lines broad. — *Nav. blanda* A. S. N. S. D. p. 90 Pl. II f. 27. *Pinn. ergadensis* Greg. T. M. S. 1856 p. 48 Pl. V f. 22?

Marine: North Sea! Black Sea! Ceylon! Seychelles! Amboina! Labuan! Tahiti!

55. **C. supergradata** Brun. (1891). — V. convex, linear, with rounded ends. L. 0,115 to 0,135; B. 0,016 mm. Axial and central areas combined in a broad, linear space. Median line strongly flexuose. Striæ 6 in 0,01 mm., parallel smooth. Longitudinal lines broad, marginal. — *Nav. supergr.* Brun. D. Esp. n. p. 40 Pl. XV f. 6.

Marine: Gulf of Naples! Port d'Alger (Brun), Bosphorus (Brun).

56. **C. Wittii** Grun. (1881). — V. linear, slightly constricted in the middle, with subcuneate ends. L. 0,073; B. 0,014 mm. Axial and central areas indistinct. Striæ 8 in 0,01 mm., smooth, subparallel. Longitudinal lines broad, submarginal. — *Nav. Wittii* Grun. in Cl. N. R. D. p. 11 Pl. III f. 31.

Marine: Brazil (Grun.).

57. **C. Zanardiniana** Grun. (1860). — V. linear, with slightly concave margins and subcuneate ends. L. 0,168; B. 0,019 mm. Axial area narrow, slightly dilated around the central nodule. Striæ 5 in 0,01 mm. Longitudinal lines broad, median. — *Nav. Zanard.* Grun. Verh. 1860 p. 525 Pl. III f. 12.

Marine: Adriatic (Grun.).

58. **C. Campbellii** Petit (1877). — V. with parallel or slightly concave margins and cuneate ends. L. 0,058 to 0,081; B. 0,019 to 0,022 mm. Axial area indistinct. Central area a subquadrate space with fragments of striæ. Striæ 8 in 0,01 mm. smooth, parallel. Longitudinal lines marginal. — *Nav. Campb.* Pet. D. de Campb. p. 22 Pl. V f. 23.

Marine: Island of Campbell!

An examination of original specimens has convinced me that this species is nearly akin to *C. Powellii.*

59. **C. biseriata** Petit (1877). — V. convex, lanceolate, gradually tapering from the middle to the ends. L. 0,055 to 0,074; B. 0,0176 mm. Axial area narrow. Central area a quadrate space. Median line with approximate central pores. Striæ 7 in 0,01 mm., smooth, slightly radiate throughout. Longitudinal lines broad, on one side of the median line uniting with the central area. — *Nav. biseriata* Petit D. de Campb. p. 23 Pl. IV f. 15.

Marine: New Zealand!

60. **C. Powellii** Lewis (1861). — V. linear, with parallel margins and cuneate ends. L. 0,05 to 0,13; B. 0,015 to 0,03 mm. Axial area indistinct or narrow. Central area quadrate. Striæ 7 to 11 in 0,01 mm., parallel, smooth. Longitudinal lines broad, uniting with the central area.

Var. *atlantica* Cl. — L. 0,05 to 0,1 mm. Striæ 10 to 11 in 0,01 mm. — *Nav. Powellii* Lewis Proced. Ac. nat. sc. Philad. p. 65 Pl. II f. 6. *Nav. sectilis var. Boryana* Pant. II p. 53 Pl. VIII f. 152 (1889).

Marine: Quincy, Mass! Long Island Sound! Hungary fossil (Pant).

Var. *galapagensis* Cl. (1881). — L. 0,05 to 0,09; B. 0,013 to 0,02 mm. Striæ 8 to 9 in 0,01 mm. — *Nav. Pow, var. galapag.* Cl. N. R. D. p. 11 Pl. III f. 30.

Marine: West Indies! Galapagos Islands!

Var. *Vidovichi* Grun. (1863). — V. 0,1 to 0,15 mm. Striæ 6 to 7 in 0,01 mm. — *Nav. Vidovichi* Grun. Verh. 1863 p. 150 Pl. XIII f. 4.

Marine: Adriatic (Grun.), Sumatra (Deby Coll.)! S. America (Deby Coll.)!

Var. *egyptiaca* Grev. (1866). — V. elongated, slightly constricted in the middle. L. 0,11 to 0,13; B. 0,02 mm. Axial area distinct. Central area irregularly quadrate. Striæ 6 in 0,01 mm. smooth, transverse. Longitudinal lines broad, united, or nearly so, with the central area. — *Nav. egyptiaca* Grev. T. M. S. XIV p. 127 Pl. XII f. 16—17. Perag. D. de Villefr. p. 53 Pl. II f. 9.

Marine: Adriatic! Alexandria (Deby Coll.), Sumatra!

Var. *Bartholomei* Cl. (1878). — V. panduriform. L. 0,055 to 0,07; B. 0,015 or 0,017 (max.) to 0,01 (min.) in 0,01 mm. Axial area distinct, but narrow. Central area quadrate. Striæ 7 to 8 in 0,01 mm. smooth, parallel. Longitudinal lines broad, marginal, united with the central area. — *Nav. Bartholomei* Cl. W. Ind. D. p. 6 Pl. I f. 5. A. S. Atl. CLX f. 9.

Marine: West Indies! Porto Seguro (Deby Coll.)! Bahia (Deby Coll.)!

61. **C. Castracanei** Grun. (1881). — V. broadly linear to lanceolate, with obtuse ends. L. 0,07 to 0,135; B. 0,02 to 0,03 mm. Median line straight, with small, terminal nodules and large quadrate, central nodule. Axial and central areas uniting in a narrow, lanceolate space. Striæ 9 to 12 in 0,01 mm., slightly radiate throughout, smooth. Longitudinal lines broad, area-like, median, not united with the central area.

Var. *Philippinarum* Cl. — V. linear with gradually narrowed ends. L. 0,11; B. 0,02 mm. Striæ 12 in 0,01 mm.

Marine: Manilla (Deby Coll.).

Var. *Petitiana* Grun. (1881). — V. broadly linear, with cuneate ends and parallel margins. L. 0,07; B. 0,02 mm. Area crossed by faint striæ. Striæ 11 in 0,01 mm. — *Nav. Pet.* Grun. in Cl. N. R. D. p. 12 Pl. III f. 34.

Marine: Cebu!

Var. *seychellensis* Grun. Ms. — Like var. Petitiana, but without faint striæ on the area. Striæ 10 in 0,01 mm.

Marine: Seychelles (Van-Heurck Coll.)!

Var. *caledonica* Cl. — V. narrow elliptical. L. 0,135; B. 0,03 mm. Striæ 10 in 0,01 mm.

Marine: New Caledonia (Kinker Coll.)!

Var. *genuina* Cl. — V. lanceolate. L. 0,1; B. 0,03 mm. Striæ 9 in 0,01 mm. — *Nav. Castracanei* Grun. in Cl. N. R. D. p. 12 Pl. III f. 33.

Marine: Australia (Grun.).

C. Castracanei is a large and beautiful form, and is connected by intermediate varieties with *C. Powellii*.

62. **C.? venusta** Pant. (1889). — V. linear, with rostrate ends. L. 0,037; B. 0,095 mm. Axial area narrow. Central area small, dilated on both sides of the median line to broad lateral areas. Striæ 21 to 22,5 in 0,01 mm., parallel, divergent towards the ends. Longitudinal lines marginal. — *Nav. venusta* Pant. II p. 54 Pl. V f. 81.

Marine: Hungary, fossil (Pant.).

I have not seen this species; the description being made from the figure in Pantocseks work, which shews some likeness to a small *C. Powellii*, with the striæ crossed by a narrow, marginal line.

63. **C. amica** Cl. a. Grun. (1881). — V. broad, slightly constricted in the middle, with cuneate ends. L. 0,075 to 0,095; B. 0,023 to 0,03 mm. Axial area very narrow. Central area large, quadrate, dilated to broad lateral areas on both sides of the median line. Striæ 7 to 8 in 0,01 mm. smooth, almost parallel. — *Nav. amica* Cl. a. Grun. in Cl. N. R. D. p. 12 Pl. III f. 37.

Marine: Tahiti!

C. amica is remarkable by the broad lateral areas, which are also very much developped in the following two species. These areas occupy the place of the longitudinal lines of the other species of this genus.

64. **C. quadriseriata** Cl. a. Grun. (1881). — V. broad, hexagonal, with parallel margins and large, cuneate ends. Median line with small terminal fissures and incrassate central nodule. L. 0,09 to 0,16; B. 0,035 to 0,047 mm. Axial area narrow. Central area large, orbicular. Striæ 7 to 8 in 0,01 mm., slightly radiate at the ends, elsewhere parallel, smooth. Longitudinal areas broad, linear, attenuated towards the ends. — *Nav. quadriseriata* Cl. N. R. D. p. 12 Pl. III f. 32. *Nav. duplex* Pant. III Pl. XLII f. 579 (1893).

Marine: Barcelona! Balearic Islands! Gulf of Naples! Levant (Grove Coll.)!

65. **C.? kryophila** Cl. (1883). — V. elliptic-lanceolate, with cuneate or obtuse ends. L. 0,05 to 0,08; B. 0,018 to 0,04 mm. Axial area narrow. Central area small, orbicular, dilated on both sides of the median line to large, lunate lateral areas, on which faint traces of the striæ

are visible. Striæ 8 to 9 in 0,01 mm. smooth, slightly radiate. — *Nav. kryoph.* Cl. Vega p. 473 Pl. XXXVII f. 43. Var.? *gelida* Cl. l. c. f. 42.

Marine: North Siberian Sea, Cape Wankarema! Ice from the east-coast of Greenland!

A very peculiar form, for which I can find no other natural place than this. The large lateral areas give this form some resemblance to *N. Hennedyi*, but nevertheless it cannot belong to the section Lyratæ of Navicula, as the structure of the striæ is entirely different. If this species really be a Caloneis, we have here the »lateral lines» in an extraordinary degree of development.

66. **C. Musca** Greg. (1857). — V. broad, panduriform, with cuneate or rounded ends. L. 0,04 to 0,07; B. 0,016 to 0,025 mm. Axial and central areas united in a broad lanceolate, space, sometimes constricted in the middle. Median line bordered by thick siliceous strings, with indistinct terminal fissures and approximate central pores. Striæ 7 to 8 in 0,01 mm., smooth, or more or less obscurely punctate. Longitudinal line broad, submarginal. — *Nav. Musca* Greg. D. of Clyde p. 479 Pl. IX f. 6. A. S. N. S. D. p. 86 Pl. I f. 15. Atl. CLX f. 1, 2, 10, 11, 12. *Nav. constricta* Grun. Verh. 1860 p. 535 Pl. III f. 18 (very bad). *Nav. intercedens* A. S. Atl. CLX f. 3, 4, 5. *Nav. muscæformis* Pant. III Pl. XVII f. 256 (1893).

Marine: North Sea! Mediterranean Sea! Adriatic! Bab el mandeb! Ceylon! Seychelles! China! Japan! Galapagos Islands! Porto Seguro! West Indies!

Var. *intermedia* Cl. — Strongly constricted, with elliptical segments. L. 0,06 to 0,09; B. 0,025 to 0,028 mm. Axial area narrow, lanceolate. Striæ 6 in 0,01 mm. Longitudinal lines broad, submarginal. — *Nav. Musca var. intermedia* A. S. Atl. CLX f. 7, 8.

Marine: Sumbava (Kinker Coll.)! Manila (Deby Coll.)! Samoa (Atl.).

Var. *mirabilis* Leud. Fortm. (1879). — V. panduriform with tongue-shaped segments. L. 0,077; B. 0,029 mm. Axial area narrow linear, slightly dilated around the central nodule. Striæ 7 (6 according to Leud.) in 0,01 mm. Longitudinal lines broad, submarginal. — *Nav. mirabilis* Leud. Fortm. D. de Ceylan p. 31 Pl. II f. 21. A. S. Atl. CLX f. 6.

Marine: Ceylon! Sumbava (Kinker Coll.)! Manila (Deby Coll.)! Sumatra!

Var. *eurynota* Cl. — V. strongly constricted in the middle with elliptical segments. L. 0,08; B. 0,02 (max.) to 0,01 (min.) mm. Axial area very large. Striæ 6 in 0,01 mm. Longitudinal line narrow, median. — Part II Pl. I f. 9.

Marine: Rio Janeiro (Deby Coll.)!

Var.? *margino-punctata* Grove a. Sturt (1887). — V. slightly constricted in the middle, with cuneate or rounded ends. L. 0,055 to 0,11; B. 0,022 to 0,032 mm. Area broad and large. Striæ 10 in 0,01 mm., becoming faint towards the area. Longitudinal lines marginal. — *Nav. margino-punctata* Gr. a. Sturt Journ.Quek. M. Club. III (2) p. 132 Pl. X f. 7. *Nav. margino-lineata* Gr. a. Sturt. l. c. f. 11. A. S. Atl. CLX f. 27.

Marine: Oamaru, New Zealand, fossil!

N. Musca is extremely variable and many of the varieties are very dissimilar in appearance, but there exist, so far as I can find, no characteristics of sufficient importance for their distinction as species. Nearly akin to *N. Musca* is also the following, which is described as a species, because it occurs in many different places with the same characteristics.

67. **C. Kinkeriana** Truan (1892). — V. panduriform, of the same outline as *Diploneis Kützingii*. L. 0,11 to 0,13; B. 0,04 (max.) to 0,018 (min.). Axial area broad, with rudimentary continuations of the striæ. Median line straight, enclosed between thick siliceous strings, with small terminal nodules and approximate central pores. Striæ 7 in 0,01 mm., smooth, or indistinctly granulate, radiate. Longitudinal bands narrow, nearer to the margin than to the median line. —

Cl. in Diatomiste I p. 76 Pl. XII f. 5. *Nav. Kink.* Pant. III Pl. XLII f. 571. *Nav. Venus* Pant. III Pl. XXIX f. 422 (1892)?

Marine: Guernsey (Grove Coll.)! Mediterranean Sea (Naples, Nice, Barcelona)! Moron, fossil (Truan).

This is certainly one of the most beautiful naviculoid diatoms. It was named by the late Mr. Truan *Nav. Kinkeriana*, a name given by Pantocsek to another Navicula (*N. Kinkerii* II, IX f. 169). For this reason I proposed to name it N. amoena, but having since separated the genus Caloneis from Navicula, I prefer the name given by Truan.

68. **C. biconstricta** Grove a. Sturt (1887). — V. biconstricted with orbicular median and elliptical terminal segments. L. 0,08; B. 0,016 mm. Axial area narrow; central area orbicular. Striæ 8 in 0,01 mm. Longitudinal line marginal. — *Nav. bic.* Grove a. Sturt. Quek. M. Club. III (2) p. 132 Pl. X f. 9.

Marine: Oamaru, New Zealand, fossil!

69. **C. formicina** Grun. (1878). — V. biconstricted, with small median and large terminal segments. L. 0,057 to 0,085; B. 0,012 (max.) to 0,004 (min.) mm. Axial area narrow, dilated in the middle to a transverse fascia. Striæ 6 in 0,01 mm., very delicately punctate. Longitudinal line inframarginal. Frustule rectangular. — *Nav. formicina* Grun. in Cl. West Ind. D. p. 6, f. 6. A. S. Atl. CLX f. 38 to 41.

Marine: Campeachy Bay (Grun.).

70. **C.? egena** A. S. (1890). — V. biconstricted, with the median segment smaller than the terminal, which are acuminate. L. 0,033; B. 0,005 mm. Axial and central areas united in a space of the same shape as the valve. Striæ marginal, 11 in 0,01 mm. Longitudinal line? — *Nav. egena* A. S. Atl. CLX f. 42, 43.

Marine: Campeachy Bay (A. S.).

71. **C. ophiocephala** Cl. a. Grove (1891). — V. very convex, divided by two constrictions into three segments, of which the median is almost orbicular, the terminal spathulate. L. 0,07 to 0,085; B. 0,013. Median line with indistinct terminal nodoles, enclosed between strong siliceous strings. Axial areas in the terminal segments large, lanceolate. Central area very broad, having a lunate marking or each side of the central nodule. Striæ 11 in 0,01 mm. at the base of the segments, 13 at the ends, radiate, smooth. Longitudinal line narrow. — *Nav. ophiocephala* Cl. a. Grove Diatomiste I p. 57 Pl. IX f. 13.

Marine: Island of Rhea, Singapore! Java! Island of Muntok, Sumatra! Macassar Straits (Grove Coll.)!

72. **C.? scintillans** Temp. a. Brun. (1889). — V. strongly constricted in the middle. Segments rhomboidal with cuneate ends. L. 0,09 to 0,125; B. 0,025 to 0,035; at the constriction 0,012 mm. Median line enclosed between strong siliceous strings with small terminal fissures, turned in the same direction, and approximate central pores. Axial area narrow. Central area a broad, transverse fascia. Striæ 6 in 0,01 mm. smooth, slightly divergent in the middle of each segment. Longitudinal line(?) approximate to the axial area, indistinct. — *Nav. scint.* D. f. du Japon p. 45 Pl. V f. 5. A. S. Atl. CLX f. 36, 37.

Marine: Japan, fossil! Jedo (Atl.).

I am not quite sure whether this form belongs to Caloneis or to Pinnularia. On the fig. in D. f. du Japon a marginal longitudinal line is visible, but I have not seen this line on original specimens. It seems to me doubtful whether the line close to the axial area is the longitudinal

line. If this form does not belong to Caloneis, it is a Pinnularia, and is then akin to *P. lobata* and *P. excellens.*

73. **C.? Hardmaniana** Cl. V. Sp. — V. deeply constricted, with subelliptical segments, broadest at the base. L. 0,05; B. 0,016, at the constriction 0,005 mm. Median line with approximate median pores, and small terminal nodules. Axial area very broad, elliptical in each segment. Central area a broad, transverse fascia. Striæ 8 in 0,01 mm. at the base of the segments, 10 at the ends, smooth. Longitudinal lines indistinct. — Part II Pl. I f. 10.

Marine: Campeachy Bay (Hardmans coll.)!

This species is akin to *C. scintillans* and may perhaps be a Pinnularia.

Additional.

74. **C. latevittata** Pant. (1893). — V. with parallel margins and cuneate ends. L. 0,084; B. 0,0024 mm. Axial area narrow, slightly dilated around the central nodule. Striæ parallel throughout, 18 in 0,01 mm. not distinctly punctate. Longitudinal lines broad, nearer to the margin than to the median line. — *Nav. latev.* Pant. III Pl. VIII f. 122.

Habitat? Hungary, Bodos (Pant.).

I have not seen this species, and am uncertain whether it is a Caloneis or a Neidium.

Neidium Pfitzer (1871).

Valve elongated, linear to broadly lanceolate. Median line straight; its central pores turned in contrary directions; its ends with two lateral and one axial prolongations. On both sides of the median line are one or two longitudinal lines. Axial area narrow or indistinct. Central area orbicular or somewhat transversely dilated. Structure: distinct puncta, disposed in transverse, usually oblique, rows. Cell-contents: two chromatophores along the connecting zone, which do not migrate along the interior of the valve, and are divided by fissures parallel to the axis of the cell (Pfitzer, Bau und Entw. p. 39). In conjugation two cells form two auxospores with transversely striate perizonium, which opens by an operculum (Griffith, Ann. and Mag. n. hist. s. 2 Vol. XVI p. 92 Pl. II B 1855. — De Bary, Bot. Z. Beil. p. 62, 1858).

The genus Neidium was founded in 1871 by Pfitzer (Bau u. Entw. p. 39) on the characteristics of the cell-contents, but the peculiarities of the valve are also sufficient for the distinction of Neidium as a genus. The median line has the central pores turned in contrary directions. The terminal nodules are also peculiar. The longitudinal lines point to some relation between Neidium and Caloneis, but the structure is different. The forms of Neidium have in the dry state usually a characteristic yellow colour. The striæ are coarsely, or at least distinctly, punctate and they usually cross the valve in an oblique direction. The puncta form also, on the other hand, more or less regular, longitudinal striæ.

Neidium is, as far I can see, not nearly akin to any other genus, although there are some relations to Caloneis, of which genus *C. Silicula* was by Pfitzer included in Neidium. One species of Scoliopleura, viz. *S. Schneideri* Grun. resembles Neidium in the oblique striation.

The numerous forms included in Neidium are so intimately connected, that all the species are more or less artificial and founded on variable characteristics, such as the form and outline of the valve. It seems from the observations of Griffith that the mother-cells of the auxospore have rostrate, but the young cells, rounded ends. Strictly speaking, perhaps all the forms of Neidium ought to be treated as varieties of one species, but this course would make it difficult to discriminate between the numerous forms.

All the Neidia live in fresh water, some few also in brackish water. They occur in arctic as well as in tropical regions.

Artificial key.

1.	Valve elongated, 3 to 6 times longer than broad	2.
	— broad, 2 to 3	7.
2.	Margins parallel	3.
	— convex	4.
	— undulating	5.
3.	Ends rounded	*N. bisulcatum* Lagst.
	— cuneate	*N. amphigomphus* Ehb.
	— rostrate	*N. affine* Ehb.
4.	Ends rounded	*N. Iridis* Ehb.
	— subrostrate	*N. Iridis* var.
	— rostrate-capitate	*N. productum* W. Sm.
5.	Ends broad, rounded	*N. affine* var.
	— cuneate	6.
6.	Striæ slightly oblique	*N. Hitchcockii* Ehb.
	— strongly	*N. oblique-striatum* A. S.
7.	L. 0,03 to 0,04 mm.	*N. dubium* Ehb.
	L. 0,06 mm.	*N. dilatatum* Ehb.
	L. 0,07 to 0,1 mm.	*N. citreum* A. S.
	L. 0,16 mm.	*N. tumescens* Grun.

1. **N. bisulcatum** Lagst. (1873). — V. linear, with rounded ends. L. 0,04 to 0,07; B. 0,008 to 0,009 mm. Striæ 28 to 30 in 0,01 mm., distinctly punctate. — *Navic. bisulcata* Lagst. Spitsb. D. p. 31 Pl. I f. 8. A. S. Atl. XLIX f. 15, 17. *N. scita* W. Sm. Ann. Mag. n. hist. XIX p. 10, Pl. II f. 4 (1857)?

Fresh water (alpine regions): Greenland! Spitsbergen! Beeren Eiland (Lagst.)! Dovre, Norway! Sweden (Åreskutan, Westerbotten etc.)! Finland! Lac Gerardmer (Vosges)! Argentina!

2. **N. affine** Ehb. (1843). — V. linear, with rostrate ends.

Var. *longiceps* Greg. (1856). — V. small, frequently with undulating margins. Ends broad, rostrate or rostrate-capitate. L. 0,03; B. 0,005 mm. Striæ very fine. — *Nav. longiceps* Greg. M. J. IV Pl. I f. 27.

Fresh water: Greenland! Scotland (Greg.)!

Var. *undulata* Grun. (1860). — V. slightly triundulate, with broad, rounded ends. L. 0,07; B. 0,013 mm. Striæ 24 in 0,01 mm. — *Nav. aff. var. undulata* Grun. Verh. 1860 p. 544. Pl. V f. 6. V. H. Syn. Pl. XIII f. 6.

Fresh water: Sweden (Cl. M. D. N:o 103), Belgium (V. H.).

Var. *amphirhynchus* Ehb. (1843). — V. with protracted, rostrate-capitate ends.

Forma minor: L. 0,04 to 0,05; B. 0,008 to 0,013 mm. Striæ 25 to 27 in 0,01 mm.

Fresh water: Sweden (Upsala)! Astralia (Blue Mountains)!

Forma major: L. 0,09; B. 0,01 mm. Striæ about 16 in 0,01 mm. — *Nav. affinis* Ehb. Am. III: 1, f. 10 etc. *Nav. amphirhynchus* W. Sm. B. D. XVI f. 142. Donk. B. D. p. 34 Pl. V f. 9. A. S. Atl. XLIX f. 27 to 30. *Nav. aff. var. amphirh.* Grun. Verh. 1860 Pl. V f. 5, 11. *Nav. Iridis var. amphirh.* V. H. Syn. Pl. XIII f. 5.

Fresh water: Spitsbergen (Lagst.), Beeren Eiland (Lagst.), Scotland! England! Belgium (V. H.)! Sweden! Finland! New Zealand!

Var. *genuina* Cl. — V. with rostrate, less protracted ends.

Forma minor: L. 0,045 to 0,065; B. 0,008 to 0,013 mm. Striæ 22 to 29 in 0,01 mm. — *Nav. affinis* Ehb. Am. II: 2. f. 7; 4 f. 4. Kütz. Bac. XXVIII f. 65. *Nav. affinis var.* A. S. Atl. XLIX fig. 20 to 23. *Nav. bisulcata var. turgidula* Lagst. Spitsb. D. p. 32 Pl. I f. 9.

Fresh water: Spitsbergen (Lagst.), Lappland! Finland (Tulomian Lappmark)! Italy (Atl.)! Australia (Blue Mountains and Tasmania)!

Forma media: L. 0,07 to 0,12; B. 0,017 to 0,02 mm. Striæ 18 to 19 in 0,01 mm., composed of puncta, 13 to 18 in 0,01 mm. — *Nav. affinis* Greg. M. J. 1854 II f. 8. Grun. Verh. 1860 Pl. V f. 2. Donk. B. D. p. 33 Pl. V f. 8. *Nav. firma var. subampliata* Grun. A. S. Atl. XLIX f. 19.

Fresh water: Greenland! Iceland! Spitsbergen (Lagst.)! England! Sweden! Finland! South Africa! Australia (Murray River)!

Forma maxima: L. 0,18 to 0,3; B. 0,04 mm. Striæ 12 to 17 in 0,01 mm. Puncta 14 to 15 in 0,01 mm. — A. S. Atl. XLIX f. 1.

Fresh water: Monticello, (fossil) New York!

3. **N. productum** W. Sm. (1853). — V. subelliptical, with rostrate-capitate ends. L. 0,06 to 0,1; B. 0,02 to 0,025 mm. Striæ 17 in 0,01 mm. — *Nav. producta* W. Sm. B. D. I p. 51 Pl. XVII f. 144. A. S. Atl. XLIX f. 37 to 39. Grun. Verh. 1860 p. 543 Pl. IV f. 35. *Nav. Iridis var. producta* V. H. Syn. p. 104 Pl. XIII f. 3. *Nav. affinis* V. H. Syn. Pl. XIII f. 4.

Fresh water: England! Germany! Belgium (V. H.). Bengal!

This form graduates into *N. affinis var. amphirynchus.*

4. **N. oblique-striatum** A. S. (1877). — V. linear, slightly triundulate, with cuneate ends. L. 0,068 to 0,13; B. 0,015 to 0,022 mm. Striæ 14 to 20 in 0,01 mm. very oblique, coarsely punctate, puncta 17 to 18 in 0,01 mm. — *Nav. obl. str.* A. S. Atl. XLIX f. 41, 42.

Fresh water: Demerara River!

5. **N. Iridis** Ehb. (1843). — V. linear, subelliptical, with rounded ends. L. 0,09 to 0,17; B. 0,022 to 0,03 mm. Striæ slightly oblique, 16 to 19 in 0,01 mm., punctate; puncta 13 to 17 in 0,01 mm. — *Nav. Iridis* Ehb. Am. p. 130 Pl. IV: 1, f. 2. Kütz. Bac. p. 92 Pl. XXVIII f. 42. Donk. B. D. p. 30 Pl. V f. 6. A. S. Atl. XLIX f. 2. V. H. Syn. XIII f. 1. *Nav. firma* Kütz. Bac. p. 92. Pl. XXI f. 10. W. Sm. B. D. Pl. XVI f. 138. A. S. Atl. XLIX f. 3. *Nav. firma var. major* Grun. Verh. 1860 p. 543 Pl. V f. 1. Ströse, Kliecken D. f. 5 a.

Fresh water: Franz Jos. Land (Grun.), Iceland! Sweden! Finland! England! Vosges! Switzerland (Brun), Belgium (V. H.). North America (French Pond, Monticello, Delaware)! Cape Horn (Petit). Australia (Blue Mountains)!

Var. *ampliata* Ehb. (1842). — V. narrow, elliptical, with broad, subrostrate ends. L. 0,07 to 0,1; B. 0,023 to 0,026 mm. Striæ 16, puncta 17 in 0,01 mm. — *Nav. ampliata* Ehb. Ber. 1842 p. 337 M. Geol. A. S. Atl. XLIX f. 4, 5. *Nav. affinis* W. Sm. B. D. XVI f. 143. Ströse, Kliecken D. f. 12.

Fresh water: Sweden, Degernäs (Atl.); Holstein (Atl.). Houghton, Michigan N. A.!

6. **N. amphigomphus** Ehb. (1843). — V. linear, with cuneate ends. L. 0,09 to 0,15; B. 0,022 to 0,04 mm. Striæ 16 in 0,01 mm. coarsely punctate, puncta 17 in 0,01 mm. — *Nav. amphigomphus* Ehb. Am. II f. 27, III: 1 f. 8. Kütz. Bac. p. 93 Pl. XXVIII f. 40, 41. A. S. Atl. XLIX f. 32 to 34. *Nav. firma* Donk. B. D. p. 31 Pl. V f. 7. *Nav. affinis v. amphirhynchus* Grun. Verh. 1860 p. 544 Pl. V f. 2. *Nav. dilatata* A. S. Atl. XLIX f. 9. *Nav. Iridis var. amphigomphus* V. H. Syn. p. 104 Pl. XIII f. 2.

Fresh water: Greenland! Spitsbergen (Lagst.)! Sweden! Finland! Belgium (V. H.)! Germany! Switzerland! North America (New Providence! Monmouth! Canada! Sierra Nevada!). South America!

7. **N. Hitchcockii** Ehb. (1843). — V. linear, biconstricted, with cuneate ends. L. 0,055 to 0,1; B. 0,015 mm. Striæ 20, puncta 20 in 0,01 mm. — *Nav. Hitch.* Ehb. Am. p. 130, M. G. V: 3 f. 11. Donk. B. D. p. 29 Pl. V f. 4. A. S. Atl. XLIX f. 35, 36.

Fresh water: Sweden! Scotland (Donk.)! Bengal! Australia (Murray River)! New Zealand! North America (Port Hope! Crane Pond! French Pond!).

N. Hitchcockii may be regarded as a undulate form of *N. amphigomphus.*

8. **N. dubium** Ehb. (1843). — V. elliptical, sometimes slightly biconstricted, with obtuse, subrostrate, or almost apiculate ends. L. 0,03 to 0,0375; B. 0,01 mm. Striæ 20 to 24 in 0,01 mm. — *Nav. dubia* Ehb. Am. p. 130 Pl. II f. 2, 8. Kütz. Bac. p. 96 Pl. XXVIII f. 61. Greg. M. J. 1856, IV Pl. I f. 3. Schum. P. D. 1 Nacht. p. 21 f. 25. A. S. Atl. XLIX f. 7, 8, 24 to 26. *Nav. Peisonis* Grun. Verh. 1860 p. 544 Pl. III f. 28. *Nav. Iridis var. dubia* V. H. Syn. p. 104 Suppl. B. f. 32. *Nav. incurva var. minuta* Gutwinsky Materyjaly p. 22 Pl. I f. 18.

Fresh, sometimes brackish water: Sweden (Westerbotten to Skåne)! Gulf of Bothnia! Scotland (Greg.). Neusiedler See, Hungary (Grun.). Bengal! Australia (Blue Mountains)! New Zealand! North America (Port Hope, Ducks Pond, Lost Spring Ranch Cal.)! Surinam! Ecuador! Puerto Monte, Chile! Argentina!

9. **N. dilatatum** Ehb. (1843). — V. broadly elliptical, with subrostrate ends. L. 0,06 B. 0,025 mm. Striæ 16, puncta 17 in 0,01 mm. — *Nav. dilatata* Ehb. Am. p. 130. A. S. Atl. XLIX f. 6.

Fresh water: Finland (Vasa! Pudasjärvi Atl.).

10. **N. citreum** A. S. (1877). — V. broadly lanceolate. L. 0,07 to 0,10; B. 0,04 to 0,055 mm. Striæ 16 to 17, puncta 17 to 19 in 0,01 mm. — *Nav. citrea* A. S. Atl. XLIX f. 12.

Fresh water: Demerara River!

11. **N. tumescens** Grun. (1877). — V. broadly lanceolate. L. 0,16; B. 0,06 mm. Striæ 16. puncta 17 in 0,01 mm. — *Nav. firma var. tumescens* Grun. A. S. Atl. XLIX f. 10.

Fresh water: North America (Bemis Lake! Cherryfield! Monmouth! Troy!).

Additional.

To Neidium perhaps belongs *Navicula includens* Pant. III (Pl. XIII f. 201), unknown to the author.

Pseudoamphiprora Cl. (1881).

Valve more or less lanceolate and convex. Median line straight. Central nodule transversely dilated into a stauros, not reaching the margin, but abutting on two longitudinal lines, one on each side of the median line. Axial area indistinct, central area a transverse fascia. Striæ nearly parallel, composed of fine puncta. Connecting zone not complex. — The cell-contents of *P. stauroptera* have two chromatophore-plates along the valves. They have entire margins and a deep, narrow sinus from the apices, below the median line. Their substance is thinner below the longitudinal lines.

In the year 1881 (New and rare D. p. 13) I proposed to include in a section Pseudo-amphiprora of Navicula a few forms, among which was *Amphora stauroptera* Bail., synonymous with *Amphiprora lepidoptera* Greg. (D. of Cl. Pl. XII f. 59 c) and *A. obtusa* Greg. (l. c. f. 60). This small group is very interesting and merits to be regarded as a separate genus, the systematic place of which is between *Naviculæ Lyratæ* and *Caloneis*.

All the species are marine and inhabit both arctic and tropical seas.

Artificial key of species.

1. Stauros narrow . . . . . *P. impleta* Cl. a. Grov.
   — broad . . . . . 2.
2. V. with cuneate ends . . . . . *P. polygona* Bréb.
   V. lanceolate . . . . . 3.

3. { V. very convex . . . . . *P. crucifix* Br. a. Temp.
   { V. less convex . . . . . 4.
4. { Striæ coarsely punctate . . . . . *P. jugata* Cl.
   { — finely — . . . . . *P. stauroptera* Bail.

1. **P. impleta** Cl. a. Grove (1891). — V. elliptic-lanceolate. L. 0,13; B. 0,038 mm. Median line with very approximate central pores and indistinct terminal fissures. Stauros narrow dilated at the extremities. Striæ 12 in 0,01 mm., radiate throughout, finely lineate. Longitudinal lines 3 to 4 on each half of the valve, the most distinct connecting the ends of the stauros with the ends of the valve. — *Nav. impl.* Cl. a. Grove. Diatomiste I, p. 58 Pl. IX fig. 1.

Marine: Macassar Straits!

2. **P. polygona** Brun (1891). — V. broad with slightly convex margins and cuneate, obtuse, ends. L. 0,12 to 0,15; B. 0,035 to 0,05 mm. Median line with small terminal fissures, turned in the same direction, and not very approximate central pores. Stauros moderately broad. Striæ slightly radiate throughout, 16 in 0,01 mm., punctate, puncta 21 in 0,01 mm. Longitudinal lines not very distinct. — *Nav. pol.* Brun. D. Esp. n. p. 38 Pl. XV f. 9.

Marine: Japan, fossil!

The longitudinal lines are not so distinct as on the other species. In their place is a kind af low crest separating the interior part of the valve from the exterior steeply sloping part.

3. **P. stauroptera** Bail. (1854). — V. elliptic-lanceolate, with obtuse ends. L, 0,11 to 0,13; B. 0,03 to 0,035 mm. Stauros moderately broad. Striæ 14 to 18 in 0,01 mm., finely punctate, parallel. Longitudinal lines distinct, median. — *Amphora stauroptera* Bail. Smiths. Contr. VII p. 8 f. 14, 15 (1854). *Amphiprora lepidoptera* Greg. D. of Clyde p. 506 Pl. XII f. 59 c (1857). *Amphiprora obsusa* Greg. D. of Clyde l. c. fig. 60. A. S. N. S. D. III f. 1. *Nav. arctica* Cl. D. arct. S. p. 16 Pl. III f. 13 (1873). Lagerst. Boh. D. p. 46. Cl. N. R. D. p. 13.

Marine: Sea of Kara (Grun.). Finmark! North Sea! Nova Scotia (Bail). Sidney (Brun Coll.!).

P. stauroptera 500 times magnified.

4. **P. jugata** Cl. (1881). — V. lanceolate, with obtuse ends. L. 0,068 to 0,093; B. 0,02 to 0,024 mm. Stauros of median breadth. Striæ 10 in 0,01 mm. parallel, more distinct outside the longitudinal lines, distinctly punctate; puncta about 12 in 0,01 mm. Longitudinal lines median. — *Nav. jugata* Cl. N. R. D. p. 13 Pl. III f. 38.

Marine: Galapagos Islands!

Var. *Pensacolæ* Cl. (1881). — V. slightly triundulate, with subrostrate ends. L. 0,054; B. 0,015. Striæ 15 in 0,01 mm. — *Nav. Pensacolæ* Cl. N. R. D. p. 14 Pl. III f. 39.

Marine: Pensacola!

5. **P. crucifix** Temp. a. Brun. (1889). — V. very convex, narrow, lanceolate, with subacute ends. L. 0,12; B. 0,022 mm. Stauros moderately broad. Striæ 16 in 0,01 mm. parallel, punctate; puncta about 16 in 0,01 mm. Longitudinal lines marginal. — *Nav. cruc.* D. foss. du Japon p. 42 Pl. VII f. 10.

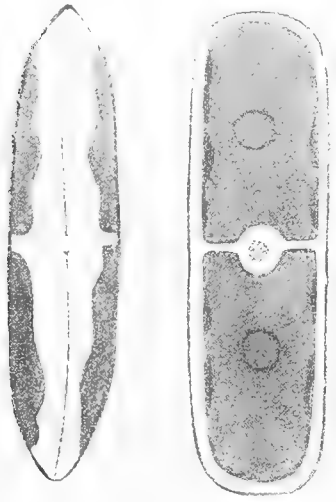
Marine: Japan, fossil!

To this genus probably belongs *Stauroneis decora* GREV. (T. Bot. Soc. of Edinb. Vol. VIII p. 236 Pl. III f. 11) from New Caledonia. It is very transparent, lanceolate, in length 0,14 mm. and has a short stauros not reaching the longitudinal ridges.

Scoliotropis CL. N. G.

Valve elongated symmetrical. Median line slightly sigmoid, especially towards the ends. On both sides of the median line is a longitudinal line. Structure double: coarser transverse costæ and finer puncta, disposed in obliquely decussating rows. Connecting zone with longitudinal rows of short striæ.

This genus has been formed for *Scoliopleura latestriata* GRUN. as this form is entirely different from the true Scoliopleura-forms in its structure, which is the same as in *Gomphoneis*, and in the complex nature of its connecting zone. Later on another, very interesting species, was discovered, unfortunately not yet found in entire specimens, *S. Gillesii*.



S. latestriata, 500 times magnified.

The frustules of *S. latestriata* have along the connecting zone on each side, two chromatophore-plates, the margins of which are gently undulating. In front-view the plates have a sinus around the central plasma-mass.

1. **S. latestriata** BRÉB. (1849). — V. linear, narrowed at the cuneate ends. L. 0,1 to 0,18; B. 0,025 mm. Median line strongly sigmoid. Structure: strong costæ, 7 in 0,01 mm., transverse, throughout, and minute puncta, 18 in 0,01 mm., forming obliquely decussating lines and alternating in double rows with the costæ. Connecting zone with several longitudinal rows of short striæ, about 25 in 0,01 mm. — *Amphipr. latestr.* BRÉB. in Kütz. Sp. Alg. p. 93. *Navic. convexa* W. SM. B. D. I p. 49 Pl. XVI f. 136 (1853). *Scoliopleura latestriata* V. H. Syn. p. 111 Pl. XVII f. 12.

Marine: North Sea (Sweden! England! Belgium!), Caspian Sea (Grun.). Atlantic coasts of North America! West Indies! California!

Var. *Amphora* CL. (1892). — V. asymmetrical, with a more convex dorsal side. Median line curved, with the terminations directed towards the same side. — *Scoliotr. latestr. var. Amphora* CL. Diatomiste I p. 78 Pl. XII f. 13.

Marine: Long Island Sound, New York!

I have only seen detached valves, of this variety, so I do not know whether both valves have the median lines on the same side of the frustule or not.

2. **S. Gilliesii** CL. a. COMBER N. SP. — V. convex, linear, tapering at the somewhat rounded ends. L. 0,2; B. 0,06 mm. Median line straight (sigmoid at the ends?). Central nodule small; its median pores turned in opposite directions. Axial and central areas indistinct. Costæ 7 in 0,01 mm. a little closer towards the ends, parallel, somewhat convergent at the ends, crossed by a longitudinal keel, enclosing a furrow broader than a half of the breadth of the valve. The costæ alternate with double rows of puncta, about 14 in 0,01 mm., forming longitudinal undulating rows. — Pl. I f. 16.

Marine: Jamaica (Comber Coll.)!

This species, named in honour of Captain GILLIES, who procured the material, is a very characteristic, large form, of which fragments only have been found. The median line seems to be curved, probably in contrary directions, at the ends. The median pores have the same charac-

teristics as those of *Neidium*, and also the longitudinal keels or ridges, but the structure differs entirely from that of *Neidium* and agrees with that of *Diploneis*. In my opinion this remarkable form approaches nearer to *Scol. latestriata* than any other.

Gomphoneis Cl. N. Gen.

Valve elongated, clavate, or asymmetrical with the transverse axis. Median line straight, more or less oblique. Terminal fissures straight. Axial area narrow, linear. Central area small, rounded, with one or more stigmas. On both sides of the median line are longitudinal lines. Structure double: slightly radiate costæ, and fine puncta, forming obliquely decussating lines. — Zone broader in the upper than in the lower end, not complex. Cell-contents unknown.

I have formed this new genus for some species formerly considered as belonging to Gomphonema, but differing from it both in the structure and in the presence of the longitudinal lines. In these characteristics they agree nearly with Scoliotropis, but differ in the straight median line, and the asymmetrical form of the valve.

To Gomphoneis may perhaps also belong *Gomphonema eriense* Grun.

The few known species of Gomphoneis are all of fresh-water habitat and are found in North and Central America.

Artificial key.

1. Central area on both sides of the central nodule with rows of stigmas . . *G. elegans* Grun.
   — — — — — — — — one or two stigmas . . . . . 2.
2. Costæ about 9 in 0,01 mm. . . . . *G. Mamilla* Ehb.
   — — 12 — — . . . . . *G. herculeana* Ehb.

1. **G. elegans** Grun. (1880). — V. sublanceolate, tapering from the gibbous middle to the broad rounded upper end, and to the narrower basis. L. 0,12 to 0,15; B. 0,028 to 0,03 mm. Median line broad (oblique). Axial area narrow; central area orbicular, with a circlet of stigmas. Costæ 10 in 0,01 mm., radiate in the ends. Puncta 22 in 0,01 mm. Longitudinal lines distinct, median. — *Gomphonema elegans* Grun. V. H. Syn. Pl. XXV f. 19.

Fresh water: Shasta Co. Cal. foss. (Cl. M. D. N:o 264), Pitt River, Oregon (Grove Coll.)!

2. **G. Mamilla** Ehb. (1854). — V. lanceolate, gradually tapering to the obtuse, narrow ends. L. 0,09 to 0,15; B. 0,02 to 0,03 mm. Axial area narrow, linear. Central area small, rounded, with one or two stigmas. Costæ slightly radiate at the ends, 8 to 10 in 0,01 mm., alternating with double rows of fine puncta, forming obliquely decussating rows, 16 to 20 in 0,01 mm. Longitudinal lines marginal. — *Gomphonema Mam.* Ehb. M. G. XXXVII: 2 f. 10. V. H. Syn. Pl. XXIII f. 1. *Gomphonema oregonicum var. maxima* Grun. V. H. Syn. Pl. XXIII f. 3.

Fresh water: Shasta Co. Calif., fossil! Pitt River, Oregon (Grove Coll.)!

3. **G. herculeanum** Ehb. (1845). — V. clavate, with broad and rounded or subtruncate upper ends. L. 0,06 to 0,1; B. 0,02 to 0,022 mm. Axial area very narrow; central area small, rounded, with one stigma. Costæ slightly radiate at the ends, about 12 in 0,01 mm., alternating with double rows of puncta (about 22 in 0,01 mm.) forming obliquely decussating rows. Longitudinal lines faint, sometimes obsolete, median. — *Gomphonema hercul.* Ehb. Ber. 1845 (according to Chase). Grun. Casp. Sea Alg. p. 11. V. H. Syn. Pl. XXIII f. 2.

Fresh water: New York! Lake Erie (Cl. M. D. N:o 40)! Winnipeg River, Manitoba Grove Coll.)!

Var. *robusta* Grun. (1878). — Broader, more clavate. — *G. herc. v. rob.* Grun. Casp. Sea Alg. p. 12 Pl. III f. 3.

Fresh water: Kamtschatka (Grun.).

Var. *clavata* Cl. — Broadest at the upper, rounded-truncate end. L. 0,11; B. 0,03 mm.

Fresh water: Pitt River, Col. (Grove Coll.)!

Naviculæ Luxuriosæ Cl.

Valve of elliptical outline, with depressed areas on both sides of the median line, separated by a more or less broad furrow from the marginal part. Axial and central area uniting in a narrow space around the median line. Structure: marginal, short striæ and on the depressed areas large distant puncta forming more or less regular longitudinal rows.

Only a few forms of this section are known, and it seems at present impossible to decide as to their affinities. They have some resemblance to *Diploneis nitescens*. The short marginal striæ are apparently smooth, but in a specimen of *N. luxuriosa* from China I have seen in the marginal furrow rows of distinct puncta in continuation of the marginal striæ.

1. **N. luxuriosa** Grev. (1862). — V. elliptic-lanceolate, with obtuse, sometimes cuneate, ends. L. 0,06 to 0,09; B. 0,025 to 0,035 mm. Axial area narrow linear, slightly dilated in the middle. Striæ marginal, slightly radiate at the ends, 7 to 9 in 0,01 mm. Furrow with rudimentary, sometimes distinctly punctate, striæ. Depressed lateral areas large with 3 to 5 longitudinal rows of large puncta straight, or curved towards the median line. — *Nav. luxuriosa* Grev. T. M. S. XI p. 18 Pl. I f. 10, 11. *Nav. lux. var. cuneata* Brun. D. esp. n. p. 35 Pl. XVI f. 3.

Marine: N. S. Wales (Grev.), China! Japan (Brun Coll.)!

2. **N. decora** Grove and Sturt (1887). — V. elliptical, with obtuse ends. L. 0,075 to 0,125; B. 0,03 to 0,045 mm. Median line straight; its terminal fissures turned in the same direction. Axial area distinct, linear, slightly dilated around the nodule. Marginal striæ 7 in 0,01 mm., apparently smooth, slightly radiate. Furrow crossed by faint striæ. Areas large, coarsely punctate; puncta forming 5 to 6 irregularly undulating longitudinal rows, or somewhat scattered. — Grove and Sturt Quek. M. Cl. III (2) p. 133 Pl. X f. 13. A. S. Atl. CLXXIV f. 27.

Marine: Oamaru, New Zealand, fossil!

3. **N. trilineata** Grove and Sturt (1887). — V. elliptic-lanceolate. L. 0,1; B. 0,033 mm. Axial area narrow, slightly dilated towards the middle. Striæ 6 in 0,01 mm. crossed by two longitudinal blank bands, so that each half of the valve seems to bear three longitudinal rows of elongate, coarse puncta. — Grove and Sturt Quek. M. Cl. III (2) p. 132 Pl. X f. 8.

Marine: Oamaru, New Zealand, fossil!

Naviculæ Nicobaricæ Cl.

Valve elliptical in outline. Median line with approximate central pores and large comma-like terminal fissures, bordered on both sides by a longitudinal row of large, sometimes confluent puncta. Axial and central areas united in a lanceolate space. Structure apparently smooth, distant striæ, radiate throughout.

This group comprises only two known species *N. Nicobarica* and *N. Ny*, of doubtful affinity to and other species. They have some resemblance to certain Diploneis forms, but the central and terminal nodules are very different. They seem to me provisionally to be nearest akin to *Diplon. bioculata* and *N. forcipata*, although the relation is a distant one.

1. **N. nicobarica** Grun. (1863). — V. broadly elliptical. L. 0,0244 to 0,043; B. 0,019 to 0,03 mm. Median line with moderately approximate median pores and large comma-like terminal fissures, turned in the same direction. Axial and central areas uniting in a large lanceolate space, having on both sides of the median line a row of large, sometimes confluent puncta. Striæ 7 to 8 in 0,01 mm. smooth, radiate throughout. — Grun. Verh. 1863 p. 150 Pl. V f. 8. A. S. Atl. VIII f. 57, LXX f. 35, 36. Cl. Vega p. 505 Pl. XXXV f. 16.

Marine: Ceylon! Nicobar Islands (Grun.), Celebes (Atl.), Cape of Good Hope (Atl.), Cape Horn (Petit).

2. **N. Ny** Cl. N. Sp. — V. elliptical, with broad rounded ends. L. 0,04; B. 0,018 mm. Median line with large comma-like terminal fissures, turned in the same direction. Axial and central area united in a large lanceolate area having on both sides of the median line a row of small puncta, and around the central nodule a few larger stigmas. Striæ, 16 in 0,01 mm., apparently smooth. — Pl. I f. 24.

Marine: Java!

Cymatoneis Cl. N. G.

Valve more or less elliptical or lanceolate in outline, divided by one or several longitudinal ridges into two or more divisions. Median line with approximate central pores and elongated terminal fissures, at some distance from the ends of the valve. Axial area narrow, central small, usually rhomboidal. Structure: puncta disposed in transverse and straight longitudinal rows — Zone not complex.

This little group of very characteristic forms seems to be most nearly akin to Scoliopleura, although no species has any very close connection with that genus. The structure of the valve is the same as in *Scoliopleura Peisonis* and the ridges on both sides of the median line recall those of Scoliopleura. In several forms there is a tendency in the median line to be sigmoid.

1. **C. sulcata** Grev. (1863). — V. convex, with triundulated margins, and apiculate or subrostrate ends. L. 0,045 to 0,06; B. 0,025 to 0,033 mm. Axial area very narrow, dilated around the central nodule to a rhomboidal space. Median line slightly sigmoid; terminal fissures elongated, distant from the ends. Ridges two or three on each side of the median line. Striæ radiate at the ends, 8 to 11 in 0,01 mm.; puncta forming straight, longitudinal rows, 14 to 18 in 0,01 mm. — *Navic. sulcata* Grev. Trans. Bot. Soc. Edinb. Vol. VIII p. 235 Pl. III f. 10. Leud Fortm. D. de Ceylan Pl. III f. 30. *Nav. triundulata* Grun. Hedwigia VI p. 27 (1867). M. M. J. 1877 Pl. CXCV f. 10. *Cymaton. sulc.* Pl. I f. 12, 13.

Marine: Mediterranean Sea! Seychelles (V. H. Coll.)! Madagascar (V. H. Coll.)! Ceylon! Labuan! Japan! Port Jackson! Java! China! Japan! New Caledonia (Grev.), Galapagos Islands! Honduras (Grun.), Campeachy Bay! West Indies! Florida!

Varies occasionally with a slight constriction in the middle and with quadri-undulated margins.

2. **C. quadrisulcata** Grun. (1867). — V. elliptic-lanceolate, with slightly rostrate, obtuse ends. L. 0,05 to 0,09; B. 0,028 to 0,036 mm. Axial area indistinct; central area orbicular. Ridges two on each side of the median line. Striæ slightly radiate, 6 to 8 in 0,01 mm., punctate; puncta forming longitudinal rows. — *Nav. quadris.* Grun. Novara p. 101 Pl. I A f. 14.

Marine: S:t Pauls Island.

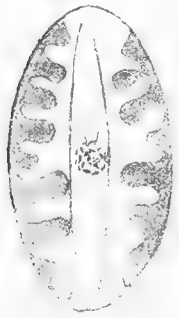
Grunow figures two specimens, which seem to belong to different species. The smaller resembles *C. sulcata* and may be a non-undulated variety of that species. The larger may be identical with the following, but I cannot identify them, as Grunow's figure shews two ridges of equal strength on both sides of the median line.

3. **C. circumvallata** Cl. N. Sp. — V. linear-elliptical with broad, rounded, sometimes slightly rostrate ends. L. 0,055 to 0,075; B. 0,012 to 0,022 mm. Median line slightly sigmoid, with approximate central pores and prolonged terminal fissures. Axial area narrow; central rhomboidal. Ridges one or two on each side of the median line. Striæ 9 in 0,01 mm., parallel, radiate at the ends, punctate; puncta coarse, forming longitudinal rows, 14 in 0,01 mm. — Pl. I f. 10, 11.

Marine: Balearic Islands! Ceylon! Labuan! Japan (Brun Coll.)!

Diploneis Ehb. (1840).

Valve usually short, constricted in the middle, or not, generally with obtuse or rounded ends. Central nodule more or less quadrate, prolonged into *horns*, or processes, which enclose the median line. On both sides of the horns are depressions, or *furrows*, of more or less breadth. Structure: transverse finer striæ, or coarser costæ, which usually continue in a rudimentary state across the furrows, where they frequently give rise to a longitudinal row of large pearls. The transverse costæ are often crossed by one or more longitudinal costæ, giving the valve the appearance of being reticulated; or alternate with double rows of finer puncta, or *alveoli*. — The cell-contents (of *D. fusca*, *D. Smithii*, *D. didyma*, *D. subcincta*, *D. chersonensis* and *D. constricta*) have two chromatophore-plates along the connecting zone. They are deeply indented and divided, sometimes in such a manner as to be split up into closely crowded and orbicular small discs.



Diploneis Smithii, times magnified.

The name *Diploneis* was given by Ehrenberg 1840, to some panduriform naviculoid diatoms. This characteristic is of no importance; but on the other hand, the central nodule, the furrows and the structure are so peculiar, that the genus Diploneis may be regarded as a well founded one.

The central nodule is, in the more typical forms, large and quadrate, with the angles prolonged into strong siliceous horns, enclosing the median line. In some few forms these horns are less distinct, as in *D. nitescens*. The horns correspond evidently to the lyre-shaped expansions or lateral areas in the section of Naviculæ Lyratæ, but in Diploneis the space between the horns and the median line is never punctate as in that group. There are a few forms which are intermediate between Diploneis and the Nav. lyratæ, viz. *Dipl. hyalina* Donk. and *D. Hudsonis* Grun. Outside the horns are depressed parts of the valve, *furrows*. These furrows have usually a longitudinal row of large pearls, formed by the continuation of the costæ of the valve. Sometimes there are double rows of pearls or alveoli. These furrows are to be found also in other genera, as in Scoliopleura, Cymatoneis, etc., and point to a relationship between Diploneis and those genera. Between the furrows and the exterior part of the valve is in several species a space, the *lunula*, of different structure from the outside part of the valve. Such lunulæ occur in *D. mirabilis*, *D. Crabro* and others.

The structure of Diploneis is very variable. In some forms, as in *D. hyalina*, the valve has fine striæ, which in *D. Hudsonis* are formed by obliquely decussating puncta. In other forms there are coarse costæ, not composed of puncta. The costæ frequently anastomose and seem then to be crossed by one or more, undulating, or straight, longitudinal ribs. When these longitudinal ribs are numerous, they form with the transverse costæ a network of quadrate alveoli. The costæ often alternate with double rows of puncta (alveoli), forming obliquely decussating rows. These alveoli seem to be formed by numerous small lateral branches from the costæ. A similar structure occurs in *Scoliotropis* and *Gomphoneis*. In the larger forms the transverse costæ alternate with large rounded pore-like markings, the *ocelli*, which evidently belong to an interior stratum of the valve. In *D. Crabro* and allied forms these ocelli form a marginal row, which in the middle ap-

proaches the central nodule. In other forms, as in *D. lesinensis*, they form several, more or less irregular, longitudinal rows. The ocelliferous stratum seems to correspond to the interior porous layer in *Trachyneis* and perhaps to the foramina of the larger *Pinnularia*.

Diploneis has, as already remarked, some affinity to the group of *Naviculæ lyratæ*, intermediate forms being *D. hyalina* and *D. Hudsonis*. It has also some relation to *Cymatoneis* and through that genus to *Scoliopleura*. Another genus, which has some relation to Diploneis, is Amphora, sensu strictiori. In the last named group we find the large central nodule, the lateral furrows, and, frequently, the reticulated structure of some Diploneis-forms; but there are no known intermediate forms between Diploneis and Amphora.

The systematic arrangement of the numerous forms of Diploneis is excedingly difficult. The species are very variable in size and in the coarsness of the structure. Moreover valves, which are uninjured often present a very dissimilar appearance to such as have been corroded by preparation. Several »new species» have been founded on corroded specimens of well-known species. Many, at first sight very distinct species, are connected by intermediate varieties. Although I have examined and figured a very large number of forms from all parts of the world, I must confess that my attempt to their classification still leaves much to desire.

Most species of Diploneis live in salt water. Brackish forms are *D. didyma*, *D. interrupta*, *D. Smithii* and frequently *D. elliptica*. The panduriform species are all marine or brackish, and *D. didyma* becomes almost elliptical in slightly brackish water. Fresh water species of Diploneis are few, but very frequent. The are all elliptical in outline.

Artificial key.

1.	Finely strate (striæ 17 to 24 in 0,01 mm.)	2.
	Coarsely — (costæ 3 to 17 in 0,01 mm.)	6.
2.	Striæ of distinct, coarse puncta	*D. ovalis* Hilse.
	— not distinctly or finely punctate	3.
3.	Horns of the central nodule strong and distinct	4.
	— — — — not distinct	5.
4.	Transverse striæ crossed by oblique striæ	*D. Hudsonis* Grun.
	— — not — —	*D. hyalina* Donk.
5.	Furrows broad	*D. bioculata* Grun.
	— narrow	*D. oculata* Bréb.
6.	Transverse costæ not crossed by longitudinal, or not alternating with alveoli	7.
	— — crossed by one or several longitudinal, or alternating with single or double rows of alveoli	25.
7.	Horns of the central nodule not distinct	*D. inscripta* Cl.
	— — — — distinct	8.
8.	Furrows narrow	9.
	— broad	18.
9.	Valve constricted	14.
	— not or slightly	10.
10.	Valve elliptical	11.
	— linear-elliptical	12.
	— linear	13.
11.	Costæ 6 to 10 in 0,01 mm.	*D. suborbicularis* Greg. (*D. coffæformis* A. S.).
	— 12 to 18 —	*D. Puella* A. S.
12.	Fresh-water species	*D. Boldtiana* Cl.
	Marine	*D. advena* A. S.
13.	Horns parallel	*D. congrua* Jan.
	— divergent in the middle	*D. compar* Jan.
14.	Slightly constricted	*D. subnuda* A. S.
	Strongly —	15.
15.	Ends rostrate	*D. laciniosa* A. S.
	— not —	16.

16. Costæ incrassate at the margin . . . *D. Adonis* Brun.
— not — — . . . 17.

17. Segments almost orbicular . . . *D. interrupta* Kütz.
— elongate-elliptical . . . *D. Guinardiana* Brun.

18. Valve not constricted . . . 19.
— panduriform . . . 23.

19. Valve very convex and thick . . . *D. circumnodosa* Brun.
— not — — . . . 20.

20. Valve elliptical . . . *D. Cynthia* A. S.
— linear . . . 21.

21. Furrows decreasing in breadth from the middle . . . *D. munda* Jan.
— of equal breadth throughout . . . 22.

22. Central nodule small . . . *D. mediterranea* Grun.
— — large . . . *D. contigua* A. S.

23. Furrow crossed by costæ . . . *D. Letourneurnii* Cl.
— without or with rudimentary costæ . . . 24.

24. Costæ 4 to 7 in 0,01 mm. . . . *D. muscæformis* Grun.
— 7 to 8 — . . . *D. constricta* Grun
— 11 to 12 — . . . *D. incurvata* Greg.

25. Costæ crossed by a single longitudinal rib . . . 26.
— — several — ribs . . . 35.
— alternating with double rows of alveoli . . . 61.

26. Valve not constricted . . . 27.
— constricted . . . 29.

27. L. 0,02 to 0,03 mm. . . . 28.
L. 0,04 to 0,08 mm. . . . *D. lineata* Donk.

28. Furrows broad . . . *D. discrepans* A. S.
— narrow . . . *D. Papula* A. S.

29. Valve gently constricted . . . 30.
— deeply — . . . 34.

30. Furrows decreasing in breadth from the middle . . . *D. Vetula* A. S.
— of almost equal breadth . . . 31.

31. Furrows very broad . . . *D. binaria* A. S.
— not — . . . 32.

32. Longitudinal rib in the middle of the striæ . . . 33.
— — marginal . . . *D. subcincta* A. S.

33. Rib narrow . . . *D. exemta* A. S.
— broad . . . *D. demta* A. S.

34. L. about 0,03 mm. . . . *D. bombiformis* Cl.
L. 0,07 to 0,1 mm. . . . *D. coarctata* A. S.

35. Valve constricted . . . 36.
— not . . . 50.

36. Valve with ocelli . . . *D. areolata* Cl.
— without . . . 37.

37. Valve strongly constricted . . . 38.
— slightly — . . . 45.

38. Segments orbicular . . . *D. Clepsydra* Cl.
— elliptical or deltoid . . . 39.

39. Costæ alternating with faint alveoli . . . *D. Præstes* A. S.
— — — distinct — . . . 40.

40. Ribs forming undulating rows . . . *D. splendida* Greg.
— — straight or curved . . . 41.

41. L. 0,04 or less . . . *D. Gründleri* A. S.
L. larger . . . 42.

42. Furrows indistinct . . . *D. Weissflogii* A. S.
— distinct . . . 43.

43. Ribs two to five on each side of the median line . . . 44.
— eight to ten . . . *D. Kützingii* Grun.

44. Transverse costæ 5 to 8 in 0,01 mm. . . . *D. Bombus* Ehr.
8 to 13 — . . . *D. chersonensis* Grun.

45. Longitudinal ribs 2 to 4 in 0,01 mm. . . . 46.
— — 5 to more — . . . 47.

46. Furrows broader in the middle . . . *D. Schmidtii* Cl.
— not — — . . . *D. Entomon* Ehb.

47. Furrows broader in the middle . . . 48.
— not — — . . . 49.

48. Transverse costæ 6 to 9 in 0,01 mm. . . . *D. bomboides* A. S.
— — 11 — — . . . *D. divergens* A. S.

49. Transverse costæ 9 in 0,01 mm. . . . *D. didyma* Ehb.
— — 13 — — . . . *D. chinensis* Cl.

50. Median line ending far from the margin . . . *D. microtatos* Pant.
— — — near — — . . . 51.

51. Furrows abruptely dilated around the central nodule . . . 52.
— not — — — . . . 53.

52. Transverse costæ about 7 in 0,01 mm. . . . *D. hyperborea* Grun.
— — — 12 — . . . *D. vacillans* A. S.

53. Furrows broad . . . 54.
— narrow . . . 57.

54. Freshwater species . . . *D. finnica* Ehb.
Marine — . . . 55.

55. Longitudinal ribs few . . . *D. notabilis* Grev.
— — numerous . . . 56.

56. Central nodule small . . . *D. Græffii* Grun.
— — large . . . *D. fusca* Greg.

57. Longitudinal ribs wider than the costæ . . . *D. domblittensis* Grun.
— equidistant with — or closer . . . 58.

58. Central nodule small . . . *D. litoralis* Donk.
— — large . . . 59.

59. Freshwater species . . . 60.
Marine — . . . *D. æstiva* Donk.

60. Ribs as close as the costæ . . . *D. elliptica* Kütz.
— closer than — . . . *D. Parma* Cl.

61. Valve not or slightly constricted . . . 62.
— constricted . . . 74.

62. Valve elliptical . . . 63.
— elongated with parallel or slightly concave margins . . . 73.

63. Furrows narrow . . . 64.
— broad . . . 67.

64. Without ocelli . . . 65.
With ocelli . . . *D. biseriata* Cl. (*D. Crabro* var.).

65. Furrows equally arcuate . . . *D. Smithii* Bréb.
— bent around the central nodule . . . 66.
— linear . . . *D. advena* var. *recta*.

66. Central nodule large . . . *D. subovalis* Cl.
— — rather small . . . *D. borealis* Grun.

67. Furrows forming a large, orbicular space . . . 68.
— — an elliptical or lanceolate space . . . 69.

68. Furrows double . . . *D. mirabilis* Castr.
— single . . . *D. Platessa* Cl. a. Grove.

69. Horns distinct . . . 70.
— indistinct . . . 72.

70. Horns divergent . . . *D. Campylodiscus* Deby.
— approximate . . . 71.

71. Furrows broader than $^1/_3$ of the breadth of the valve . . . *D. Debyi* Pant.
— narrower . . . *D. major* Cl.

72. Freshwater species . . . *D. Mauleri* Brun.
Marine — . . . *D. nitescens* Greg.

73. L. 0,03 to 0,06 mm. . . . *D. Szontaghii* Pant.
L. 0,08 to 0,24 mm. . . . *D. gemmata* Grev.

74.	Valve without ocelli	75.
	— with —	76.
75.	Furrows narrow	*D. dalmatica* Grun.[1]
	— broad	*D. Vespa* Cl.
76.	Ocelli in a marginal band	*D. Crabro* Ehr.
	— rows alternating with the costæ	77.
77.	Furrows broad	*D. gemmatula* Grun.
	narrow	78.
78.	Costæ 3 to 4 in 0,01 mm.	*D. vagabunda* Brun.
	— 5 to 6 —	*D. lesinensis* Grun.
	— 7 —	*D. prisca* A. S.

D. Hudsonis Grun. (1892). — V. hyaline, elliptical, with more or less rounded ends. L. 0,036 to 0,05; B. 0,012 to 0,02 mm. Central nodule quadrate, its horns slightly divergent in the middle. Furrows forming a small, rhomboid, not striate, space around the central nodule. Parts outside the furrows striate. Striæ fine, 24 to 25 in 0,01 mm. slightly radiate at the ends, finely punctate; puncta forming obliquely decussating rows. — *Naricula (Diploneis?) Hudsonis* (Grun.) Cl. in Diatomiste I p. 77 Pl. XII f. 8.

Brackish water: Hudson River!

This little form is very remarkable and not closely connected with any other known species. It seems to be most nearly related to *D. hyalina*, but there are considerable differences.

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1. **D.? bioculata** Grun. (1881). — V. elliptical, with rounded ends. L. 0,02 to 0,036; B. 0,013 to 0,015 mm. Central nodule elongated; its horns close to the median line. Central pores distant, incrassate. Furrows broader than half of the breadth of the valve. Striæ 17 to 22 in 0,01 mm. not distinctly punctate, continued across the furrows to the median line, slightly radiate throughout. — *Nav. bioculata* Grun. A. S. Atl. LXX f. 9, 10, 11, VII f. 49?

Marine: Balearic Islands! Adriatic! Java! Port Jackson! Galapagos Islands!

Var. *rittata* Cl. — L. 0,04; B. 0,015 mm. Central nodule very narrow; central pores distant. Furrow separated from the exterior part of the valve by a linear, broad band. Striæ 17 in 0,01 mm., on the furrows punctate. — Pl. I f. 15.

Marine: Ceylon!

The exact place of this species is difficult to decide. The incrassated central pores recall those of *Nav. forcipata*, but nevertheless I believe it to be a Diploneis, akin to *D. hyalina*.

2. **D. inscripta** Cl. N. Sp. — V. lanceolate, subacute, convex. L. 0,065; B. 0,017 mm. Central nodule small; its horns close to the median line. Central pores approximate, incrassate. Furrows as broad as half of the valve. Striæ 10 in 0,01 mm. continued across the furrows, not distinctly punctate, parallel, very slightly radiate in the ends. — Pl. I f. 17.

Marine: Gulf of Naples! China!

This species seems to connect the genus *Cymatoneis*, to which it has some resemblance, with the forms of the group of *D. nitescens*.

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3. **D. hyalina** Donk. (1861). — V. hyaline, thin, elliptical. L. 0,045 to 0,076; B. 0,014 to 0,026 mm. Central nodule somewhat elongated; its horns slightly divergent in the middle. Furrows much broader than half of the breadth of the valve. Striæ 22 in 0,01 mm., distinct outside, fainter in the furrows, fading away towards the horns of the median line. — *Nav. hyalina* Donk. M. J. I p. 10 Pl. I f. 6. B. D. p. 5 Pl. I f. 1. A. S. Atl. LXX f. 1—5.

Marine: Finmark! North Sea!

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[1] Var. of *D. Crabro*.

4. **D. coffæiformis** A. S. (1874). — V. broadly elliptical. L. 0,023 to 0,07; B. 0,01 to 0,033 mm. Central nodule quadrate to rectangular, with somewhat divergent horns. Furrows narrow, close to the horns. Striæ 8 to 10 in 0,01 mm., radiate at the ends, less distinct or imperceptible on the furrows, not alternating with puncta or alveoli. — *Nav. coffæiformis* A. S. N. S. D. p. 88 Pl. I f. 22 Pl. II f. 13. Atl. VIII f. 7.

Marine: North Sea! Gulf of Naples! Macassar Straits! Calif. Santa Monica, fossil (Deby Coll.).

Var. *densestriata* A. S. (1881). — Striæ 10 in 0,01 mm. Lunulæ large. — *Nav. coff. v. dens.* A. S. Atl. LXX f. 54.

Marine: Jamaica (Atl.).

Var. *subcircularis* A. S. (1881). — V. orbicular. L. 0,04; B. 0,034 mm. Striæ 8 in 0,01 mm. — *D. coff. subc.* A. S. Atl. LXX f. 53.

Marine: ?

5. **D. suborbicularis** Greg. (1857). — V. elliptical with broad, rounded ends. L. 0,04 to 0,053; B. 0,024 to 0,032 mm. Central nodule large, quadrate; its horns divergent. Furrows linear, closely following the horns, with faint continuations of the costæ, or with a row of puncta. Costæ 6 to 9 in 0,01 mm. — *Nav. Smithii var. suborbicularis* Greg. D. of Clyde p. 487 Pl. IX f. 17. *Nav. suborbicularis* Donk. B. D. p. 9 Pl. I f. 9. A. S. N. S. D. Pl. I f. 21. Atl. VIII f. 2, 3, 5, not 4.

Marine: Davis Strait! North Sea! Corsica! Adriatic, Caspian Sea (Grun.), Ceylon! Madagascar! Singapore! Labuan! Galapagos Islands! Cape Horn (Petit), Brazil (Atl.), Gulf of Mexico (Atl.) North Carolina! Fossil: Hungary (Pant.), Sta Monica, Cal.!

Between *D. coffæiformis* and *D. suborbicularis* there is no sharp distinction, the furrows being broader, the horns of the central nodule more divergent and the costæ usually coarser in *D. suborbicularis* than in *D. coffæiformis*.

6. **D. compar** Jan. (1881). — V. linear, with broad, truncate ends. L. 0,05; B. 0,01 mm. Central nodule large, quadrate; its horns divergent at their basis. Furrows narrow, linear. Costæ about 13 in 0,01 mm. — *Nav. compar* A. S. Atl. LXX f. 69.

Marine: ?

7. **D. advena** A. S. (1875). — V. linear-elliptical sometimes slightly constricted in the middle. L. 0,08 to 0,1; B. 0,026 to 0,035 mm. Central nodule small, quadrate, its horns parallel, approximate. Furrow narrow, linear. Costæ 9 in 0,01 mm., almost parallel, continuing across the furrow. — *Nav. advena* A. S. Atl. VIII f. 29; XII f. 41.

Marine: Cape Good Hope (Atl.), Madagascar! Java (Deby Coll.)! Japan (Deby Coll.)! Sandwich Islands (Atl.).

Var. *recta* Brun. a. Hérib. (1893). — L. 0,1 to 0,12; B. 0,02 to 0,023 mm. Costæ 7 in 0,01 mm. alternating with double rows of obscure puncta, about 14 in 0,01 mm. — *Nav. recta* Brun. a. Hérib. D. d'Auvergne p. 90 Pl. II f. 3.

Marine: Puy du Mur, Auvergne fossil (Br.). Morris Creek Conn. (Brun Coll.)!

Var. *sansegana* Grun. (1875). — V. linear-elliptical. L. 0,053; B. 0,018 mm. — *Nav. sansegana* Grun. A. S. Atl. VIII f. 27.

Marine: Adriatic (Grun.).

Var. *parca* A. S. (1875). — V. narrow, elliptical. L. 0,03 to 0,045; B. 0,016 mm. Furrows narrowed at the ends. Costæ 10 to 14 in 0,01 mm. — *Nav. parca* A. S. Atl. VIII f. 20 to 22.

Marine: North Sea, Samoa, Campeachy Bank (Atl.).

8. **D. subnuda** A. S. (1875). — V. gently constricted, with elliptical segments. L. 0,076; B. 0,022; at the comtr. 0,015 mm. Central nodule small, its horns straight, approximate. Furrows linear, dilated in the middle. Costæ 10 in 0,01 mm. — *Nav. subnuda* A. S. Atl. XII f. 44.

Marine: Mazatlan (Atl.).

Var. *densestriata* A. S. (1881). — Smaller. Costæ 11 in 0,01 mm. — *Nav. subnuda v. densestr.* A. S. Atl. LXIX f. 45.

Marine: California (Atl.).

9. **D. laciniosa** A. S. (1875). — V. strongly constricted in the middle, with rostrate ends. L. 0,033; B. 0,012; at the constr. 0,0076 mm. Central nodule very small; its horns parallel. Furrows narrow, not dilated in the middle. Costæ strongly divergent towards the margins, 12 in 0,01 mm. — *Nav. lac.* A. S. Atl. XII f. 54.

Marine: Java (Atl.).

10. **D. congrua** Jan. (1881). — V. linear, with broad, capitate ends. L. 0,06; B. 0,0136 mm. Central nodule small; its horns parallel, approximate. Furrows very narrow, slightly dilated in the middle. Costæ 12 in 0,01 mm. — *Nav. congr.* Jan. A. S. Atl. LXX f. 66.

Marine: ?

This species is unknown to the author. The fig. in Atl. does not show the structure. Probably akin to *D. litoralis.*

11. **D. Cynthia** A. S. (1875). — V. narrow, elliptical, with rounded ends. L. 0,05 to 0,075; B. 0,018 to 0,025 mm. Central nodule small; its horns parallel, approximate. Furrows broad, linear, forming a narrow elliptical space, a third as broad as the valvé. Costæ 7 in 0.01 mm., parallel, radiate at the ends, continued across the furrows. — *Nav. Cynthia* A. S. Atl. VIII f. 41.

Marine: Red Sea (Van Heurck Coll.)! Seychelles (Van Heurck Coll.)! Madagascar! Java! Tahiti! West Indies!

Var. *elongata* Cl. — L. 0,13; B. 0,038 mm. Costæ 13 in 0,01 mm.

Marine: Java!

Var. *sibirica* Cl. — L. 0,05; B. 0,017 mm. Costæ 11 in 0,01 mm.

Marine: Cape Wankarema!

Var. *minuta* Cl. — L. 0,035; B. 0,01 mm. Costæ 15 in 0,01 mm. — A. S. Atl. VIII f. 28.

Marine: Cape Good Hope (Atl.) Galapagos Islands!

12. **D. mediterranea** Grun.. (1875). — V. linear with rounded or cuneate ends. L. 0,053; B. 0,021 mm. Central nodule small; its horns parallel. Furrows broad, with a row of puncta. Costæ 7 in 0,01 mm. — *Nav. gemmata v. mediterranea* Grun. in A. S. Atl. VIII f. 42.

Marine: ?

13. **D. munda** Jan. (1881). — V. linear, with rounded ends. L. 0,047; B. 0,015 mm. Central nodule very small; its horns parallel, approximate. Furrows broadest in the middle, gradually tapering to the ends. Costæ 7 in 0,01 mm. marginal, not reaching the furrows. — *Nav. munda* A. S. Atl. LXX f. 70.

Marine: ?

The costæ are figured coarsely punctate, but nevertheless the general appearance of this species agrees most with *D. mediterranea.*

14. **D. contigua** A. S. (1875). — V. linear, with rounded or subcuneate ends. L. 0,066 to 0,14; B. 0,017 to 0,03 mm. Central nodule large, quadrate, with parallel, approximate horns. Furrows very broad, linear, crossed by rudimentary costæ or by a double row of large puncta. Costæ 6 to 7 in 0,01 mm. — *Nav. cont.* A. S. Atl. VIII f.43. *Nav. Thumii* Pant. I p. 29 Pl. X f. 85 (1886).

Marine: Japan (Deby Coll.)! Fossil: Oamaru N. Zeal.! S:t Peter, Hungary!

Var. *Zechenteri* Pant. (1886). — L. 0,072; B. 0,017 mm. Costæ 8 in 0,01 mm. — *Nav. Zechenteri* Pant. I p. 30 Pl. XIV f. 118.

Marine: Hungary, fossil (Pant.).

Var. *Eudoxia* A. S. (1875). — V. linear, with rounded ends. L. 0,07 to 0,085; B. 0,017 to 0,022 mm. Costæ 6 to 7 in 0,01 mm. Furrows narrower, than on the type. — *Nav. mediterranea* A. S. N. S. D. Pl. II f. 10. *Nav. Eudoxia* A. S. Atl. VIII f. 40, LXX f. 71.

Marine: Morocco! Balearic Islands! Red Sea! Bab el mandeb! Madagascar! Ceylon! Galapagos Islands! Monterey (Atl.). Fossil: Szákal, Hungary!

Var. *Eugenia* A. S. (1875). — V. with subcuneate ends. L. 0,06; B. 0,017 mm. Costæ 7 to 8 in 0,01 mm. — *Nav. Eugenia* A. S. Atl. VIII f. 44.

Marine: Ceylon (Leuduger Fortm.) Macassar Straits! Campeachy Bay (Atl.).

There is, so far as I can see, no specific distinction between the above forms, which I regard as belonging to *D. contigua*. They are perhaps all only smaller, and corroded, forms of *D. gemmata*.

15. **D. circumnodosa** Brun. (1891). — V. very convex and thick, linear, with broad, rounded ends. L. 0,1; B. 0,023 mm. Central nodule short and broad; its horns divergent at the nodule. Furrows very broad. Costæ 7 in 0,01 mm., continued across the furrows as rows of three large puncta. — *Nav. circumn.* Brun. Esp. n. p. 33 Pl. XVI f. 2.

Marine: Japan, fossil (Brun Coll.)!

16. **D. Letourneuri** Cl. N. Sp. — V. elongated, very slightly constricted in the middle, with broad, rounded ends. L. 0,07; B. 0,023; at the constr. 0,02. Central nodule elongated quadrate; its horns nearly parallel. Furrows very broad. Costæ 9 in 0,01 mm. almost parallel, continued across the furrows, smooth. — Pl. I f. 18.

Marine: Columbo, Ceylon (Letourneur Coll.)!

17. **D. muscæformis** Grun. (1875). — V. gently constricted in the middle, with cuneate ends. L. 0,07 to 0,095; B. 0,03 to 0,04 at the constr. 0,024 to 0,037 mm. Central nodule quadrate, with approximate, scarcely divergent horns. Furrows $^1/_2$ to $^1/_3$ as broad as the valve. Costæ 4 to 7 in 0,01 mm., with faint continuations across the furrows.

Var. *placida* A. S. L. 0,09 mm. Costæ 4 to 4,5 in 0,01 mm. — *Nav. placida* A. S. Atl. CLXXIV f. 2.

Marine: Galapagos Islands! San Pedro Calif. fossil (Kinker Coll.)! Oamaru New Zealand, fossil (Atl.).

Var. *genuina* Cl. — Costæ 7 in 0,01 mm. — *Nav. muscæform.* A. S. Atl. XIII f. 42, 47.

Marine: Campeachy Bay! Java!

Var. *constricta* Grun. — Ends rounded. L. 0,05 to 0,06; B. 0,018 to 0,019 at the constr. 0,013 to 0,015 mm. Costæ 6 to 7 in 0,01 mm. — *Nav. constricta* Grun.? A. S. Atl. XII f. 65; LXIX f. 42.

Marine: Balearic Islands! Sansego (Atl.), Seychelles (Van Heurck Coll.)! Madagascar! Sumbava (Kinker Coll.)! Japan (Deby Coll.)! Leton Bank (Atl.).

Var. *pusilla* Cl. — V. slightly constricted. L. 0,02; B. 0,010 mm. Costæ 9 in 0,01 mm.

Marine: Galapagos Islands!

This form is doubtful as a species, having very much the appearance of strongly corroded valves of other species as *D. Beyrichiana* and allied forms. Grunow mentions a form from the Caspian Sea in length 0,038 mm. and with 12 costæ in 0,01 mm., which seems not to belong to *D. muscæformis*.

18. **D. constricta** Grun. (1860). — V. gently constricted in the middle, with subcuneate ends. L. 0,06 to 0,15; B. 0,023 to 0,03, at the constr. 0,02 to 0,025 mm. Central nodule quadrate, its horns parallel, approximate. Furrows very broad. Costæ 7 to 8 in 0,01 mm., very faint on the furrows, radiate at the ends. — *Nav. constricta* Grun. Verh. 1860 p. 535 Pl. III f. 18 (according to V. H. T 103). *Nav. Musca* Donk. B. D. p. 50 Pl. VII f. 6 (1873). *Nav. Donkinii* A. S. N. S. D. Pl. I f. 12 (1874); II f. 8. Atl. XII f. 63, 64.

Marine: Finmark! North Sea! Balearic Islands! Ceylon! Florida!

Forma minuta. — L. 0,035; B. 0,014; at the constr. 0,013 mm. Costæ 13 in 0,01 mm.

Marine: Madagascar!

Var. *distans* Cl. — Horns of the central nodule divergent.

Marine: Norway! (L. 0,052; B. 0,02; constr. 0,018 mm. Costæ 9 in 0,01 mm.) Hungary, Szákal! (L. 0,04; B. 0,016 constr. 0,015 mm. Costæ 10 in 0,01 mm.) Galapagos Islands! (L. 0,032; B. 0,013; constr. 0,011 mm. Costæ 12 in 0,01 mm.).

19. **D. incurvata** Greg. (1856). — V. elongated, panduriform. L. 0,06 to 0,07; B. 0,013 to 0,017; constr. 0,01 to 0,012 mm. Central nodule small, quadrate; its horns parallel. Furrows broad, linear, not costate or punctate. Costæ 11 to 12 in 0,01 mm., parallel, slightly radiate at the ends. — *Nav. inc.* Greg. T. M. S. IV p. 44 Pl. V f. 13. Donk. B. D. p. 49 Pl. VII f. 4. A. S. N. S. D. Pl. I f. 10, 11; II f. 6.

Marine: Finmark! North Sea! Morocco! Florida! Galapagos Islands! Cape of Good Hope!

20. **D. interrupta** Kütz (1844). — V. deeply constricted, its segments broadly elliptical to orbicular, with rounded ends. L. 0,029 to 0,072; B. 0,012 to 0,024; at the constr. 0,007 to 0,013 mm. Central nodule elongated, quadrate, its horns parallel. Furrows linear, narrow. Costæ 8 to 12 in 0,01 mm., divergent, usually interrupted or not reaching the margin in the middle of the valve. — *Nav. interr.* Kütz Bac. p. 100 Pl. XXIX f. 93. Donk. B. D. p. 47 Pl. VII f. 2. Grun. Verh. 1860 p. 531 Pl. V f. 20. Lagst. Spitsb. D. p. 28 Pl. II f. 6. A. S. N. S. D. Pl. I f. 8. Atl. XII f. 3, 4, 5, 11; LXIX f. 24. V. H. Syn. p. 89 Pl. IX f. 7, 8. *Diploneis didyma* Ehb. Abh. Berl. 1870 Pl. II f. 13. W. Sm. B. D. XVII f. 154 *a'*. *Nav. Puella* A. S. Atl. LXIX f. 25. *Nav. interr. v. Novæ Zealandiæ* A. S. Atl. XII f. 12.

Brackish water: Spitzbergen! Beeren Eiland (Lagst.), Kara! Finmark! North Sea! Baltic (Torneå to Rügen)! Mediterranean Sea! Red Sea (Grun.), Java! Samoa! Australia! Auckland (Grun.), Cape Good Hope (Atl.), Atlantic coast of America! Greenland! Arctic America! Franzenbad! Halle! Great Salt Lake!

Var. *Tallyana* Grun. (1882). — Costæ interrupted in the middle, outside the furrow. — *Nav. interr. v. Tall.* Grun. F. D. Öst. Ung. p. 150 Pl. XXX f. 59.

Brackish water: Tallya, Hungary, fossil (Grun.).

Var. *zanzibarica* Grun. (1875). — V. deeply constricted. L. 0,05 to 0,07; B. 0,02 to 0,033; at the constr. 0,009 to 0,017 mm. Segments nearly orbicular. Horns of the central nodule divergent. Costæ 7 to 8 in 0,01 mm. (according to A. S. Atl. alternating with rows of puncta). *Nav. interr. v. zanz.* A. S. Atl. XII f. 1, 2.

Brackish and marine: Zanzibar (Atl.), Carpentaria, Australia (Atl.).

Var.? *Weisneri* Pant. (1886). — V. less constricted. L. 0,021 to 0,032; B. 0,01 to 0,014; at the constr. 0,012 mm. Segments tongue-shaped. Horns somewhat divergent. Costæ 10 to 12,5 in 0,01 mm. — *Nav. Weisneri* Pant. I p. 29 Pl. XVIII f. 158. *Nav. interr. var. fossilis* Pant. II p. 48 Pl. VI f. 112; Pl. XII f. 208, 215 (1889).

Brackish water: Hungary fossil!

Var.? *Gorjanovicii* Pant. (1886). — V. gently constricted, with elliptical segments. L. 0,022 to 0,036; B. 0,012 to 0,014; at the constr. 0,007 to 0,009 mm. Horns slightly divergent. Costæ 8 to 12,5 in 0,01 mm. not interrupted in the middle. — *Nav. Gorjanovicii* Pant. I p. 25 Pl. IX f. 81. *Nav. Heerii* Pant. II p. 47 Pl. XI f. 195; Pl. XII f. 210 (1889). ?*Nav. Gorjanov. var. major* Pant. II p. 46 Pl. V f. 78.? *Nav. suspecta? var. Czekehazensis* Pant. II p. 44 Pl. IV f. 56.

Brackish water: Hungary, fossil (Pant.)!

Var. *clancula* A. S. (1875). — V. deeply constricted, with almost orbicular segments. L. 0,036; B. 0,018, at the constr. 0,009. Costæ 8 to 9 in 0,01 mm. not interrupted in the middle. — *Nav. clanc.* A. S. Atl. XII f. 33, 34.

Marine: Australia (Atl.).

Diploneis interrupta is a very variable species, and appears to graduate into *D. incurva*. The specimens in the deposits of Hungary are corroded, so that it is not easy to decide whether they really belong to *D. interrupta* or not. So far as I can see from the descriptions and figures, there is no difference between *Nav. Wiesneri* and *Nav. interrupta var. fossilis* PANT. The same is also the case with the nearly related forms *Nav. Heerii* and *Nav. Gorjonovicii* PANT.

21. **D. Guinardiana** BRUN. (1889). — V. elongated, panduriform, with narrow elliptical segments. L. 0,08 to 0,095; B. 0,018 to 0,028; at the constr. 0,009 to 0,017 mm. Central nodule small, quadrate; its horns parallel, approximate. Furrows very narrow, linear. Costæ 8 in 0,01 mm. smooth, almost parallel. — *Nav. Guin.* BRUN. a. TEMP. D. de Japon p. 43 Pl. V f. 9.

Marine: Madagascar! Sumbava! Macassar Straits! Japan, fossil (Brun).

22. **D. Adonis** BRUN. (1889). — V. stout and panduriform. L. 0,1 to 0,125; B. 0,035 to 0,045; at the constr. 0,024 to 0,028 mm. Segments elliptical. Central nodule large, quadrate; its horns divergent. Furrows narrow linear. Costæ 5 in 0,01 mm. smooth, curved; strongly incrassate at the margin of the valve (or in certain focus alternating with a punctum). — *Nav. Adonis* BRUN a. TEMP. D. f. du Japon p. 41 Pl. V f. 3.

Marine: Mexilones! Iquique! Yedo, fossil (Brun).

Var. *gibbosa* BRUN (1889). — Segments deltoid. — *Nav. Adonis v. gibb.* BRUN l. c. f. 2.

Marine: Mexillones, Peru!

Var. *Ganymedes* CL. — L. 0,07 to 0,1; B. 0,025 to 0,03; at the constr. 0,017 to 0,022. Costæ 7 to 8 in 0,01 mm.

Marine: Peru (Mexillones! Iquique!) Madagascar (Kinker Coll.)!

Var. *Oamaruensis* CL. — L. 0,045 to 0,05; B. 0,015 to 0,018; at the constr. 0,01 to 0,012 mm. Costæ 9 in 0,01 mm. — *Nav. Apis* GROVE a. STURT. A. S. Atl. CLXXIV f. 13.

Marine: Oamaru, New Zealand, fossil!

D. Adonis comprises a series of forms from the small var. *Oamaruensis* to the large typical *D. Adonis*, which are doubtful as species, as they have very much the appearance of being corroded.

23. **D. lineata** DONK. (1858). — V. elliptical to linear-elliptical. L. 0,04 to 0,08; B. 0,019 to 0,032 mm. Central nodule quadrate; its horns convergent at the ends. Furrows rather narrow, smooth, or with one to two rows of puncta. Costæ 9 to 10 in 0,01 mm., crossed by a longitudinal line, smooth. — *Nav. lineata* DONK. T. M. S. VI p. 32 Pl. III f. 17. B. D. p. 8 Pl. I f. 8. A. S. N. S. D. Pl. I f. 16, 17. Atl. VII f. 44, LXIX f. 31; LXX f. 67. *Nav. adriatica* GRUN. Verh. 1860 p. 525 Pl. III f. 17.

Marine: North Sea (Coasts of Scandinavia and England)! Mediterranean Sea (Balearic Islands, Gulf of Naples)! Adriatic!

Forma pusilla CL. — L. 0,032; B. 0,014 mm. Costæ 11 in 0,01 mm.

Marine: Galapagos Islands!

24. **D. Vetula** A. S. (1875). — V. elliptical, very slightly constricted in the middle with broad rounded ends. L. 0,05; B. 0,024 mm. Central nodule broad, quadrate, its horns parallel. Furrows broadest in the middle, gradually tapering to the ends. Costæ 10 in 0,01 mm., crossed near the margin by a line. — *Nav. Vetula* A. S. Atl. XII f. 49.

Marine: Sansego (Atl.).

25. **D. Papula** A. S. (1875). — V. elliptical. L. 0,023; B. 0,01 to 0,011 mm. Central nodule small; its horns somewhat divergent. Furrows linear, narrow. Costæ about 13 in 0,01 mm. crossed by one longitudinal line. — *Nav. Papula* A. S. Atl. VII f. 45 to 47.

Marine: Samoa (Atl.) Campeachy Bay (Atl.).

26. **D. subcincta** A. S. (1874). — V. slightly constricted in the middle, with more or less distinctly cuneate ends. L. 0,06 to 0,092; B. 0,0235 to 0,025; at the constr. 0,02 to 0,022 mm. Central nodule large, quadrate; its horns parallel or convergent at the ends. Furrows moderately broad, narrowed at the ends, with faint traces of costæ. Costæ 6 to 7 in 0,01 mm., crossed by a longitudinal line. — *Nav. subcincta* A. S. N. S. D. Pl. II f. 7. Atl. XIII f. 41; LXIX f. 32. GRUN. D. Franz Josephs Land p. 56 (4) Pl. I f. 38, 39. *Nav. didyma* LAGST. Boh. D. f. 4 *a*.

Marine: Franz Josephs Land (Grun.), Kara! Finmark! North Sea! Balearic Islands! Adriatic! Madagascar! Monterey, Cal.! Fossil: Aegina (Atl.), Japan (Brun a. Temp.), Maryland (Deby Coll.)! St. Monica (Deby Coll.)!

27. **D. discrepans** A. S. (1875). — V elliptical. L. 0,03; B. 0,011 mm. Central nodule broad, quadrate, its horns divergent at their basis, convergent at the ends. Furrows broad. Costæ 11 in 0,01 mm., crossed by a longitudinal costa(?). — *Nav. discr.* A. S. Atl. VIII f. 8.

Marine: Campeachy Bank (Atl.).

Unknown to the author. The description is from the fig. in atlas and I am not sure if the longitudinal line across the costæ really be a costa.

28. **D. binaria** A. S. (1875). — V. slightly constricted, with broad, rounded ends. L. 0,042; B. 0,022; at the constr. 0,02 mm. Central nodule large, quadrate, its horns parallel, approximate. Furrows very broad, not dilated in the middle, with double longitudinal rows of puncta. Costæ 6 in 0,01 mm. crossed by a longitudinal costa. — *Nav. binaria* A. S. Atl. XII f. 62.

Marine: Java (Atl.).

29. **D. demta** A. S. (1881). — V. sligthly constricted. L. 0,116; B. 0,037; at the constr. 0,03 mm. Central nodule large, quadrate; its horns parallel. Furrows broad, linear. Costæ 6 in 0,01 mm. crossed by a broad longitudinal costa(?). — *Nav. demta* A. S. Atl. LXIX f. 34.

Marine, fossil: St. Monica, Cal. (Atl.).

Unknown to the author. The fig. in Atl. does not distinctly show if the longitudinal band is, as here accepted, a costa or a row of ocelli. In the latter case this form may probably be placed near *D. Pandura*.

30. **D. exemta** A. S. (1875). — V. panduriform, with tongue-shaped segments. L. 0,085 to 0,136; B. 0,032 to 0,042; at the constr. 0,026 to 0,03 mm. Central nodule quadrate, rather large; its horns parallel. Furrows linear. Costæ 5 in 0,01 mm., crossed by a longitudinal line, on the furrows faint or reduced to puncta. — *Nav. exemta* A. S. Atl. XI f. 28, 29.

Marine: Tamatave (Brun Coll.)! Tahiti! Kerguelens Land (Rae Coll.)! Campeachy Bay! Fossil: Oamaru, New Zealand! S:ta Monica (Deby Coll.)!

Var.? *crabroniformis* GRUN. (1875). — L. 0,083; B. 0,025; at the constr. 0,016. Costæ 6 in 0,01 mm. — *Nav. crabronif.* Atl. XI f. 24.

Marine: Gulf of Mexico (Atl.).

Var. *digrediens* CL. — L. 0,048 to 0,065; B. 0,022; at the constr. 0,01 to 0,014 mm. Horns somewhat divergent. Costæ 8 in 0,01 mm.

Marine: China (Thum.)! Hungary, fossil (Deby Coll.)!

31. **D. coarctata** A. S. (1875). — V. deeply constricted in the middle. L. 0,07 to 0,1; B. 0,026 to 0,035; at the constr. 0,0136 to 0,018 mm. Central nodule quadrate, with parallel horns. Furrows narrow, linear, with a row of large puncta. Costæ 3—4 in 0,01 mm., crossed by a longitudinal line. — *Nav. coarct.* A. S. Atl. XI f. 30, 31, 32, LXIX f. 11.

Marine: Campeachy Bay (Atl.), Cape Horn (Petit), Hungary, fossil (Pant.).

This is a very suspicious form. The figure recently published by A. SCHMIDT in Atl. (CLXXIV f. 22) has very much the appearance of being a strongly corroded specimen of *D. Crabro var.*, or of *D. Dirhombus*, if that form be anything but a small *D. Crabro*.

32. **D. bombiformis** Cl. N. Sp. — V. deeply constricted in the middle, with broad segments. L. 0,032; B. 0,014 mm. Central nodule small, its horns strongly divergent. Furrows narrow. Costæ 8 in 0,01 mm. crossed by a longitudinal line. — Pl. I f. 26.

Marine: Macassar Straits (Grove Coll.)!

This form may be a small variety of *D. Bombus*.

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33. **D. Clepsydra** Cl. N. Sp. — V. strongly constricted, with almost orbicular segments. L. 0,07; B. 0,032; at the constr. 0,016 mm. Central nodule large, quadrate; its horns divergent in the middle. Furrows narrowed in the middle and at the ends, crossed by faint costæ. Costæ 7 in 0,01 mm. strongly radiate, alternating with single rows of alveoli. — Pl. I f. 29.

Marine: Madagascar!

34. **D. Præstes** A. S. (1875). — V. elongated, slightly constricted, with narrow elliptical segments. L. 0,07 to 0,12; B. 0,019 to 0,025; at the constriction 0,015 to 0,017 mm. Central nodule small, quadrate; its horns parallel. Furrows linear, moderately narrow. Costæ almost parallel, 6 to 7 in 0,01 mm., alternating with rows of indistinct puncta. — *Nav. Præstes* A. S. Atl. XII f. 57, 58.

Marine: Gulf of Naples (Thum.)! Alexandria (Deby Coll.)! Red Sea (Deby Coll.)! Mazatlan (Atl.). Campeachy Bay (Atl.).

D. Præstes is nearly allied to *D. Guinardiana*, from which it differs by somewhat coarser costæ and the rows of alveoli alternating with the costæ. It seems to be very probable that *D. Guinardiana* is only a corroded *D. Præstes*.

35. **D. Entomon** (Ehb. 1844) A. S. — V. elongated, slightly constricted in the middle, with tongue-shaped segments. L. 0,072 to 0,15; B. 0,028 to 0,042; at the constr. 0,026 to 0,35 mm. Central nodule large, quadrate, its horns parallel. Furrows moderately wide, linear, forming a space of about a third of the width of the valve, often dilated around the central nodule. Costæ 6 to 8 in 0,01 mm. parallel, at the ends divergent, anastomosing with a few (1 to 4) longitudinal, irregularly undulating, more or less distinct, costæ. — *Dipl. Entomon* Ehb. Berl. Ber. 1844 accord to Chase. *Nav. Entomon* A. S. N. S. D. Pl. I f. 13, 14; Atl. XIII f. 48, 49. *Nav. bomboides var. media* Grun. A. D. p. 41 Pl. III f. 54. *Nav. bomboides* A. S. Atl. XIII f. 38.

Marine: Arctic America! Spitsbergen! Kara! Finmark! North Sea! Mediterranean Sea! Adria! Samoa! Sidney! China! Japan! Behrings Island! Mexillones, Peru (Deby Coll.)! Fossil: Brünn, Tegel! Bory, Hungary!

D. Entomon is not a sharply defined species, graduating as it seems into *D. splendida*, with which many of its varieties are closely connected.

36. **D. splendida** Greg. (1856). — V. elongated, panduriform. L. 0,055 to 0,22; B. 0,02 to 0,05; at the constr. 0,015 to 0,03 mm. Central nodule large, quadrate; its horns parallel. Furrows narrow, linear, not dilated around the central nodule. Transverse costæ 5 to 8 in 0,01 mm.; crossed on each side of the median line by 4 to 6, slightly curved or undulating longitudinal costæ. — *Nav. splendida* Greg. T. M. S. IV p. 44 Pl. V f. 14. V. H. S. Pl. IX f. 4. A. S. N. S. D. Pl. I f. 3, 4, Pl. II f. 2. Atl. XIII f. 31, 32, 34. *Nav. Entomon* Donk. B. D. p. 49 Pl. VII f. 5. *Nav. didyma var.* Greg. T. M. S. IV p. 45 Pl. V f. 16. *Nav. gemmatula* Cl. Quek. M. Cl. II (2) p. 167 Pl. XII f. 1 (1885). *Nav. Taschenbergeri* A. S. Atl. CLXXIV f. 9; 1892 (a large and coarse form). *N. margaritifera* Pant. III Pl. XXXV f. 494 (1893)?

Marine: Greenland! Spitsbergen! Beeren Eiland! Finmark! North Sea! Ceylon! Madagascar! Java! Sumatra! Port Jackson! Japan! Sandwich Islands (Atl.). West Indies! Florida! Fossil: Moravian Tegel! S:a Monica, Calif.!

Var. *Puella* A. S. (1875). — L. 0,0636 to 0,106; B. 0,0166 to 0,026; at the constrict. 0,0075 to 0,015 mm. Transverse costæ 6 to 9 in 0,01 mm.; longitudinal 2 to 3 on each side of the median line, less distinct. — *Nav. Puella* A. S. Atl. XII f. 13; LXIX f. 15. *Nav. exemta* A. S. N. S. D. p. 85. Pl. II f. 5 (1874). Atl. LXIX f. 13.

Marine: North Sea (A. S.); Sorrento (Atl.), Campeachy Bay (Atl.), California (Atl.).

Under the name *Nav. Puella* A. SCHMIDT seems to have confounded different forms. The figs. 14 and 15 Pl. XII probably do not represent the same form as the fig. 13. The fig. 13, which I regard as the most typical, is evidently a small variety of *D. splendida*. A. SCHMIDT seems also to have denoted two different species as *Nav. exemta*.

Var. *diplosticta* A. S. (1875). — With fine puncta above the reticulation of the costæ. — *Nav. diplosticta* A. S. Atl. XIII f. 25 to 30; LXIX f. 22, CLXXIV f. 10 (no punctation visible).

Marine: Campeachy Bay (Atl.), Gulf of Mexico (Atl.), Java, Samoa (Atl.), Cape Horn (Petit).

Var.? *Haynaldii* PANT. (1889). — V. slightly constricted. L. 0,091 to 0,15; B. 0,028 to 0,04; at the constr. 0,027 to 0,028 mm. Central nodule quadrate, with parallel horns. Furrows narrow, linear, with a row of puncta. Transverse costæ radiate at the ends, 8 to 10 in 0,01 mm., crossed on each side of the median line by about 8 longitudinal, slightly undulating costæ. — *Nav. Haynaldi* PANT. II p. 47 Pl. XXIV f. 361.

Marine: Hungary, Bory, fossil!

The fig. in PANTOCSECS work is not very clear. The above description is from specimens from Bory, which agree in all eventials with *D. splendida*, being only a little less constricted and having finer structure than usual.

Var.? *prominula* A. S. (1875). — V. strongly constricted. L. 0,042; B. 0,019; at the constr. 0,013 mm. Transverse costæ 8 in 0,01 mm., crossed by some few longitudinal costæ. — *Nav. prominula* A. S. Atl. XIII f. 15.

Marine: Kings Mill Island (Atl.).

This form requires a more accurate examination before its true place in the system can be determined.

Var.? *élesdiana* PANT. (1886). — L. 0,07 to 0,1; B. 0,026 to 0,03; at the constr. 0,02 to 0,028 mm. Segments tongue-shaped. Transverse costæ 8 in 0,01 mm.; longitudinal numerous, about 8 on each side of the median line. — *Nav. élesd.* PANT. I p. 42 Pl. XVII f. 152.

Marine: Hungary, fossil (Pant.). Baltjik, fossil! Russia, fossil (Deby).

Nav. Margarita A. S. (Atl. CLXXIV fig. 17) seems to be akin to var. *élesdiana*. I have not seen any form exactly resembling this, but I think it very probable, that the figured specimen would in another focus have very much the same appearance as some of the numerous varieties of *D. splendida*.

37. **D. bomboides** A. S. (1874). — V. panduriform, with subelliptical to tongue-shaped segments. L. 0,09 to 0,13; B. 0,04 to 0,055; at the constr. 0,03 to 0,035 mm. Central nodule strong, quadrate; its horns parallel. Furrows linear, somewhat dilated around the central nodule. Transverse costæ 6 to 7 in 0,01 mm, crossed by numerous slightly undulating, longitudinal costæ, about 6 in 0,01 mm. — *Nav. bomboides* A. S. N. S. D. Pl. I f. 2. Atl. XIII f. 36. V. H. Syn. Suppl. B f. 19. *Nav. didyma* W. SM. B. D. XVII f. 154 a*. *Nav. Williamsonii* V. H. Syn. Pl. IX f. 3.

Marine: North Sea! Alexandria (Deby Coll.)! Zanzibar (Atl.), Madagascar! Ceylon! Philippines! Sydney! China! Japan! Galapagos Islands! Campeachy Bay!

Var. *madagascarensis* CL. — V. short, slightly constricted, with broad, tongue-shaped segments. L. 0,04 to 0,085; B. 0,022 to 0,043; at the constr. 0,02 to 0,035 mm. Transverse costæ 7 to 9 in 0,01 mm., slightly radiate. Longitudinal costæ almost straight, curved outwards in the middle of the valve. — A. S. Atl. LXIX f. 35 (small form). — Pl. I f. 22.

Marine: Madagascar (Kinker a. Brun Coll.)! Cape Good Hope (Atl.)! Manilla (Deby Coll.)!

Forma minor Cl. — L. 0,03 to 0,045; B. 0,015 to 0,023; at the constr. 0,013 to 0,02 mm. Central nodule small. Transverse costæ 11 in 0,01 mm.; longitudinal 9 in 0,01 mm.

Marine: Tahiti! Madagascar!

The f. minor may be the same as *Nav. futilis* A. S. Atl. XIII f. 17 from Zanzibar, but the furrows are not drawn as dilated around the nodule.

Var. *moesta* A. S. 1881. — V. slightly constricted. L. 0,09; B. 0,034; at the constr. 0,029 mm. Transverse costæ 7 in 0,01 mm. — *Nav. moesta* A. S. Atl. LXIX f. 18, 19.

Marine, fossil: Baltjik (Atl.).

D. bomboides is very nearly akin to *D. splendida*, from which it differs only in the furrows which are slightly dilated around the nodule, a characteristic which seems to be variable. To judge from specimens from Bory Deposit in Hungary *Nav. andesitica* Pant. (1889, II p. 42 Pl. XXVII f. 390) seems to be somewhat corroded specimens of *D. bomboides* with rather closer costæ.

38. **D. divergens** A. S. (1875). — V. more or less constricted in the middle, with elliptical to tongue-shaped segments. L. 0,038 to 0,045; B. 0,018 to 0,02; at the constr. 0,012 to 0,013 mm. Central nodule small, quadrate; its horns divergent at the basis, convergent at the ends. Furrows linear, broader around the central nodule, forming a lanceolate space. Transverse costæ 11 in 0,01 mm., crossed on each side of the median line by about 5 longitudinal, slightly curved costæ. — *Nav. divergens* A. S. Atl. XII f. 50, 51.

Marine: Mediterranean Sea!

Var. *digrediens* A. S. (1881). — V. less constricted. L. 0,04; B. 0,019; at the constr. 0,017 mm. Transverse costæ 13 in 0,01 mm. Longitudinal costæ less distinct. — *Nav. digrediens* A. S. Atl. LXIX, f. 26, 27.

Marine: Tahiti! Baltjik, foss.!

39. **D. Schmidtii** Cl. N. Sp. — V. slightly constricted in the middle, with broad tongue-shaped segments. L. 0,027 to 0,075; B. 0,011 to 0,038; at the constr. 0,0105 to 0,027 mm. Central nodule small, quadrate; its horns divergent in the middle. Furrows broader in the middle, narrower at the ends, with faint traces of the costæ. Transverse costæ 8 to 9 in 0,01 mm. crossed on each side of the median line by 3 to 4 more or less undulating longitudinal costæ. — A. S. Atl. XII f. 48; LXIX f. 23 (small, but typical). XIII f. 18, 19. — Icon. n. Pl. I f. 20, 21.

Marine: Seychelles! Madagascar! Port Jackson! Tahiti! Galapagos Islands!

This form is nearly akin to *D. divergens*. The fig. 18, 19 Pl. XIII in A. S. Atl. greatly resembles larger specimens of *D. Schmidtii*, but has not divergent horns. *Nav. vana* A. S. Atl. LXIX f. 36 is probably also nearly related.

40. **D. chinensis** Cl. N. Sp. — V. slightly constricted, with broad, rounded ends. L. 0,055; B. 0,02; at the constr. 0,013 mm. Central nodule elongated, quadrate; its horns parallel. Furrows narrow, linear, not dilated in the middle. Costæ 13 in 0,01 mm., alternating with single rows of alveoli, about 16 in 0,01 mm. — Pl. I f. 25.

Marine: China (Thum).

41. **D. Grundleri** A. S. (1873). — V. deeply constricted, very convex. Segments semi-orbicular to broadly tongue-shaped, often of inequal size. L. 0,04; B. 0,02; at the constr. 0,01 mm. Central nodule quadrate, large, with divergent horns. Furrows narrow, broader in the middle. Transverse costæ 7 in 0,01 mm., crossed by 2 to 4 longitudinal costæ, usually interrupted in the middle of the valve. — *Nav. Grundl.* A. S. Zeitschr. f. ges. Naturw. 1873 p. 407 Pl. VI f. 5, 6. Atl. XII f. 35, 36.

Marine: Balearic Islands! Bab-el-Mandeb! Philppines! Atlantic coast of N. America! Para River (A. S.).

42. **D. didyma** Ehb. (1840). — V. slightly constricted in the middle, with tongue-shaped segments. L. 0,05 to 0,09; B. 0,017 to 0,036 mm. Central nodule moderately large, its horns not divergent. Furrows narrow, linear. Transverse costæ 8 to 10 in 0,01 mm., crossed by numerous, slightly undulating, longitudinal costæ. — *Pinnularia didyma* Ehb. Kreideth. p. 75. *Nav. didyma* W. Sm. B. D. XVII f. 154 a. A. S. Zeitschr. f. ges. Naturw. 1873 p. 405 Pl. VI f. 1. A. S. N. S. D. Pl. I f. 7. Atl. XIII f. 1, 2, 3. V. H. Syn. p. 90 Pl. IX f. 5, 6. Suppl. B. f. 20. *N. Bombus* Donk. Pl. VII f. 7 b, 8 b.

Brackish and marine: Greenland! Spitsbergen! Kara! Finmark! Baltic (from Westerbotten to Rügen), Caspian Sea (Grun.), Black Sea! Ceylon! Tahiti! Japan! Cape Horn (Petit), West Indies!

D. didyma is a variable species, related to the var. *elésdiana* of *D. splendida* and to certain forms of *D. Bombus*. The outline of the valve becomes less panduriform and almost elliptical as the water becomes less salt. The varieties in the northern part of the Bay of Bothnia where the water is almost fresh are almost elliptical and closely connected with *D. domblittensis*.

43. **D. Bombus** Ehb. (1844). — V. deeply constricted, with suborbicular or elliptical segments often of inequal size. L. 0,065 to 0,13; B. 0,022 to 0,045; at the constr. 0,012 to 0,025 mm. Central nodule large; its horns divergent in the middle, approximate at the ends. Furrows narrow, linear. Transverse costæ 5 to 8 in 0,01 mm. crossed by 2 to 5 curved, longitudinal costæ. Central alveoli distant from the margin. — *Dipl. Bombus* Ehb. Berl. 1844 p. 84 (accord. to Chase). M. G. Pl. XIX f 31. *Nav. Bombus* Greg. D. of Clyde p. 484 Pl. IX f. 12. Donk. B. D. p. 50 Pl. VII f. 7 a. V. H. Syn. p. 90 Suppl. B f. 22, A. S. Atl. LXIX f. 28, 29. *Nav. gemina* A. S. Zeitschr. f. ges. Naturw. 1873 p. 405 Pl. VI f. 2. N. S. D. Pl. I f. 1, II f. 1. Atl. XIII f. 4, 5, 6, 7, 8, 9. *Nav. abnormis* Castr. Chall. Exp. XXVIII f. 19.

Marine: Finmark! North Sea! Marocco! Mediterranean Sea! Adriatic! Black Sea! Caspian Sea (Grun.)! Madagascar! Java! Japan! Samoa! Galapagos Islands! Cape Horn (Petit), Brazil (Atl.), Florida! Campeachy Bay! Fossil: Aegina (Ehb., Atl.).

Var. *egena* A. S. (1875). — L. 0,038 to 0,047; B. 0,015 to 0,02; at the constr. 0,006 to 0,012 mm. Transverse costæ 8 to 9 in 0,01 mm. crossed on each side of the median line by about 3 longitudinal costæ. — *Nav. gemina v. egena* A. S. Atl. XIII f. 10.

Marine: Balearic Islands! Madagascar! Manilla! China! Japan!

Var. *densestriata* A. S. (1875). — L. 0,045 to 0,056; B. 0,018 to 0,026; at the constr. 0,011 to 0,015 mm. Costæ 8 to 9 in 0,01 mm. — *Nav. gemina v. densestr.* A. S. Atl. XIII f. 11, 12. *Nav. didyma* A. S. Atl. LXIX f. 30.

Marine: Marocco! Seychelles (Van Heurck Coll.)! California (Atl.).

Var. *bullata* Cl. — L. 0,15; B. 0,047 in 0,01 mm. Horns with a row of large puncta. Costæ 5 to 7 in 0,01 mm.

Marine: Adriatic! Red Sea (Deby Coll.)! California!

44. **D. Kützingii** Grun. (1860). — V. strongly constricted, with deltoid-elliptical segments. L. 0,063 to 0,15; B. 0,03 to 0,085; at the constr. 0,014 to 0,035 mm. Horns of the central nodule parallel. Transverse costæ 6 to 8 in 0,01 mm., crossed by numerous (8 to 10) longitudinal, almost straight or slightly undulating costæ. — *Nav. Kützingii* Grun. Verh. 1860 p. 532 Pl. III f. 15. A. S. Atl. XIII f. 22, 23, 24. Pant. I Pl. XXIX f. 299.

Marine: Balearic Islands! Gulf of Naples! Black Sea! Red Sea (Deby Coll.)! Cape of Good Hope! Bermuda (Rae Coll.)! Valparaiso (Atl.), Galapagos Islands! Fossil: Hungary (Pant.), Aegina (Atl.).

Var. *bullata* Cl. — Horns with a row of large puncta.

Marine: Gulf of Naples! Red Sea (Deby Coll.)!

D. Kützingii is very nearly akin to *D. Bombus var. densestriata*, but it is larger and the horns of the central nodule are parallel.

45. **D. chersonensis** GRUN. (1875). — V. panduriform, usually slender, with subelliptical segments. L. 0,055 to 0,15; B. 0,02 to 0,06; at the constr. 0,012 to 0,03 mm. Central nodule with parallel, approximate horns. Furrows very narrow, linear. Transverse costæ 8 to 13 in 0,01 mm., crossed by 2 to 5, not undulating, almost straight longitudinal costæ. — *Nav. cherson.* GRUN. A. S. Atl. XII f. 40, LXIX f. 21. *Nav Apis.* A. S. N. D. Pl. I f. 9. Atl. XII f. 18 to 23, 25.

Marine: North Sea! Mediterranean Sea! Zanzibar (Atl.), Ceylon! Philippines! China! Tahiti! Galapagos Islands! West Indies! Florida! Cape Horn (Petit). Fossil: S:ta Monica Calif.

This very widely distributed species is usually regarded as *Nav. Apis* of EHRENBERG. I am unable to make out what this name, as is the case with so many others of the names given by EHRENBERG, may denote. *Nav. Apis* of DONKIN (B. D. p. 48 Pl. VII f. 3) and of SCHMIDT (Atl. XII f. 16; LXIX f. 41, 43, 44) are unknown to me. Specimens from England in the collection of GROVE are identical with *D. incurvata. D. chersonensis* is nearly akin to *D. splendida*, intermediate forms being frequent. Such a form is the fig. 24 Pl. XII in A. S. Atl. and *Nav splendida var. arata* A. S. (Atl. XIII f. 13, 14, 16, 33, 35). To *D. chersonensis* belongs most likely *Nav Hantkenii* PANT. (II p. 46 Pl. VIII f. 150). On corroded specimens the longitudinal costæ are less distinct and the transverse more or less fragmentary. Such corroded specimens form Bruns *Nav. pedalis* (D. esp. nouvelles p. 36 Pl. XVI f. 10; 1891. A. S. Atl. CLXXIV f. 14, 15; 1892), original specimens of which I had an opportunity of examining.

46. **D. Weissflogii** A. S. (1873). — V. strongly constricted, with subelliptical segments. L. 0,033 to 0,11; B. 0.014 to 0,035; at the constr. 0,009 to 0,025 mm. Central nodule with approximate horns. Furrows not distinct from the other rows of alveoli. Transverse costæ 7 to 8 in 0,01 mm., crossed by numerous equidistant, straight, longitudinal costæ, curved outwards in the middle of the valve. On the middle of the valve the costæ are slightly divergent and not, or only close to the central nodule, crossed by longitudinal costæ. — *Nav. Weissflogii* A. S. Zeitschr. f. ges. Natur. 1873 p. 406 Pl. VI f. 3, 4. A. S. Atl. XII f. 26 to 32. V. H. Syn. p. 90 Suppl. B. f. 21. *Nav. diversa* GREV. Ed. N. Ph. J. XVIII p. 186 f. 14; 1863.?

Marine: Bab el mandeb! Madagascar! Ceylon! Singapore! Philippines! Samoa! Tahiti! Sandwich Islands (Atl.), Gulf of Mexico! Florida! North Carolina!

47. **D. areolata** CL. N. Sp. — V. moderately constricted, with subelliptical segments. L. 0,13; B. 0,045; at the constr. 0,028 mm. Central nodule large, its horns almost parallel. Furrows linear, with strongly marked transverse costæ. Transverse costæ 4, in 0,01 mm., crossed by a few, slightly curved longitudinal costæ, 3 in 0,01 mm., which are interrupted in the middle of the valve. The rectangular areolæ, formed by the two sets of costæ are large and have in their middle one or two ocelli. — Pl. I f. 28.

Marine: S:ta Monica, Calif., fossil (Deby Coll.)!

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48. **D. domblittensis** GRUN. (1882). — V. elliptical. L. 0,027 to 0,045; B. 0,015 to 0,022 mm. Central nodule large, quadrate. Furrows narrow, of equal breadth the whole length. Transverse costæ 10 in 0,01 mm. anastomosing and thus producing more or less regular longitudinal rows of elongated alveoli, about 7 in 0,01 mm. No fine punctation visible. — *Nav. expleta v. domb.* GRUN. Foss. D. Öster. Ung p. 156 Pl. XXX f. 60. *Nav. hilarula* PANT. III Pl. XV f. 230 (1893). *Dipl. domb.* Icon. n. Pl. II f. 2.

Fresh or slightly brackish water: Sweden, Lefrasjön in Skåne! Mälaren! Domblitton, foss.! Gulf of Bothnia! Common in the Baltic deposits of the Ancylus-epoch!

This form seems to be closely connected with *D. didyma*, of which it may be a non-constricted freshwater form. GRUNOW consideres it as connected with *D. notabilis.*

49. **D. elliptica** Kütz. (1844). — V. elliptical, with broad and rounded ends. L. 0,02 to 0,037; B. 0,011 to 0,02 mm. Central nodule of medium size quadrate. Furrows narrow, of the same breadth throughout. Transverse rows of puncta 10 to 13 in 0,01 mm. Alveoli 10 to 14 in 0,01 mm. forming irregular longitudinal rows. — *Nav. elliptica* Kütz. Bac. p. 98 Pl. XXX f. 55? V. H. Syn. Pl. X f. 10 (upper figure). A. S. Atl. VII f. 29, 32. *Nav. elliptica var. minor* Grun. Foss. D. Österr. Ung. p. 145. *Nav. ovalis* W. Sm. B. D. I p. 48 Pl. XVIII f. 153 *a*? *Nav. elliptica* W. Sm. B. D. II p. 93.

Fresh water: Iceland! Sweden! Finland! Germany! England! New Zealand! North America (New York)! Ecuador!

Var. *grandis* Grun. (1882). — L. 0,065 to 0,13; B. 0,033 to 0,045 mm. Transverse and longitudinal rows of alveoli 10 in 0,01 mm. — *Nav. ellipt. var. grandis* Grun., Foss. D. Österr. Ung. p. 145. *Nav. præclara* Pant. III Pl. XI f. 182 (1893).

Brackish water: Hungary, fossil!

Var. *ladogensis* Cl. (1891). — L. 0,06; B. 0,025 mm. Transverse costæ 9 in 0,01 mm. irregularly anastomosing with a few longitudinal undulating costæ. — Cl. D. of Finland p. 43 Pl. II f. 9.

Fresh water: Ladoga!

Var. *Ostracodarum* Pant. (1893). — V. elliptical, tapering from the middle to the ends. L. 0,045; B. 0,027 mm. Transverse rows of alveoli 6 in 0,01 mm. — *Nav. ostrac.* Pant. III Pl. IX f. 145.

Habitat:? Köpecz, Hungary, fossil (Pant.).

50. **D. Puella** (Schum. 1867?) Cl. — V. elliptical. L. 0,013 to 0,025; B. 0,008 to 0,014 mm. Central nodule large, quadrate. Furrows narrow, of the same breadth throughout. Costæ 12 to 18 in 0,01 mm. Alveoli indistinct. — *Nav. Puella* Schum. Preuss. D. II Nachtr. f. 39? *Nav. elliptica var. minutissima* V. H. Syn. p. 92 Pl. X f. 11.

Fresh water: Spitzbergen! Sweden! Finland! Berlin! Hungary, fossil (Grun.).

This species, differing only in its small size and indistinct alveoli, is closely connected by intermediate forms with *D. elliptica*. *Navicula Puella* A. S. is quite another form (see page 88).

51. **D. Boldtiana** Cl. (1891). — V. elongate-elliptical. L. 0,03; B. 0,0012 mm. Central nodule small, quadrate. Furrows of equal breadth throughout. Costæ 14 in 0,01 mm. No distinct alveoli. — Cl. D. of Finl. p. 43 Pl. II f. 12.

Fresh water: Finland!

52. **D. oculata** Bréb. (1854). — V. elongate-elliptical. L. 0,015 to 0,02; B. 0,006 to 0,007 mm. Central nodule small. Furrows very narrow. Costæ 23 in 0,01 mm. Alveoli very small. — *Nav. oculata* Bréb. in Desm. Crypt. N:o 110. Journ. Quek. M. Cl. 1870 f. 5. V. H. Syn. Pl. IX f. 10.

Fresh water: France.

53. **D. ovalis** Hilse (1861). — V. broadly elliptical, not constricted in the middle. L. 0,035 to 0,043; B. 0,02 to 0,026 mm. Central nodule very large, rounded. Furrows very narrow, closely following the central nodule and its horns. Transverse rows of alveoli 13 to 19 in 0,01 mm. radiate at the ends. Puncta 13 to 20 in 0,01 mm. forming irregular longitudinal rows. — *Pinnularia ovalis* Hilse in Rab. A. E. 1025. *Nav. ovalis* A. S. Atl. VII f. 33, 34, 35, 36. W. Sm. B. D. XVII f. 153 *a*? Cl. D. of Finland p. 44 Pl. II f. 13. *Nav. elliptica* A. S. Atl. VII f. 30. V. H. Syn. Pl. X f. 10 (lower fig.). *Nav. Carpathorum* Pant. III Pl. XVII f. 246 (1893)?

Fresh water: Sweden (Lapland, Gotland, Billingen)! Finland (Russian Lapland)! Norway (Dovre)! Saxony! Alps of Switzerland! Australia, Daintree River!

Var. *pumila* Grun. (1882). — L. 0,02 to 0,022; B. 0,008 to 0,085 mm. Rows of alveoli 16 to 18 in 0,01 mm. — *Nav. ovalis var. pum.* Grun. Foss. D. Österr. Ung. p. 150 Pl. XXX f. 61. *Nav. Parmula* Bréb. (according to Grunow).

Fresh water: Hungary, foss. (Grun.), Baku (Grun.).

Var. *oblongella* NÆGELI (1849). — V. linear elliptical. L. 0,02 to 0,038; B. 0,0065 to 0,01 mm. Rows of alveoli 13 to 19 in 0,51 mm. Puncta 20 to 25 in 0,01 mm. — *Nav. oblongella* NÆG. KÜTZ Sp. Alg. p. 890. V. H. Syn. Pl. X f. 12. *Nav. ovalis var. fossilis* PANT. II p. 51 Pl. VI f. 115 (1889)?

Fresh water: Iceland! Finland! Paris! Königsberg, fossil!

54. **D. notabilis** GREV. (1863). — V. elliptical. L. 0,025 to 0,08; B. 0,02 to 0,035 mm. Central nodule large, quadrate. Furrows linear, arcuate, moderately broad. Transverse costæ 7 to 10 in 0.01 mm. alternating with large, elongated alveoli, forming 4 to 5 longitudinal, undulating rows, more close towards the margins.

Forma genuina — Rows of alveoli one to three along the margin and one along the furrow. *Nav. notab.* GREV. T. M. S. XI p. 18 f. 9. A. S. Atl. VIII f. 46, 47, 48.

Forma expleta A. S. (1874). — Rows of alveoli filling the whole space between the furrow and the margins. — *N. notabilis var. expleta* A. S. N. S. D. I f. 20, II f. 11. Atl. VIII f. 49 to 52.

Marine: North Sea! Mediterranean Sea! Black Sea! Red Sea! Ceylon! Madagascar! Cape of Good Hope! Java! Labuan! Sandwich Islands! West Indies! Brazil!

55. **D. Græffii** GRUN. (1875). — V. elongated elliptical. L. 0,065 to 0,12; B. 0,025 to 0,042 mm. Central nodule small, rounded quadrate. Furrows broad, gradually narrowed from the middle and crossed by faint prolongations of the costæ. Costæ 7 to 8 in 0,01 mm., alternating with single rows of quadrate alveoli, 8 to 11 in 0,01 mm. and forming 7 to 8 longitudinal rows on each side of the furrows. — *Nav. Græffii* A. S. Atl. VII f. 5, 6.

Marine: Bab el mandeb! Seychelles! Madagascar! Manilla! Java! Sumbava! Labuan! Japan (Atl.), Samoa (Atl.), Tahiti!

Forma minor. — L. 0,06; B. 0,018 mm. — A. S. Atl. VIII f. 33.

Marine: Campeachy Bank (Atl.).

This species seems to be intermediata between *D. notabilis* and *D. fusca.*

56. **D. fusca** GREG. (1857). — V. elliptical or subrectangular, not constricted. L. 0,07 to 0,14; B. 0,038 to 0,075 mm. Central nodule moderately large, quadrate. Furrows broad, gradually tapering from the middle and crossed by faint prolongations of the costæ, frequently alternating with double rows of obliquely disposed puncta. Costæ 6 to 10 in 0,01 mm. alternating with rows of more or less quadrate alveoli, forming more or less regular, longitudinal rows, equidistant with, to twice as close as, the costæ.

Var. *Pelagi* A. S. (1875). — V. rhombic-elliptical. L. 0,055 to 0,066; B. 0,035 to 0,04 mm. Central nodule large, rounded quadrate. Furrows broad, semilanceolate, crossed by rows of alveoli. Costæ 7 in 0,01 mm. Alveoli 9 in 0,01 mm. forming longitudinal rows, parallel with the margins. — *Nav. Pelagi* A. S. Atl. VII f. 25, 26.

Marine: Campeachy Bay! Colon (Deby Coll.)! Tahiti!

Var. *nigricans* PANT. (1893). — V. narrow elliptical. L. 0,25; B. 0,07. Transverse and longitudinal rows of alveoli 6 in 0,01 mm. — *Nav. nigricans* PANT. III Pl. XL f. 552.

Marine: Bory, Hungary, fossil (Pant.).

Var. *pseudofusca* PANT. (1886). — V. nearly orbicular. L. 0,052 to 0,087; B. 0,037 to 0,066 mm. Costæ in the middle 9 at the ends 13 in 0,01 mm. Furrows forming a large rhomboid space. Longitudinal rows of alveoli about 10 in 0,01 mm. — *Nav. pseudofusca* PANT. I p. 28 Pl. XIII f. 109.

Marine: Hungary, fossil (Pant.).

Var. *norvegica* CL. — L. 0,085 to 0,01; B. 0,045 to 0,055 mm. Costæ and longitudinal rows of alveoli 10 in 0,01 mm. — *N. fusca* A. S. Atl. VII f. 2, 3.

Marine: North Sea! Hungary, fossil (Deby Coll.)!

Var. *subrectangularis* CL. — V. more or less rectangular. L. 0,85 to 0,13; B. 0,037 to 0,056 mm. Costæ and longitudinal rows of alveoli 8 in 0,01 mm. — *Nav. fusca* A. S. Atl. VII f. 4. *N. Smithii* DONK. B. D. p. 6 Pl. I f. 4.

Marine: North Sea! Balearic Islands! Sumatra (Deby Coll.)!

Var. *Gregorii* Cl. — V. elliptical to subrectangular. L. 0,17; B. 0,08 mm. Costæ and longitudinal rows of alveoli 7 in 0,01 mm. — *Nav. Smithii var. fusca* Greg. D. of Clyde IX f. 15.

Marine: North Sea! Gulf of Naples (Deby Coll.)!

Var. *delicata* A. S. (1874). — Elliptical. L. 0,07 to 0,13; B. 0,038 to 0,08 mm. Costæ 7 to 10 in 0,01 mm. Longitudinal rows of alveoli 10 to 15 in 0,01 mm. — *Nav. fusca var. delicata* A. S. N. S. D. I f. 26. Atl. VII f. 1, 7, 8.

Marine: North Sea (A. S.), Adriatic! Sumatra! Hungary, fossil (Deby Coll.)!

Var. *tenuipunctata* Cl. — V. elliptical. L. 0,07 to 0,14; B. 0,032 to 0,07 mm. Costæ 6 to 9 in 0,01 mm. Longitudinal rows of alveoli 12 to 18 in 0,01 mm. — *Nav. fusca* V. H. Syn. Suppl. B. f. 24.

Marine: Gulf of Naples! Sumatra (Deby Coll)! South Sea (Van Heurck Coll.)! Mexillones guano (Deby Coll.)!

Var. *Van Heurckii* Cl. — V. elongated, very slightly constricted. L. 0,08; B. 0,025 mm. Costæ 8 in 0,01 mm. Alveoli 20 in 0,01 mm. — Pl. I f. 19.

Marine: South Sea (Van Heurck Coll.)!

Var. *subfusca* Pant. (1893). — Narrow elliptical. L. 0,055; B. 0,017 mm. Transverse rows of alveoli 5, longitudinal 7 in 0,01 mm. — *Nav. subfusca* Pant.. III Pl. XL f. 553.

Habitat:? »Isopallaga-Serges» (Pant.).

Var. *oamaruensis* Cl. — V. narrow elliptical. L. 0,11; B. 0,03 mm. Central nodule elongated rounded. Furrows very broad, about a fourth of the breadth of the valve. Costæ 8 and longitudinal rows of puncta 16 in 0,01 mm. — Pl. II f. 3.

Marine: New Zealand, Oamaru, fossil!

Var. *japonica* Cl. — L. 0,11; B. 0,055 mm. Costæ 6 and longitudinal rows of alveoli 13 in 0,01 mm. Furrows separated from the other parts of the valve by a row of foramina and crossed by transverse single rows of large puncta. — Pl. I f. 23.

Marine: Sendaï, Japan, fossil (Tempère).

Nav. præflua Pant. (III Pl. XV f. 232) appears to be a form of *D. fusca*.

57. **D. æstiva** Donk. (1858). — V. elliptical. L. 0,037 to 0,065; B. 0,018 to 0,038 mm. Central nodule large, elongated. Furrows narrow of equal breadth throughout. Costæ 8 to 12 in 0,01 mm. Alveoli of equal or double number in 0,01 mm. — *Nav. æstiva* Donk. T. M. S. VI p. 32 Pl. III f. 18. B. D. p. 6 Pl. I f. 3. A. S. Atl. VII f. 8, 10, 11; VIII f. 26, 31.

Forma α. Costæ and alveoli of equal number.

Marine: Singapore (costæ and alveoli 9 in 0,01 mm.), Manilla (c. a. alv. 10 in 0,01 mm.), Colon (c. a. alv. 12 in 0,01 mm.) all in Deby Coll.!

Forma β. Alveoli twice as close as the costæ.

Marine: West coast of Sweden (L. 0,04 mm. Costæ 12 in 0,01 mm.), Sumatra (L, 0,06 mm. Costæ 8 in 0,01 mm. Deby Coll.)!

58. **D. litoralis** Donk. (1870). — V. elliptical. L. 0,027 to 0,07; B. 0,015 to 0,033 mm. Central nodule small, elongated, rounded rectangular. Furrows very narrow, parallel and close to the horns. Costæ 11 (typical) to 14 in 0,01 mm. Alveoli 22 (typical) to more in 0,01 mm., forming longitudinal rows. — *Nav. litoralis* Donk. B. D. p. 5 Pl. I f. 2. V. H. Syn. Suppl. B. f. 25. A. S. Atl. VIII f. 23 to 25. *Nav. litor. var. subtilis* A. S. N. S. D. Pl. I f. 24, 25. *Nav. Ovulum* Grun. Verh. 1860 p. 519 Pl. III f. 19?

Marine: Arctic America! Finmark! North Sea! Sea of Kara! Cape Deschneff! Adriatic! Java! Tahiti! Port Jackson! West Indies!

Var. *hospes* A. S. (1875). — V. subhexagonal. L. 0,05; B. 0,023 mm. Costæ 11, alveoli 13 in 0,01 mm. — *Nav. hospes* A. S. Atl. VIII f. 32.

Marine: Samoa (Atl.), Java!

59. **D. hyperborea** Grun. (1860). — V. elliptical. L. 0,1; B. 0,049 mm. Furrows abruptly bent around the large central nodule. Costæ 7 in 0,01 mm. — *Nav. hyperborea* Grun. Verh. 1860 p. 531 Pl. III f. 16. *Nav. propinqua* A. S. Atl. VII f. 13?

Marine: Bohuslän, Sweden (Grun.).

Var. *excisa* A. S. (1874). — V. slightly constricted in the middle. L. 0,09; B. 0,03 mm. Costæ 9 in 0,01 mm. — *Nav. fusca var. excisa* A. S. N. S. D. II f. 9.

Marine: North Sea (Atl.).

60. **D. vacillans** A. S. (1875). — V. elongated elliptical, constricted, or not constricted. L. 0,04 to 0,06; B. 0,014 to 0,016 mm. Furrows dilated in the middle, forming in the middle of the valve a lanceolate space. Costæ 9 to 14, alveoli 15 to 21 in 0,01 mm. Alveoli forming longitudinal rows parallel with the margins of the areas.

Forma α. V. constricted in the middle. — *Nav. vacillans* A. S. Atl. VIII f. 61; XII f. 42, 43, 52, 53.

Marine: Ceylon (Leuduger Fortm.) Rodriguez! Cape Good Hope (Atl.), Japan (Atl.), Samoa (Atl.), Sandwich Island (Atl.), Cape Horn (Petit), Campeachy Bank (Atl.), California (Atl.).

Forma β. V. not constricted in the middle. — A. S. Atl. VIII f. 34, 35, 36. — *Nav. parca var. producta* Pant. II p. 52 Pl. VIII f. 148 (1889).

Marine: North Sea (Atl.), Marocco! Balearic Islands! Macassar Straits! Colon (Deby Coll.)! Campeachy Bay (Atl.).

Var. *delicatula* Cl. — not constricted. Striæ 13 to 14 in 0,01 mm. — A. S. Atl. VIII f. 37.

Marine: Cape Good Hope (Atl.).

Var. *renitens* A. S. (1875). — V. strongly constricted. L. 0,05; B. 0,018 mm. Costæ 10 in 0,01 mm. — *Nav. vacill. v. renitens* A. S. Atl. XII f. 55.

Marine: Celebes (Atl.).

Var. *corsicana* Grun. (1878). — V. slightly constricted. L. 0,065; B. 0,022 mm. Costæ 8, alveoli 18 in 0,01 mm. — Cl. M. D. N:o 153.

Marine: Corsica! Seychelles (Van Heurck Coll.)! Campeachy Bay!

Var.? *minuta* Grun. (1880). — V. slightly constricted. L. 0,014 to 0,02; B. 0,0045 mm. Costæ about 16 in 0,01 mm.. — *Nav. vacillans f. minuta* (*N. Pfitzeriana* O. W.) V. H. Syn. p. 90 Pl. IX f. 9.

Marine: Belgium (V. H.).

61. **D. Parma** Cl. (1891). — V. broadly elliptical. L. 0,03; B. 0,02 mm. Central nodule moderately large, rounded quadrate. Furrows arcuate, equally bent, approximate to the horns. Costæ 14 in 0,01 mm. Alveoli 20 in 0,01 mm., forming longitudinal rows. — Cl. D. of Finland p. 43 Pl. II f. 10.

Fresh water: Sweden, Lake Rosslängen i Kalmar Län! Finland, Åbo, Viando!

Similar to *D. finnica* but only half the size and with costæ and alveoli twice as close.

62. **D. finnica** Ehb. (1838) Cl. — V. broadly elliptical. L. 0,05 to 0,055; B. 0,034 to 0,036 mm. Central nodule small, elongated. Furrows broad, with arcuate exterior margins enclosing a large, lanceolate space, about one third of the valve. Costæ 7 in 0,01 mm. Alveoli 12 in 0,01 mm. forming longitudinal or near the margin obliquely decussating rows. — *Coccon. finnica* Ehb. Inf. p. 194. M. G. XVII, 2 f. 19. *D. finnica* Cl. D. of Finland p. 43 Pl. II f. 11.

Fresh water: Sweden, Lake Roslängen! Degernäs in Westerbotten, fossil! Finland! U. States Albany, Maine, fossil! Crane Pond, fossil! Canada, fossil!

63. **D. microtatos** Pant. (1886). — V. orbicular. L. and B. 0,034 to 0,04 mm. Central nodule large, not sharply defined. Median line with distant central pores, and ending at a considerable distance from the margin. Furrows broad; their outer margins enclosing an elliptical

space, half as broad as the valve and crossed by somewhat radiate rows of alveoli. Rows of alveoli 8 in 0,01 mm. Alveoli 8 in 0,01 mm. — *Nav. microtatos* PANT. I p. 27 Pl. IX f. 80.

Marine: Szákol, Hungary, foss.! South Naparina, Trinidad, foss. (Deby Coll.)!

Var. *Christianii* T. C. — L. 0.045; B. 0,04 mm. Median rows of the alveoli at the margin alternately longer and shorter, 11 in 0,01 mm. — *Raphidodiscus Marylandica, Christianii and Febigerii* T. C. Microscope 1889, according to Wolle D. of N. Am. Pl. LXXXIV f. 1 to 4. Icon. n. Pl. II f. 1.

Marine: Cambridge, Maryland, fossil (Deby Coll.)!

64. **D. Smithii** BRÉB. (1856). — V. elliptical. L. 0,027 to 0,05; B. 0,015 to 0,035 mm. Central nodule small. Terminal nodules close to the ends. Furrows narrow, close to the horns. Costæ 7 to 11 in 0,11 mm. alternating with double rows of alveoli disposed in obliquely decussating lines, twice or more as close as the costæ. — *Nav. elliptica* W. SM. B. D. I p. 48 Pl. XVII f. 152 *a*. *N. Smithii* BRÉB. in W. SM. B. D. II p. 92. *N. Smithii v. borealis f. minor* GRUN. Franz Josephs Land D. Pl. I f. 41. *N. Smithii* A. S. Atl. VII f. 16, 17. N. S. D. I f. 19.? *N. Scutellum* V. H. Syn. Pl. IX f. 11.? *Nav. Smithii var. lævis* Dannf. Baltic D. p. 30 Pl. II f. 15.

Marine and brackish: Franz Josephs Land (Grun.), Spitzbergen! Sea of Kara! Finmark! Baltic! Gulf of Bothnia! North Sea! Mediterranean Sea! Madagascar! Seychelles! Tasmania! Java! New Zealand! Colon! Campeachy Bay!

Nav. Dóczyi (PANT. II p. 45 Pl. XIV f. 247, 1889) from Bremia in Hungary, seems to be a finely costate variety of *D. Smithii*. Its length is 0,052 and its breadth 0,017 mm. The costæ are 14 to 16,5 in 0,01 mm. and are described as indistinctly punctate.

65. **D. subovalis** CL. N. Sp. — V. elliptical. L. 0,38; B. 0,019 mm. Central nodule large, rounded. Furrows narrow, closely following the central nodule and its horns. Costæ 10 in 0,01 mm., alternating with double rows of alveoli, forming oblique lines, about 18 in 0,01 mm. — Pl. I f. 27.

Fresh water: New Zeeland, Paeroa.

This form resembles *D. ovalis* in its shape and large central nodule, but has the structure of *D. Smithii*.

66. **D. borealis** GRUN. (1884). — V. elongate-elliptical. L. 0,65 to 0,078; B. 0,025 to 0,0265 mm. Central nodule elongated. Furrows narrow, dilated around the central nodule and crossed by costæ, interrupted by a longitudinal band. Costæ 10 in 0,01 mm., alternating with rows of alveoli. forming oblique longitudinal lines, about 24 in 0,01 mm. — *Nav. Smithii var. borealis* GRUN. Franz Josephs Land D. p. 56 (4) Pl. I f. 40. *Nav. fusca* DONK. B. D. Pl. I f. 5.?

Marine: Franz Josephs Land (Grun.), Matotschin Sharr, Sea of Kara! Gullmarefjord! Java (var. L. 0,042; B. 0,017 mm. Costæ 8 puncta 17 in 0,01 mm.).

Var. *subconstricta* CL. — V. slightly constricted in the middle. L. 0,58; B. 0,02 mm. Costæ 10, alveoli 24 in 0,01 mm. Furrows narrow, the costæ not interrupted by a longitudinal band.

Marine: Campeachy Bay!

This form resembles *D. vacillans*, from which it differs by the alveoli forming oblique rows. The fig. 14 and 15 Pl. VII in A. S. Atl. seem to belong to *D. borealis*.

67. **D. major** CL. N. Sp. — V. elliptical. L. 0,07 to 0,17; B. 0,037 to 0,06 mm. Central nodule large, rounded quadrate. Terminal nodules distant from the ends. Furrows rather broad; their outer margins enclosing a space $^1/_4$ to $^1/_3$ as broad as the valve, crossed by costæ and double rows of alveoli. Costæ 5 to 7 in 0,01 mm. alternating with double rows of alveoli, 7 to 15 in 0,01 mm., forming oblique lines. — *Nav. Smithii* A. S. Atl. VII f. 19$_3$ (typical)! 22, 21, 18. V. H. Syn. Pl. IX f. 12. Suppl. Pl. B. f. 23.

Marine: North Sea! Marocco! Barcelona! Madagascar! Macassar Straits! Sumatra! China! Japan! Australia! S:ta Monica, Calif. fossil! Colon!

Var. *permagna* PANT. (1889). — V, elliptical, very large. L. 0,014 to 0,2; B. 0,075 mm. Costæ 4,5 to 5 in 0,01 mm. alternating with double rows of alveoli, about 9 in 0,01 mm. — *Nav. fusca var. permagna* PANT. II p. 46.

Marine: Bory, Hungary, fossil!

D. major is usually considered as a larger form of *D. Smithii*, with which it is intimately connected. Still I find it desirable to separate them, as the structure of *D. major* is much coarser.

68. **D. Platessa** CL. and GROVE. N. Sp. — V. broadly elliptical-lanceolate. L. 0,06; B. 0,045 mm. Central nodule rounded-quadrate. Furrows very broad, their outer margins enclosing a lanceolate space $^3/_4$ as broad as the valve and crossed by costæ. Costæ 7 to 8 in 0,01 mm., alternating with double rows of alveoli (16 in 0,01 mm.) forming obliquely decussating lines. — Pl. II f. 6.

Marine: Manilla (Deby Coll.)! Macassar Straits (Grove Coll.)!

69. **D. mirabilis** CASTR. (1886). — V. elliptical-orbicular. L. 0,065 to 0,09; B. 0,055 to 0,062 mm. Central nodule moderately large, quadrate. Furrows very broad, double, the outer margins of the exterior enclosing a broadly lanceolate space, about $^3/_4$ as broad as the valve. The interior furrows are crossed by costæ, the exterior of costæ, alternating with double rows of alveoli. Costæ 7 in 0,01 mm. alternating with double rows of alveoli 14 in 0,01 mm. forming obliquely decussating lines. — *Nav. mirabilis* CASTR. Voyage Challenger D. p. 34 Pl. XXX f. 10.

Marine: Madagascar (Brun Coll.)! Zebu (Castr.).

70. **D. Vespa** CL. N. Sp. — V. panduriform, with subrhomboid segments. L. 0,05; B. 0,012 at the constr. 0,06 mm. Central nodule small, its horns approximate. Furrows broad, of the same shape as the valve, crossed by costæ. Costæ 11 in 0,01 mm. alternating with double rows of small puncta, arranged in obliquely decussating rows. — Pl. II f. 5.

Marine: Java!

71. **D. nitescens** GREG. (1857). — V. elliptical-lanceolate. L. 0,05 to 0,09; B. 0,022 to 0,036 mm. Central nodule small, its horns not very distinct. Furrows wide. Their outer margins enclosing a lanceolate space, $^1/_2$ or more as broad as the valve, crossed by costæ, frequently alternating with double rows of alveoli Costæ 6 to 8 in 0,01 mm. alternating with single or near the margin double rows of alveoli, 14 to 16 in 0,01 mm. — *Nav. Smithii var. nitescens* GREG. D. of Clyde p. 487 Pl. IX f. 16. *Nav. nitescens* DONK. B. D. p. 8 Pl. I f. 7. A. S. Atl. VII f. 38 to 41, VIII f. 14 to 16. *Pinnularia arraniensis* O'M. M. J. VII p. 116 Pl. V. f. 6. *Nav. adriatica* GRUN. Verh. 1860 p. 525 Pl. III f. 17.

Marine: North Sea! Morocco! Adriatic! Sebastopol! Moravian Tegel (fossil)! Seychelles! Madagascar! Sumbava! Singapore! Australia! Sandwich Islands! S:ta Monica, fossil! Colon! Campeachy Bay!

Var. *fossilis* PANT. (1889). — L. 0,099; B. 0,041 mm. Costæ 7,5 to 8,5 in 0,01 mm. Alveoli not distinct. — *Nav. nitescens var. fossilis* PANT. II p. 51 Pl. IX f. 163.

Marine: Hungary, fossil (Pant.).

Var. *fuegiana* P. PETIT (1888). — L. 0,062; B. 0,0255 mm. Costæ 10 in 0,01 mm. — *Nav. nitescens var. fuegiana* PETIT Cape Horn D. p. 122 Pl. X f. 6.

Marine: Cape Horn.

Var. *serratula* GRUN. (1875). — V. lanceolate. L. 0,09; B. 0,021 mm. Central nodule small, rounded; its horns indistinct, very approximate to the median line. Furrows broad, forming a lanceolate space, crossed by faint costæ, alternating with double rows of indistinct alveoli. Costæ 6 in 0,01 mm. alternating with (single?) rows of alveoli, 11 in 0,01 mm. — *Nav. serrat.* A. S. Atl. VII f. 42, 43 VIII f. 11.

Marine: Campeachy Bay! Colon (Deby Coll.)!

D. nitescens is remarkable for the week development of the central nodule, the horns of which are scarcely distinct. In this respect it comes near to *D. inscripta* Cl. On corroded specimens the alveoli are indistinct.

72. **D. dalmatica** Grun. (1860). — V. slightly constricted, with cuneate segments. L. 0,058 to 0,062; B. 0,014 to 0,017; at the constr. 0,012 to 0,014 mm. Central nodule small, rounded elongated; its horns indistinct, close to the median line. Furrows narrow, not dilated in the middle, crossed by faint costæ. Costæ 8 in 0,01 mm., alternating with double rows of alveoli. — *Nav. dalm.* Grun. Verh. 1860 p. 525 Pl. III f. 14. A. S. Atl. VIII f. 58, 59. *N. Hornigii* Pant. III Pl. XVI f. 241 (1893)?

Marine: Morocco! Balearic Islands! Adriatic (Grun.), Bab el Mandeb! Macassar Straits! Campeachy Bay!

Var. *Vulpecula* A. S. (1875). — V. deeply constricted, with semilanceolate segments. L. 0,062; B. 0,017; at the constr. 0,012 mm. Central nodule small, its horns indistinct. Furrows linear, moderately broad, near the horns with traces of the costæ. Transverse costæ parallel, 8 in 0,01 mm., alternating with indistinct (double?) rows of puncta. — *Nav. Vulp.* A. S. Atl. XII f. 56.

Marine: Celebes (Atl.), Java!

73. **D. Mauleri** Brun. (1880). — V. elliptical. L. 0,037 to 0,05; B. 0,013 to 0,015 mm. Central nodule large, rounded; its horns indistinct, close to the median line. Furrows broad, forming a narrow elliptical space, half as wide as the valve, with two rows of large puncta. Costæ 7 in 0,01 mm. alternating with double rows of alveoli, 10 in 0,01 mm. — *Nav. Mauleri* Brun. D. des Alpes p. 77 Pl. I f. 18. D. espèces n. p. 35 Pl. XV f. 7.

Lacustrine: Lac Leman! Sahara (Brun), Bottom-mud from Vettern! Of frequent occurrence in the Baltic deposits of the Ancylus-epoch.

Var. *borussica* Cl. (1882). — L. 0,025 to 0,037; B. 0,011 to 0,012 mm. Costæ 7 to 8 in 0,01 mm. alternating, with (single?) rows of indistinct alveoli. — *Nav. borussica* Cl. Phys. Oek. Gesellsch. zu Königsberg XXII p. 139. — A. S. Atl. VIII f. 17, 19. *Nav. Mauleri* Pant. III Pl. VII f. 105; Pl. IX f. 150.

Slightly brackish water: Gulf of Bothnia at Nedre Kalix! Domblitton, Prussia fossil! Rammer Moor (Atl.).

74. **D. Debyi** Pant. (1886). — V. lanceolate, with obtuse ends. L. 0,1; B. 0,03 mm. Central nodule rounded quadrate; its horns slightly divergent in the middle, approximate. Furrows very broad, with a row of strong puncta (reduced costæ). Costæ slightly radiate, 4 in 0,01 mm., alternating with rows of alveoli. — *Nav. Debyi* Pant. I p. 23 Pl. XV f. 136.

Marine: Szákal, Hungary, fossil (Pant.).

Var. *elliptica* Cl. — V. narrow elliptical. L. 0,1; B. 0,035 mm. Furrows broad. Costæ 5 in 0,01 mm. continued across the furrows and alternating with double rows of small alveoli. — Pl. II f. 4.

Marine: Red Sea (Deby Coll.)!

75. **D. gemmata** Grev. (1859). — V. broad, linear, with rounded or cuneate ends and parallel or slightly concave margins. L. 0,085 to 0,24; B. 0,03 to 0,065 mm. Central nodule large, quadrate; its horns parallel, closely approximate to the median line. Furrows broad, linear, filling a third or less of the surface of the valve. Costæ 3 to 6 in 0,01 mm., alternating with double rows of twice as close alveoli. Along the horns of the central nodule is a row of short, but strong costæ.

Var. *fossilis* Pant. (1886). — V. slightly constricted in the middle. L. 0,16 to 0,24; B. 0,045 to 0,065 mm. Costæ 3 in 0,01 mm. — A. S. Atl. LXX f. 74. *Nav. gemmata var. fossilis* Pant. I p. 25 Pl. XX f. 181.

Marine, fossil: Hungary (Deby Coll.)! Moravian Tegel! Moron (Atl.).

Var. *typica* Cl. — V. not constricted. L. 0,085 to 0,19; B. 0,03 to 0,05 mm. Costæ 4 in 0,01 mm. — *Nav. gemmata* Grev. Ed. N. Ph. J. X July 1859 p. 30 Pl. IV f. 7. *Nav. gemmata var. biseriata* Grun. Novara 100 Pl. I *A* f. 16. *Nav. gemmata var. spectabilis* Grun. A. S. Atl. VIII f. 38? *Nav. Basilica* Brun. D. espèces n. p. 32 Pl. XV f. 14 (1891)? *Nav. pseudogemmata* Pant. III Pl. XXIX f. 420 (1893).

Marine: Gulf of Naples! Nossibé! South Sea (Van Heurck Coll.)! Galapagos Islands! Campeachy Bay! West Indies! Fossil: Hungary (Pant.), Moravian Tegel! Nankoori! Californian Guano (Grev.).

In the coll. of Prof. Brun I have seen a specimen from Sendaï, which agrees with his *Nav. Basilica* and is only a somewhat elliptical form of *D. gemmata*.

Var. *minor* Cl. — L. 0,09 to 0,16; B. 0,027 to 0,035 mm. Costæ 5 in 0,01 mm. — A. S. Atl. LXX f. 73.

Marine: Balearic Islands! Madagascar! Colon (Deby Coll.!), Jamaica (Atl.).

Var. *punctata* Cl. — L. 0,14; B. 0,045 mm. Costæ 5 in 0,01 mm. Furrows with transverse rows of large puncta. Costæ alternating at their interior ends with one or in the middle with two large ocelli.

Marine: S:n Pedro, Calif. (Kinker Coll.)!

Var. *spectabilis* Grun. (1860). — L. 0,062 to 0,17; B. 0,025 mm. Costæ 3 to 5 in 0,01 mm. continued across the furrows. — *Nav. spectabilis* Grun. Verh. 1860 p. 533 Pl. III f. 11. *Nav. Grunowii* Rabh. Fl. E. Alg. p. 203 (1864).

Marine: Adriatic (Grun.), Sumbava (Kinker Coll.)! Fossil: S:t Peter, Hungary.

Var. *oamaruensis* Cl. — V. slightly constricted. L. 0,16; B. 0,04 mm. Horns of the central nodule more distinct and distant. Furrows with faint markings of the costæ which become strong along the horns. Costæ 5 in 0,01 mm. alternating near the furrows with two large ocelli.

Marine: Oamaru, New Zeeland, fossil!

Var. *madagascarensis* Cl. — V. narrow, very slightly constricted. L. 0,13; B. 0,024 mm. Horns distinct and somewhat distant. Furrows with two longitudinal rows of puncta along the horns. Costæ 6 in 0,01 mm.

Marine: Tamatave (Kinker Coll.)!

Var. *pristiophora* Jan (1881). — V. distinctly constricted in the middle. L. 0,1 to 0,15; B. 0,025 to 0,036 mm. Costæ 5 to 6 in 0,01 mm. — *Nav. pristiophora* A. S. Atl. LXX f. 72.

Marine: Morocco! Porto Seguro (Deby Coll.)! Leton Bank (Atl.).

Forma minuta Cl. — L. 0,057; B. 0,015 mm. Costæ 7 in 0,01 mm.

Marine: Macassar Straits!

D. gemmata is very variable, and by the form madagascarensis nearly connected with *D. contigua*, which may perhaps be only corroded specimens of D. gemmata.

76. **D. Szontaghii,** Pant. (1886). — V. elliptic-linear, with broad, rounded ends. L. 0,03 to 0,06; B. 0,016 to 0,022 mm. Central nodule large, quadrate; its horns distinct and distant from the median line. Furrows narrow, linear, with a row of large puncta (spaces between the rudimentary costæ). Costæ 5 in 0,01 mm. alternating with double rows of twice as close alveoli (on corroded specimens alternating with single rows of larger puncta). — *Nav. Szont.* Pant. I p. 29 Pl. III f. 25. Pl. XXVIII f. 284. Icon. n. Pl. II f. 7.

Marine: Sumbava (Kinker Coll.)! Hungary, fossil!

77. **D. Campylodiscus** Grun. (1875). — V. suborbicular. L. 0,038 to 0,05; B. 0,026 to 0,03 mm. Central nodule large, quadrate, its horns strong, distant, and convergent in the middle. Furrows broad, with faint costæ. Costæ 4 in 0,01 mm. alternating with double rows of faint alveoli. — *Nav. suborbicularis var. Nankoorensis* Grun. Novara p. 100 Pl. I A. f. 15 (1867). *Nav. Campylod.* Grun. A. S. Atl. VIII f. 9, 10, 12, LXX f. 64, 65. *Cocconeis coelata* Walker Arn. M. J. II p. 234 Pl. X f. 5, 6 (1862)?

Marine: Bab el Mandeb! Seychelles! Madagascar! Philippines! Tahiti! Galapagos Islands! Mazatlan (Atl.), Cape Horn (Petit), Campeachy Bay (Atl.). Fossil: Nankoori (Grun.).

78. **D. Crabro** Ehb. (1844). — V. constricted or not. L. 0,04 to 0,2 mm.; B. 0,018 to 0,06 mm. Central nodule large, quadrate with parallel horns. Furrows narrow linear, with a row of large puncta. Lunulæ none or more or less large. Costæ 3 to 8 in 0,01 mm. alternating with double rows of alveoli outside of the lunulæ. Ocelli forming a marginal band, bent inwards toward the central nodule.

This species comprises a considerable number of forms, differing in size, number of costæ, breadth of lunulæ and in the amount, or absence, or constriction of the middle. The forms also present a very different appearance, according as they are uninjured or corroded. Having compared a very large number of different forms I am unable to make distinct species of them, all being more or less connected and differing only in characteristics, which are subject to great variation.

If only a few extreme forms be examined, it is easy to found on them apparently well defined species, but the greater the number of intermediate forms observed, the greater becomes the difficulty of finding any definite distinctions between them. There are all intermediate transitions from purely elliptical to strongly constricted forms, from forms with no lunulæ to others with broad lunulæ; as to the ocelli I am not yet convinced of their value as specific characteristic. In most forms they occur as a marginal band, but there are forms without them, either because they originally had none or because the ocelli have been destroyed in preparation.

I have distinguished the following forms, which diatomists, fond of speciesmaking, may consider as specifically distinct.

A. *Forms with no, or very narrow lunulæ.*

Var. *limitanea* A. S. (1875). — V. panduriform, with narrow elliptical segments. L. 0,08 to 0,11; B. 0,024 to 0,032, at the constriction 0,017 to 0,025 mm. Central nodule small, quadrate. Lunulæ very narrow. Costæ 6 to 7 in 0,01 mm. alternating with double rows of alveoli, about 14 in 0,01 mm. Ocelli forming a narrow band along the margin. — *Nav. lim.* A. S. Atl. XI f. 23, LXIX f. 14 (optime) (not f. 12).

Marine: Seychelles (Van Heurck Coll.)! Sumbava (Kinker Coll.)! Singapore! Java! China! Kerguelens Land! Fossil: Atlantic City N. Jers. (Deby Coll.)!

The fig. 23 in A. S. Atl. is not sufficiently characteristic, but the fig. 14 Pl. LXIX represents very well the form, which I understand to be *limitanea*. It differs from Var. *Pandura* by smaller size and closer costæ. Otherwise, there is, as far as I can see, no difference.

Var. *Pandura* Bréb. (1854). — V. constricted, with elongated, tongue-shaped segments. L. 0,106 to 0,212; B. 0,038 to 0,053; at the constriction 0,023 to 0,044 mm. Central nodule of median size. Lunulæ none. Costæ 4 to 5 in 0,01 mm. alternating with double rows of fine puncta about 10 in 0,01 mm. — *Nav. Pandura* Bréb. D. de Cherb. f. 4. A. S. N. S. D. Pl. II f. 3 (optime!) Atl. XI f. 1, 2, 9 (4, 8 corroded). V. H. Syn. Pl. IX f. 1. Truan and Witt D. von Jeremie Pl. IV f. 14 (corroded). *Pinnul. Pandura var. elongata* Greg. D. of Clyde Pl. IX f. 22. *Nav. Crabro* Donk. B. D. p 46 Pl. VII f. 1. *Nav. nitida* Greg. T. M. S. IV p. 44 Pl. V f. 12*. *Nav. Mantichora* Pant. III Pl. XXXV f. 490; 1893 (corroded).

Marine: North Sea! Mediterranean Sea! Adriatic! Red Sea! Madagascar! Sumbava! Society Islands! Galapagos Islands! Magellhaëns Strait! Bolivia! Campeachy Bay! West Indies!

As *Nav. navigans* Brun a form has been figured in A. S. Atl. CLXXIV f. 1, which seems to belong to Var. Pandura. The figure is too indistinct for identification. Perhaps fig. 3, *Nav. sideralis* A. S., may be the some form in a very corroded state.

Var. *expleta* A. S. (1881). — V. slightly constricted, with broad, tongue-shaped segments. L. 0,07 to 0,12; B. 0,032 to 0,033; at the constr. 0,027 to 0,03 mm. Costæ 5 in 0,01 mm. alter-

nating with double rows of somewhat coarse puncta (8 to 11 in 0,01 mm.). — *Nav. expleta* A. S. Atl. LXIX f. 7, 8.

Marine: Zanzibar! Celebes (Atl.), Society Islands!

This form differs from *var. Pandura* by its shorter, less constricted valves.

Var. *Didelta* Cl. — V. slightly constricted, with almost triangular segments. L. 0,085; B. 0,04; at the constriction 0,028 mm. Costæ 8 in 0,01 mm. — Pl. II f. 8.

Marine: Sumbava (Kinker Coll.)!

Var. *subelliptica* Cl. — V. elongated, not at all, or very slightly, constricted. L. 0,15; B. 0,052. Costæ 3 to 4 in 0,01 mm. alternating with double rows of coarse puncta, about 8 in 0,01 mm. — Pl. II f. 11.

Marine: South America, fossil! Macassar Straits (corroded form with 4 to 5 costæ in 0,01 mm. in Grove Coll.)! Galapagos Islands (perfectly elliptical form. L. 0,08; B. 0,04 mm. Costæ 5 in 0,01 mm. Ocelli not distinct).

Var.? *Pandurella* Cl. — V. strongly constricted with subelliptical segments. L. 0,038 to 0,075; B. 0,011 to 0,022; at the constriction 0,007 to 0,013 mm. Costæ 8 to 9 in 0,01 mm. alternating with double rows of puncta, about 20 in 0,01 mm. Rows of ocelli indistinct. — Pl. II f. 9.

Marine: Indian Ocean (Deby Coll.)! China! Galapagos Islands!

This form resembles in all respects the *var. Pandura*, but is much smaller and has closer costæ. As I have not seen any rows of ocelli I am doubtful whether this form is to be regarded as belonging to this group; nevertheless it is related to the *var. Pandura* as the *var. suspecta* to the *var. separabilis* and the *var. Dirhombus* to the *var. multicostata*.

B. *Forms with moderately vide lunulæ.*

Var. *separabilis* A. S. (1875). — V. gently constricted with elliptical segments. L. 0,08 to 0,16; B. 0,033 to 0,05; at the constriction 0,026 to 0,032 mm. Costæ 5 to 6 in 0,01 mm. Lunulæ narrow. — *Nav. Crabro* Grev. M. J. V. p. 7 Pl. III f. 11. *Nav. Grevillei* Donk. B. D. p. 47. *Nav. separabilis* A. S. Atl. XI f. 3, 5, 6, 7, 10, 17. — *N. Crabro var. Japonica* A. S. Atl. CLXXIV f. 4?

Marine: Pelew Island (Atl.), Singapore (Deby Coll.)! Puerto Caballo (Atl.), Campeachy Bay (Atl.), Trinidad (Grev.).

This form is intermediate between *var. Pandura* and *var. multicostata*.

Var. *hungarica* Cl. — V. elliptical, not constricted. L. 0,06; B. 0,03 mm. Row of ocelli marginal, not bent toward the central nodule. Costæ 5 in 0,01 mm. Lunulæ narrow. — Pl. II f. 10.

Marine: Szákal (Hungary, fossil)! Galapagos Islands!

Var. *gloriosa* Brun (1891). — V. slightly constricted, vith tongue-shaped segments. L. 0,11 to 0,2; B. 0,04 to 0,074: at the constriction 0,025 to 0,06 mm. Central nodule large. Lunulæ narrow. Costæ 3 to 3,5 in 0,01 mm. alternating with double rows of large puncta, about 8 in 0,01 mm. Ocelli usually indistinct. — *Nav. gloriosa* Brun D. esp. n. p. 34 Pl. XV f. 8.

Marine: Mexillones Bolivia! Hakodadi, Japan (Deby Coll.)!

This is the stoutest and most beautiful of all the forms of *D. Crabro*. The outline varies. Some specimens are deeply and abruptly constricted, others scarcely constricted. The ocelli are usually not distinct, but in some specimens easily seen. The breadth of the lunulæ is also variable.

Var.? *suspecta* A. S. (1875). — V. strongly constricted, with elliptical segments. L. 0,046 to 0,092; B. 0,012 to 0,03; at the constriction 0,006 to 0,016 mm. Costæ 5 in 0,01 mm. Ocelli not distinct. — *Nav. suspecta* A. S. Atl. XI f. 12, 13, 26, 27. *Nav. gloriosa var. inflata* Brun D. esp. n. p. 34 Pl. XV f. 12.

Marine: Manilla (Deby Coll.)! Singapore (Van Heurck Coll.)! Java! Japan (Atl.), Galapagos Islands! Mexillones, Bolivia (Brun Coll.)! Campeachy Bay (Atl.).

I have placed this form among the varieties of *D. Crabro*, only with hesitation, as I never observed on it the marginal row of ocelli, by which the other forms are characterized.

To this group of forms belongs probably *D. ornata* (*Nav. ornata* A. S. Atl. LXIX f. 5. *N. ornata spirifera* A. S. Atl. CLXXXIV f. 25) from S:ta Monica and Monterey in California. It is a large and beautiful form, of which only corroded specimens seem to be known. At least I have hitherto not seen any uninjured specimen.

C. *Forms with broad lunulæ.*

Var. *multicostata* Grun. (1860). — V. strongly constricted, with elliptical to rhomboid segments. L. 0,09 to 0,21; B. 0,03 to 0,06; at the constriction 0,018 mm. Lunulæ very broad. Costæ 4 to 5 in 0,01 mm. — *Nav. multicostata* Grun. Verh. 1860 p. 524 Pl. III f. 13. A. S. Atl. XI f. 14, 15, 16, 18, 19, 20, CLXXIV f. 6, 7. *Nav. Crabro* A. S. Atl. LXIX f. 1, 2. V. H. Syn. p. 83 Pl. IX f. 2. A. S. N. S. D. Pl. I f. 5, 6 II f. 4 (corroded). *Nav. crabro var. oranensis* Atl. LXIX f. 3 (corroded). *Nav. polita* Brun D. esp. n. p. 37 Pl XV f. 1 (corroded).

Marine: North Sea (Norway)! Mediterranean Sea! Red Sea! Madagascar! Ceylon! Labuan! Java! Samoa! Sandwich Islands (Atl.)! Galapagos Islands! Cape Horn (Petit)! West Indies! Fossil Hungary! Moravian Tegel! Oran (Atl.), Ægina (Atl.), Nankoori! S:ta Monica Cal.

Var. *nankoorensis* Grun. (1881). — V. less constricted, with cuneate ends. L. 0,12; B. 0,053; at the constriction 0,042 mm. Costæ 4,5 in 0,01 mm. — *Nav. Crabro var. nankoor.* A. S. Atl. LXIX f. 4 (corroded).

Marine: Nankoori, fossil (Atl.).

Var. *O'Meari* Grun. Ms. — V. elliptical, not constricted. L. 0,135; B. 0,058 mm. Lunulæ very broad. Costæ parallel, 4 in 0,01 mm. — Pl. II f. 12.

Marine: Macassar Straits (Grove Coll.)! Seychelles (Grun.), South Sea (Van Heurck Coll.)!

Grunow sent me several years ago a sketch of an elliptical Diploneis from Seychelles under the name of *Nav. O'Mearii*, which agrees in essential points with the form from Macassar Straits, having, as it has, very broad lunulæ, filling almost the whole valve. L. 0,09; B. 0,03 mm. Costæ 6 in 0,01 mm.

Var.? *Gibelii* A. S. (1874). — V. slightly constricted, with tongue-shaped segments. L. 0,09; B. 0,033; at the constriction 0,026 mm. Lunulæ broad, forming a biconstricted space. Costæ 4 in 0,01 mm. — *Nav. Gibelii* A. S. Probet. f. 13 Pl. XII f. 73.

Marine: Campeachy Bay (Atl.).

Var. *minuta* Cl. — L. 0,056; B. 0,024; at the constr. 0,016 mm. Costæ 6 in 0,01 mm. — A. S. Atl. XII f. 71.

Marine: Samoa (Atl.).

Var. *perpusilla* Cl. — L. 0,04; B. 0,018; at the constriction 0,012 mm. Costæ 8 in 0,01 mm. — A. S. Atl. XII f. 72.

Marine: North Sea (Atl.).

Var.? *confecta* A. S. (1875). — V. small. L. 0,04; B. 0,009; at the constriction 0,0075 mm. Lunulæ very large. Costæ 9 in 0,01 mm. — *Nav. confecta* A. S. Atl. XII f. 46.

Marine: Campeachy Bay (Atl.).

Var.? *Dirhombus* A. S. (1875). — V. strongly constricted, with subrhomboid segments. L. 0,076 to 0,13; B. 0,024 to 0,038; at the constriction 0,012 to 0,015 mm. Lunulæ large, lunate. Costæ 4 to 6 in 0,01 mm Ocelli not distinct. — *Nav. Dirh.* A. S. Atl. XI f. 21, 22; LXIX f. 9 (10 corroded).

Marine: Gulf of Mexico (Atl.), Pelew Island (Atl.).

The connection of this form with the others is not certain, as the figures in Atl. do not shew the marginal row of ocelli. It seems as if this form were to *var. multicostata* what *var. suspecta* is to *var. separabilis*. *Dipl. coarctata* may be a corroded *Dirhombus*, which however am unable to decide, not having had an opportunity of comparing specimens.

79. **D. biseriata** Cl. N. Sp. — V. elliptical or slightly constricted. L. 0,11 to 0,13; B. 0,047 to 0,06 mm. Central nodule large, quadrate, its horns almost parallel. Furrows linear,

narrow, with a row of large granules, formed by the continuation of the costæ. Costæ 3 to 4 in 0,01 mm. alternating with double rows of coarse puncta. Lunulæ none or narrow. Ocelli forming a marginal band, and, besides, a band along the furrows or lunulæ.

This species, which is intermediate between *D. Crabro* and *D. vagabunda*, differs from *D. Crabro* in nothing but the double rows of ocelli. The form of the valve is variable, usually elliptical, but in some specimens panduriform. The lunulæ are indistinct in some forms, narrow in others. It would be admissible to group the forms of this species together with the forms of *D. Crabro*. The *var. Kinkeriana* and *galapagensis* are analogous to the Pandura-series, the *var. lata* to the separabilis-series.

Var. *Galapagensis* Cl. — V. not constricted, elliptical. L. 0,12; B. 0,05 mm. Costæ 4 in 0,01 mm. alternating with double rows of coarse puncta. Lunulæ very narrow. Ocelli forming a marginal and an interior row. — Pl. II f. 16.

Marine: Galapagos Islands!

Var. *lata* Cl. — V. elliptical, not constricted. L. 0,11; B. 0,048 mm. Costæ 4 in 0,01 mm. Lunulæ moderately broad. — Pl. II f. 14.

Marine: Galapagos Islands!

The fig. 12 Pl. CLXXIV in A. S. Atl. represents doubtless a small, but strongly corroded form of *D. biseriata*.

80. **D. vagabunda** Brun (1892). — V. panduriform with tongue-shaped segments. L. 0,13 to 0,17; B. 0,06; at the constriction 0,043 mm. Central nodule large, quadrate; its horns nearly parallel. Furrows narrow, linear, with a row of large granules. Lunulæ very narrow or not distinct. Costæ 3 to 4 in 0,01 mm., alternating with double rows of coarse puncta. Ocelli forming a marginal band and several oblique or curved rows besides. — *Nav. vagabunda* Brun A. S. Atl. CLXXIV f. 5. *Dipl. vag.* Icon. n. Pl. II f. 13, 15.

Marine: Tamatave (Kinker Coll.)! Fossil: S:ta Monica, S:n Pedro (Kinker Coll.) Calif.!

D. vagabunda is a transitional form from *D. biseriata* to *D. gemmatula* (*var. Beyrichiana*).

81. **D. prisca** A. S. (1875). — V. slightly constricted, with tongue-shaped or cuneate, obtuse segments. L. 0.07 to 0,08; B. 0,029 to 0,03 mm., at the constriction 0,02 to 0,027 mm. Central nodule quadrate; its horns parallel and approximate. Furrows narrow, linear, with a row of large puncta. Transverse costæ 7 to 8 in 0,01 mm. alternating with double rows of puncta, about 16 in 0.01 mm. and ocelli, 4 to 5 in 0,01 mm. — *Nav. prisca* A. S. Atl. Pl. XII f. 66 to 68 (69?).

Marine: Nottingham (Maryland)! Atlantic City, N. Jers. (Grove Coll.), Richmond, Va! always fossil.

This species is very nearly akin to *D. gemmatula* from which it differs by the narrow furrows. The exterior stratum with small alternating puncta is usually preserved in *D. prisca*, but never found on *D. gemmatula*, which may be a consequence of the state of preservation and preparation.

82. **D. gemmatula** Grun. (1875). — V. slightly constricted, with tongue-shaped to broadly cuneate segments. L. 0,07 to 0,15; B. 0,033 to 0,062; at the constr. 0,027 to 0,05 mm. Central nodule large; its horns almost parallel. Furrows usually broad, and somewhat dilated in the middle, with a row of large puncta. Costæ 5 to 7 in 0,01 mm. alternating with rows of more or less numerous, large ocelli.

Var. *hungarica* Cl. — V. moderately constricted. L. 0,08; B. 0,025; at the constr. 0,018 mm. Ocelli forming one row along the margin and one along furrows.

Marine: Szákal, Hungary, fossil!

Akin to *Nav. expedita* A. S. (Atl. LXIX f. 6) from Moron.

Var. *Grunowii* Cl. — V. very slightly constricted, with broad tongue-shaped segments. L. 0,07 to 0,09; B. 0,033 to 0,039; at the constr. 0,03 to 0,037 mm. Furrows very broad. Costæ 5,5 to 7 in 0,01 mm. alternating with ocelli, forming some few more or less undulating, longitudinal rows. — *Nav. gemmatula* Grun. A. S. Atl. XIII f. 20, 21 (37, 40?). *Nav. lacrimans* A. S. Atl. XII f. 61.

Marine: Balearic Islands! Red Sea! Mauritius! Tamatave! Sumatra! Yokohama! Samoa! Campeachy Bay (Atl.). Fossil: Moravian Tegel! S:ta Monica, Calif. (Deby Coll.)!

Var. *lacrimans* A. S. (1875). — V. elongated, slightly constricted in the middle. L. 0,09 to 0,14; B. 0,031 to 0,045; at the constr. 0,025 to 0,04 mm. Furrows broad. Costæ 5 in 0,01 mm. Ocelli about 4 in 0,01 mm., forming longitudinal rows. — *Nav. lacrimans* A. S. Atl. XII f. 59, 60. *Nav. gemmatula* Cl. D. of Mor. Tegel Pl. XII f. 1. *Nav. lacr. var. fossilis* Pant. II p. 49 Pl. II f. 18. *Nav. Taschenbergeri* A. S. Atl. CLXXXIV f. 8 (1892).

Marine: Tamatave (Deby Coll.)! Campeachy Bay! Colon! Fossil: Szákal, Hungary! Moravian Tegel!

Var. *Beyrichiana* A. S. (1861). — V. slightly constricted, with cuneate ends. L. 0,09 to 0,144; B. 0,35 to 0,062; at the constr. 0,027 to 0,053 mm. Furrows of median breadth, distinctly dilated around the central nodule. Costæ 6 in 0,01 mm. alternating with rows of large ocelli (about 5 in 0,01 mm.). — *Nav. Beyrichiana* A. S. Atl. LXIX f. 16, 17.

Marine: Gulf of Naples! Madagascar! Java! China! Indian Ocean (Deby Coll.)! Cape Horn (Petit). Fossil: Hungary! Ægina (Atl.).

Forma minor Pant. (1886). — V. nearly elliptical. L. 0,069; B. 0,034 mm. Costæ and ocelli about 5,5 in 0,01 mm. — *Nav. Beyr. var. minor* Pant. I p. 23 Pl. III f. 31.

Marine: Hungary, fossil (Petit).

Var. *Moravica* Cl. — V. slightly constricted, with broad, cuneate ends. L. 0,16; B. 0,068; at the constr. 0,06 mm. Costæ 4 in 0,01 mm. Ocelli scattered, 2 to 3 in 0,01 mm.

Marine: Moravian Tegel (Deby Coll.)!

83. **D. lesinensis** Grun. Ms. — V. elongated, usually very slightly constricted, with broad, tongue-shaped segments. L. 0,072 to 0,22; B. 0,03 to 0,057; at the constr. 0,028 to 0,051 mm. Central nodule small, its horns parallel, approximate. Furrows narrow, linear, scarcely dilated in the middle, with a row of large puncta or rudiments of the costæ. Costæ 5 to 6 in 0,01 mm. alternating with rows of large and close ocelli (5 to 7 in 0,01 mm.) and double rows of small, sometimes little distinct, alveoli (about 12 to 18 in 0,01 mm.). — Pl. II f. 17, 18.

Marine: Balearic Islands! Gulf of Naples! Adriatic! Red Sea! Sumatra (Deby Coll.)! Philippines (Rae Coll.).

D. lesinenses has the form and appearance of a large *D. Entomon*.

Additional.

Navicula Budayana Pant. III Pl. IV f. 57 (1893) seems to belong to the varieties of *D. elliptica*.

Navicula elliptica var. fossilis Pant. III Pl. II f. 32 perhaps a small form of *D. Smithii*, which I am unable to decide as the minute structure is not visible on the figure.

Navicula pervasta Pant. III Pl. XXXVI f. 510 a large form, very similar to *D. major var. permagna*, but the alveoli are drawn as forming single rows.

Scoliopleura Grun. (1860).

Valve elongated, convex. Median line sigmoid. Central nodule small. Median line enclosed between two approximate longitudinal lines or ridges. Structure, fine puncta disposed in transverse and longitudinal rows. Connecting zone simple or without longitudinal divisions.

The genus Scoliopleura was founded 1860 by Grunow (Verh. p. 554) for Naviculæ with sigmoid median line, such as *Nav. Jenneri* and *Nav. convexa* W. Sm. (B. D.), with the bent of the lines of both valves in contrary directions. The genus comprises very different forms, so that I have separated from it forms without longitudinal ridges along the median line. *Sc. convexa* (or *latestriata*) differs from the other species by its structure, for which reason I have formed for it the genus *Scoliotropis*. With regard to the affinities, *Scoliopleura*, as defined above, appears to be distantly allied to *Caloneis*, and to *Diploneis*.

1. **S. Schneideri** Grun. (1878). — V. elliptic-lanceolate, subacute. L. 0,14; B. 0,04 mm. Median line slightly sigmoid. Median pores in opposite directions. Terminal nodules small. Transverse striæ 18 (14 according to Grun.) in 0,01 mm. oblique, distinctly punctate, puncta forming longitudinal, undulating rows, 14 (13 according to Grun.) in 0,01 mm. — *Nav. Schn.* Grun. Casp. Sea Alg. p. 16 Pl. III f. 1.

Brackish water: Caspian Sea!

This is a very remarkable form. The median transverse striæ form oblique lines across the valve, as in some forms of Neidium; at the ends they are almost parallel.

2. **S. Peisonis** Grun. (1860). — V. narrow, elliptical, with rounded ends. L. 0,035 to 0,08; B. 0,01 to 0,018 mm. Median line strongly sigmoid. Striæ 14 to 16 in 0,01 mm., transverse, distinctly punctate; puncta forming regular, longitudinal striæ, 18 in 0,01 mm. — Grun. Verh. 1860 p. 554 Pl. V f. 25. — Icon. N. Pl. I f. 14.

Brackish water: Neusiedler See, Hungary (Grun.), Salt Lake, Utah!

3. **S. elegans** Cl. N. Sp. — V. slightly sigmoid, lanceolate, gradually tapering from the middle to the somewhat obtuse ends. L. 0,15; B. 0,03 mm. Median line sigmoid at the ends; its central pores approximate; its terminal fissures in contrary directions. Longitudinal lines closely approximate to the median line. Central area indistinct. Transverse striæ 17, longitudinal 25 in 0,01 mm. — Pl. I f. 9.

Marine: Java!

Naviculæ Fusiformes Cl.

Valve narrow, linear to lanceolate, usually thin or slightly silicious. Median line with closely approximate central pores. Axial and central areas indistinct. Striæ parallel, usually fine, not crossed by longitudinal lines, finely punctate; puncta usually arranged in longitudinal, straight rows.

This small group comprises both marine and brackish forms, akin to *N. inornata* of the Section *Naviculæ entoleiæ*, which also has approximate central pores. On the other hand this group is also allied to the Section *Naviculæ orthostichæ*.

Artificial key.

1. { Valve attenuated towards the ends, narrow lanceolate . . . . . 2.
   { — linear, with broad ends . . . . . 5.

2. { Ends subcapitate . . . . . *N. nuda* Pant.
   — acute . . . . . 3.

3. { Striæ about 12 in 0,01 mm. . . . . *N. lucida* Pant.
   — — 17 — . . . . . *N. Schmidtii* Lagst.
   — — 24 — . . . . . *N. Acus* Cl.
   — — 30 — . . . . . 4.

4. { Longitudinal striæ closer than the transverse . . . . . *N. fusiformis* Grun.
   — — more distant . . . . . *N. Frauenfeldii* Grun.

5. { Ends rostrate . . . . . *N. crassirostris* Grun.
   — obtuse or truncate . . . . . 6.

6. { Terminal fissures in contrary directions . . . . . 7.
   — — indistinct . . . . . *N. Lineola* Grun.

7. { Striæ all parallel . . . . . *N. parallelistriata* Pant.
   Median striæ radiate . . . . . *N heteroflexa* Pant.

1. **N. fusiformis** Grun. (1877). — V. narrow, lanceolate, gradually tapering from the middle to the acute ends. L. 0.115 to 0,15; B. 0,01 mm. Central pores very approximate. Striæ transverse, 33 in 0,01 mm., longitudinal 36 in 0,01 mm. — *Berkeleya Fusidium* Grun. Hedw. 1867 p. 17. *Amphipleura danica* Kütz Bac. p. 103 Pl. XXX f. 38 (1844)? *N. fus.* Grun. M. J. 1877 p. 178 Pl. CXCV f. 11.

Marine: Honduras (Grun.).

Var. *ostrearia* Gaillon (1820). — L. 0,063 to 0,073; B. 0,006 to 0,007 mm. Striæ transverse 36 in 0,01 mm. — *Vibrio ostrearius* Gaillon (accord. to Grun.). — *Nav. ostrearia* Turp. Dict. d'hist. nat. II Pl. I f. 2 (accord. to Grun.). *N. fusif. v. ostrearia* Grun. M. M. J. 1877 p. 178 Pl. CXCV f. 12. V. H. Syn. Pl. XIV f. 33.

Marine: North Sea (West coast of Sweden)! Loire infér. (Grun.), Marseille (Grun.), Triest (Grun.).

This species lives on oyster-beds and according to Bornet the oysters become greenish by feeding on this diatom. Living frustules have two chromatophore-plates along the connecting zone. The cell-sap has, especially towards the ends, a peculiar blue colour.

2. **N. Frauenfeldii** Grun. (1863). — V. lanceolate. L. 0,1 to 0,16; B. 0,019 to 0,025 mm. Central pores very approximate. Transverse striæ 29 in 0,01 mm., longitudinal more distant. — *Amphipleura Frauenfeldii* Grun. Verh. 1863 p. 144 Pl. V f. 3. *N. Frauenf.* Grun. M. M. J. 1877 p. 179.

Marine: Indian Ocean (Grun.).

3. **N. nuda** Pant. (1889). — V. narrow, lanceolate, with subcapitate ends. L. 0,037; B. 0,007 mm. Striæ not observed. — Pant. II p. 51 Pl. VI f. 108.

Brackish water: Hungary, fossil (Pant.).

This species is unknown to me and the description and figure are not sufficient for diagnosis.

4. **N. Acus** Cl. N. Sp. — V. narrow, lanceolate, acute. L. 0,09; B. 0,009 mm. Central pores approximate. Terminal fissures elongated. Axial and central areas indistinct. Striæ 24 to 25 in 0,01 mm., equidistant, in the middle slightly radiate, elsewhere transverse, or nearly so — Pl. III f. 29, 30.

Marine: Balearic Islands!

As *N. Acus* Cl. 1880 (A. D.) is the same as *N. inornata* Grun. the name Acus may be used for this form, which differs from *N. fusoides* Grun. (1880) by the absence of longitudinal lines and by its indistinct area.

5. **N. Schmidtii** Lagst. (1876). — V. narrow, lanceolate, with somewhat obtuse ends. L. 0,06 to 0,074; B. 0,009 to 0,011 mm. Central pores approximate. Striæ about 17 in 0,01 mm., transverse. — N. (without name) A. S. N. S. D. Pl. III f. 7, 8 (1874). *N. Schm.* Ldt. Boh. D. p. 45.

Marine: Bohuslän (Ldt).

I do not know this species, which seems doubtful. The fig. in A. S. is not sufficient, and the description of Lagerstedt may belong to some form of *Nav.* (Schizonema) *ramosissima*. The

fig. 7 in A. S. shews two longitudinal lines crossing the striæ on each side of the median line, which suggests some affinity to Caloneis, if this character is not due to an optical illusion.

6. **N. lucida** PANT. (1893). — V. narrow, lanceolate, subacute. L. 0,2; B. 0,022 mm. Axial area very narrow, not dilated in the middle. Transverse striæ 12 in 0,01 mm. almost parallel throughout. — PANT. III Pl. XVIII f. 264.

Habitat? »Bodas» fossil (Pant.).

Under the name *N. inculta* Pantocsek figures (III Pl. XIV f. 216) a similar, but smaller and more finely striate form, with subrostrate ends.

7. **N. parallelistriata** PANT. (1889). — V. linear, attenuated towards the broad, obtuse ends. L. 0,069; B. 0,017 mm. Central pores approximate, terminal in contrary directions. Axial area linear, narrow. Striæ 17,5 in 0,01 mm. parallel. — PANT. II p. 52 Pl. II f. 26.

Brackish water: Hungary, fossil (Pant.).

8. **N. heteroflexa** PANT. (1889). — V. linear-lanceolate, with broad, rounded ends. L. 0,074 to 0,11; B. 0,011 to 0,013 mm. Median pores approximate; terminal in contrary directions. Axial area very narrow, linear. Striæ 22 (28 accord. to Pant.) in 0,01 mm. (the median shorter than the others) radiate in the middle, parallel towards the ends. — PANT. II p. 47 Pl. II f. 34.

Brackish water: Hungary, fossil!

Var. *constricta* PANT. (1889). — V. slightly constricted in the middle, with cuneate ends. L. 0,05 to 0,06; B. 0,011 to 0,012 mm. Striæ 25 to 30 in 0,01 mm. — PANT. Pl. II f. 27, 33.

Brackish water: Hungary, fossil (Pant.).

Var. *minor* PANT. (1889). — V. linear-lanceolate. L. 0,048; B. 0,0095 mm. Striæ 22 to 25 in 0,01 mm. — PANT. II Pl. IX f. 162.

Brackish water: Hungary, fossil (Pant.).

This species is one of the most remarkable Naviculæ. Although in some respects divergent from the rest of this group, especially by its radiate median striæ, I have placed it here, as it seems to be more akin to N. parallelistriata than to any other species.

9. **N. crassirostris** GRUN. (1880). — V. linear, with prolonged, rostrate and obtuse ends. L. 0,048; B. 0,0073 mm. Median line with approximate central pores. Areas indistinct. Striæ transverse, 27 in 0,01 mm. — GRUN. A. D. p. 45 Pl. III f. 57.

Brackish water: Kara (Grun.).

Var. *Maasöensis* GRUN. (1880). — More elongated and with narrower ends. Striæ about 25 in 0,01 mm. — GRUN. A. D. p. 46.

Marine: Finmark (Grun.).

10. **N. Lineola** GRUN. — (1884). — V. linear with rounded ends. L. 0,016 to 0,051; B. 0,0025 to 0,003 mm. Central pores approximate. Striæ extremely fine(?) — GRUN. Franz Jos. Land D. p. 104 (52) Pl. I f. 45, 46.

Marine: Franz Josephs Land (Grun.).

Var. *perlepida* GRUN. (1884). — V. with somewhat constricted ends. L. 0,02 to 0,034; B. 0,002 to 0,0033 mm. — *N. perlepida* GRUN. Franz Jos. Land, D. p. 104 (52) Pl. I f. 44.

Marine: Franz Josephs Land (Grun.).

Naviculæ Orthostichæ CL.

Valve usually elongated, lanceolate to linear. Median line with small or elongated central nodule, sometimes transversely dilated into a stauros, and with small or indistinct terminal fissures.

Central pores of the median line approximate. Structure: small puncta arranged in parallel, transverse and longitudinal rows, crossing each other at a right angle. Axial and central areas small or indistinct. Connecting zone not complex.

This group is closely related to the Section Fusiformes, by the approximate central pores and the structure of the valve, but the longitudinal striæ of the valve are less distinct in Fusiformes. Some forms of Orthostichæ seem to be connected with *Gyrosigma*. The smaller forms of this section, *Nav. gregaria* to *N. microrhynchus*, have no distinct longitudinal striæ, but have been placed here, as they seem to be connected with *Nav. halophila*. On the other hand they appear to come near to *Nav. cryptocephala* of the section Lineolatæ. Some species have transversely dilated central nodules, and have been considered as belonging to the genus *Stauroneis*, but there is very little resemblance between there forms and the true *Stauroneis* (division of *Microstigmaticæ*), in the structure of the valve, which is the same as in other orthostichæ.

Artificial key.

1.	Central nodule dilated into a stauros	11.
	— — not — —	2.
2.	Longitudinal striæ indistinct	3.
	— — distinct	6.
3.	Striæ uninterrupted in the middle	4.
	— interrupted	5.
4.	Ends acute	*N. microrhynchus* Grun.
	— rostrate to capitate	*N. gregaria* Donk.
5.	Striæ crossed by a longitudinal depression	*N. Wankaremæ* Cl.
	— not — — —	*N. Kryokonites* Cl.
6.	Terminal striæ convergent	*N. holophila* Grun.
	— — not —	7.
7.	Valve broadly linear, with broad ends	*N. portomontana* Cl.
	— linear or lanceolate, narrowed towards the end	8.
8.	Transverse striæ more distant than the longitudinal	*N. cuspidata* Kütz.
	— — closer — — —	*N. Perrottetii* Grun.
	— — equidistant with —	9.
9.	Ends acute	*N. vitrea* Cl.
	— rounded	10.
10.	Striæ 15 in 0,01 mm.	*N. Kjellmanii* Cl.
	— closer —	*N. O'Mearii* Grun.
11.	Stauros short	*N. balearica* Cl.
	— reaching half-way to the margin	*N. quarnerensis* Grun.
	— pervious — — —	12.
12.	Valve rhombic-lanceolate	*N. Stodderi* Greenl.
	— linear or linear-lanceolate	13.
13.	Longitudinal striæ more distant than the transverse	*N. sulcata* Cl.
	— — closer — — —	14.
14.	Transverse striæ 12 in 0,01 mm.	*N. crucigera* W. Sm.
	— — about 26 in 0,01 mm.	*N. Spicula* Hickie.

1. **N. gregaria** Donk. (1861). — V. lanceolate, with rostrate-capitate ends. L. 0,015 to 0,035; B. 0,005 to 0,009 mm. Transverse striæ 16 to 22 in 0,01 mm. Longitudinal striæ indistinct. — Donk. M. J. I p. 10 Pl. I f. 10. B. D. p. 43 Pl. VI f. 13. V. H. Syn. p. 85 Pl. VIII f. 12—15. *Nav. cryptocephala* W. Sm. B. D. Pl. XVII f. 155. Pedicino Ischia II f. 9—11. *Nav. lanceolata* W. Sm. B. D. p. 46 Pl. XXXI f. 272? *Nav. veneta* Schum. P. D. II N. Pl. II f. 30. *Nav. Granum Avenæ* Schum. P. D. N. II p. 56 Pl. II f. 36 (1867)?

Brackish water: Sweden (Bohuslän)! England! Saxony (Salines Dürrenberg)! Belgium (V. H.) France! South Africa! Argentina!

Var. *thurholmensis* DANNF. (1882). — V. lanceolate, with more distinctly capitate ends. L. 0,02; B. 0,005 mm. Striæ 26 in 0,01 mm. — *Nav. thurholmensis* DANNF. Balt. D. p. 27 Pl. I f. 11. *N. lævis* PANT. II p. 50 Pl. XXV f. 366?

Brackish water: Bay of Finland (Dannf.).

N. gregaria connects *N. cryptocephala* of the section Lineolatæ with *N. halophila*, so that it might perhaps have been placed as well there as here. Its parallel striæ seem however to indicate a closer relation to *N. halophila*.

2. **N. Wankaremæ** CL. (1883). — V. narrow, lanceolate, with obtuse, prolonged ends. L. 0,035; B. 0,007 mm. Median line with approximate median pores. Axial area indistinct. Central area a broad, transverse fascia. Striæ parallel, about 30 in 0,01 mm., obsolete between the margin and the median line. Longitudinal striæ not seen. — *N. Kryokonites? var. Wankaremæ* CL. Vega p. 473 Pl. XXXVII, f. 47.

Marine: Cape Wankarema, North Siberian Sea!

The accurate place in the system, which this form occupies, is difficult to decide. I have placed it here, at it seems to be nearest akin to *N. gregaria*.

3. **N. Kryokonites** CL. (1883). — V. lanceolate, obtuse. L. 0,084; B. 0,011 mm. Central area a transverse, broad fascia. Striæ 22 in 0,01 mm. — CL. Vega p. 473 Pl. XXXVII f. 44.

Marine: Cape Wankarema!

Var. *subprotracta* CL. (1883). — V. rhombic-lanceolate, with subcapitate ends. L. 0,033; B. 0,007 mm. Striæ 22 in 0,01 mm. — CL. Vega l. c. f. 46.

Marine: Cape Wankarema!

Var. *semiperfecta* CL. (1883). — V. rhombic-lanceolate. L. 0,028; B. 0,008 mm. Central area a unilateral fascia. — CL. Vega l. c. f. 45.

Marine: Cape Wankarema!

4. **N. microrhynchus** GRUN. (1882). — V. narrow lanceolate, with acute, prolonged ends. L. 0,024; B. 0,004 mm. Median pores approximate. Striæ 16 (middle) to 17 (ends) finely punctate. — GRUN. Foss. D. Öst. Ung. p. 149 Pl. XXX f. 46.

Slightly brackish water: Hungary, fossil (Grun.).

N. microrhynchus is according to Grunow related to *N. Bulnheimii*, which I have placed among the Microstigmaticæ because of its wider central striæ and its, (somewhat indistinct) complex, connecting zone. *N. microrhynchus* PANT. (II p. 51 Pl. III f. 38; Pl. VIII f. 145, 1889) is, if the figures in Pantocsek's work be accurate, not the species of Grunow, which has no axial area.

5. **N. halophila** GRUN. (1881). — V. rhombic-lanceolate, subacute. L. 0.05; B. 0,01 to 0,012 mm. Striæ 19 to 20 (16 according to V. H. Syn.) in 0,01 mm. convergent at the ends, elsewhere parallel. Longitudinal striæ fine. — *N. cuspidata var. haloph.* GRUN. in V. H. Syn. p. 100 Suppl. Pl. B. f. 30. *N. protracta forma minor* PANT. III Pl. XX f. 301 (1893)?

Brackish water: Sweden, Sturkö in Blekinge! England, Hull! Belgium (V. H.) Saxony (Mansfelderseen)! France, Medoc!

6. **N. cuspidata** KÜTZ. (1834). — V. rhombic-lanceolate, with acute ends. L. 0,07 to 0,15; B. 0,017 to 0,03 mm. Transverse striæ 14 to 19, longitudinal 26 in 0,01 mm. — *Bacillaria fulva* NITSZCH. p. p. 1817 (according to Kütz.). *N. fulva* DONK. B. D. Pl. VI f. 9? *Frustulia cuspidata* KÜTZ. Syn. Pl. II f. 26. *Nav. cuspidata* KÜTZ. Bac. p. 94 Pl. III f. 24, 37. W. SM. B. D. I p. 47 Pl. XVI f. 131. DONK. B. D. p. 39 Pl. VI f. 6. GRUN. Banka D. Pl. II f. 16. Fresenius Senckenb. Abh. IV Pl. IV f. 18. Ströse Klicken f. 22. V. H. Syn. p. 100 Pl. XII f. 4. *Nav. Reinickeana* RABH. Alg. Sachs. N:o 802 (1859). *Vanheurckia cuspidata* BRÉB. Ann. Soc. phyto. et microgr. de Belgique Vol. I p. 205 (1868).

Fresh water: Sweden! Finland! Germany! France! Switzerland! Bengal! Japan! New Zealand! Australia (Murray River)! Guatemala, fossil! Ecuador! Dakota! Illinois!

Var. *danaica* GRUN. Ms. — Smaller, with somewhat obtuse ends. L. 0,07 to 0,09; B. 0,017 to 0,02 mm. Transverse striæ 16 to 17, longitudinal 21 to 27 in 0,01 mm.

Fresh water: Greenland! Danas pond, Massachusetts (Grun.).

Var. *ambigua* EHB. (1843). — Lanceolate, rostrate. Striæ finer. — *Nav. amb.* EHB. Am. II: 2, f. 9? KÜTZ. Bac. p. 95 Pl. XXVIII f. 66. W. SM. B. D. I Pl. XVI f. 149. DONK. B. D. p. 39 Pl. VI f. 5. Pedicino Ischia D. Pl. II f. 4, 6. V. H. Syn. p. 100 Pl. XII f. 5. *N. sphærophora* DONK. B. D. Pl. V f. 10? *N. birostrata* GREG. M. J. III p. 40 Pl. IV f. 15 (1855). *N. quarnerensis* GRUN. Verh. 1860 p. 530 Pl. III f. 8? *Vanheurckia amb.* BRÉB. Ann. Soc. phyto. et micro. de Belgique I p. 206 (1868).

Fresh water: Sweden! Belgium (V. H.), Italy (Pedic.), Japan! New Zealand! Argentina!

Var. *Héribaudi* PERAG. (1893). — Median striæ somewhat radiate and more distant than in the type. — Hérib. D. d'Auvergne p. 108 Pl. IV f. 16.

Fresh water: Auvergne, fossil.

As *Bacillaria fulva* NITZSCH is an older name than *N. cuspidata*, it would have been more correct to name this species *N. fulva*, but on the other hand it is so extremely difficult to make out what the names of the older authors denote, and the name *N. cuspidata* has been so commonly adopted, that to do so would make the synonymy still more intricate. I prefer therefore the generally accepted name. *N. cuspidata* is variable as to the outline, and it can hardly by doubted that *N. cuspidata* and *N. ambigna* should be united into one species. It frequently occurs in the forms of *N. cuspidata* that the interior of the valve is provided with strong transverse costæ. Such monstrosities have been named *Surirella craticula* EHR., *Craticula Ehrenbergii* GRUN., *Stictodesmis craticula* L. Sm. *Stictodesmis Febigerii* (Deby Coll. = craticular state of the var. danaica). Their true nature has been shewn by PFITZER (Bau u. Entw. p. 104). See also Héribaud D. de d'Auvergne p. 107 Pl. IV f. 15.

7. **N. Perrotettii** GRUN. (1867). — V. rhombic-lanceolate, with slightly rostrate ends. L. 0,12 to 0,185; B. 0,03 to 0,04 mm. Transverse striæ 13 to 14, longitudinal striæ 11 to 12 in 0,01 mm. — *Craticula Perrotettii* GRUN. Nov. p. 20 Pl. I f. 21. *Nav. Perrotettii* GRUN. M. J. 1877 p. 172. — Icon. n. Pl. III f. 12. *Nav. Pangeroni* LEUD. FORTM. D. de la Malaisie p. 52 Pl. II f. 9.

Slightly brackish water: Italy (Grun.), Philippines (Dr. Rae Coll.)! Java (Leud. Fortm.), New Guinea (Tempère)! Senegal (Grun.)! Rio Purus, Brazil (Deby Coll.)! Lake Pistaku, Illinois (Grove Coll.)!

8. **N. Stodderi** GREENL. (1861). — V. lanceolate with acute ends. L. 0,09; B. 0,014 mm. Central nodule dilated to a stauros, reaching the margin; terminal nodules small; terminal fissures nearly straight. Transverse striæ 18 to 19 (22 according to Lewis) in 0,01 mm. longitudinal about 13 in 0,01 mm. — *Stauroneis Stodderi* GREENL. in Lewis Proc. Ac. Philad. 1861 Pl. II f. 6.

Fresh water: French pond, Maine! Waltham, Mass.!

Var. *insignis* GRUN. Ms. — V. rhombic-lanceolate. L. 0,09; B. 0,021 mm. Transverse striæ 16 in 0,01 mm.; longitudinal 7 to 8 in 0,01 mm. — *Stauron. lineolata* EHR. Am. II: 1 f. 19? *N. Stodd. v. ins.* Pl. III f. 13.

Slightly brackish water: Bengal!

9. **N. sulcata** CL. (1881). — V. linear, with subacute ends. L. 0,088 to 0,109; B. 0,008 to 0,009 mm. Central nodule transversely dilated to a stauros reaching the margin. Transverse striæ 21, longitudinal 13 to 14 in 0,01 mm. — *Stauron. sulcata* CL. N. R. D. p. 14 Pl. III f. 46.

Marine: Balearic Islands!

10. **N. Spicula** HICKIE (1873). — V. narrow lanceolate, with subacute ends. L. 0,05 to 0,13; B. 0,004 to 0,013 mm. Central nodule dilated into a stauros, reaching the margin. Transverse striæ 25 to 29, longitudinal finer. Frustules free. — *Stauroneis Spicula* HICKIE Month. M. Journ.

XII p. 290 (according to V. H. Syn.). V. H. Syn. p. 68 Pl. IV f. 9. *Staur. hyalina* Dannf. Balt. D. p. 32 Pl. III f. 20 (1882)?

Marine and brackish water: Arctic America! Cape Wankarema! Sea of Kara! England (V. H. T.).

11. **N. crucigera** W. Sm. (1856). — V. narrow lanceolate, with acute ends. L. 0,08 to 0,11; B. 0,01 mm. Central nodule dilated to stauros, reaching the margin. Transverse striæ 12, longitudinal 25 to 28 in 0,01 mm. Frustule free or enclosed in gelatinous tubes. — *Schizonema cruc.* W. Sm. B. D. II p. 74 Pl. LVI f. 354; LVII f. 356. V. H. Syn. p. 110 Pl. XVI f. 1.

Marine: and brackish water: Gulf of Bothnia! Firth of Tay! Bohuslän! Mouth of Loire (Grun.), Saxony (salines of Dürrenberg)!

N. crucigera, which occurs in gelatinous tubes and for that reason has been regarded as a *Schizonema*, is closely connected with *N. Spicula*, which (always?) occurs free. The striation is much coarser in *N. crucigera* than in *N. Spicula*.

12. **N. balearica** Cl. (1881). — V. narrow lanceolate, with acute ends. L. 0,11; B. 0,013 mm. Central nodule dilated to a short stauros. Transverse striæ 26, longitudinal 23 in 0,01 mm. — *Stauroneis balear.* Cl. N. R. D. p. 14 Pl. III f. 41.

Marine: Balearic Islands!

13. **N. quarnerensis** Grun. Ms. — V. membranaceous, linear-lanceolate, gradually tapering from the middle to the subacute ends. L. 0,14; B. 0,02 mm. Central nodule small, transversely dilated to a very narrow stauros, reaching half way to the margins. Transverse striæ 24, longitudinal 18 to 20 in 0,01 mm. — Pl. III f. 14.

Marine: Adriatic (Grun.), Seychelles (V. H. Coll.)! Sumatra (Deby Coll.)!

Grunow has sent me a sketch of this diatom with the name *Stauroneis quarnerensis*. As it evidently belongs to this group I have changed the name to *Navicula quarn.* It is true that this name has been used by Grunow for an other form, but as that is probably identical with *N. cuspidata var. ambigua*, I think it admissible to use the name *N. quarnerensis* for this species.

14. **N. vitrea** Cl. (1880). — V. narrow lanceolate acute. L. 0,15 to 0,2. B. 0,22 mm. Transverse striæ 19 to 20, longitudinal 21 in 0,01 mm. — *Pleurosigma vitrea* Cl. A. D. p. 15 Pl. IV f. 78. Grun. A. D. p. 60. Péragallo Pleur. VIII f. 9.

Marine: Sea of Kara! Cape Wankarema! Adriatic (Grun.).

15. **N. O'Mearii** Grun. (1880). — V. narrow-lanceolate, with rounded ends. L. 0,059 to 0,068; B. 0,009 to 0,0115 mm. Transverse striæ 17; longitudinal 19 in 0,01 mm. — Grun. A. D. p. 61. Cl. Vega p. 496. *Pleur. O'M.* Pérag. Pleur. VIII f. 10.

Marine: Seychelles (Grun.), Australia (Grun.).

Var. *minor* Cl. (1883). — L. 0,05; B. 0,011 mm. Transverse striæ slightly radiate, 16 in 0,01 mm. Longitudinal striæ 18 in 0,01 mm. — Cl. Vega p. 496.

Marine: Port Jackson!

16. **N. Kjellmanii** Cl. (1880). — V. linear lanceolate, with subacute ends. L. 0,168; B. 0,0264 mm. Transverse striæ 15 in 0,01 mm.; longitudinal of equal number, slightly inflexed towards the central nodule. — *Pleurosigma (Nav.?) Kjellm.* Cl. A. D. p. 14 Pl. IV f. 80. *Pleur. Kjellm.* Pérag. Pleur. Pl. VIII f. 8. *Nav. Vegæ* Cl. Vega p. 474.

Brackish water: Sea of Kara.

Var. *subconstricta* Grun. (1883). — V. linear, slightly constricted in the middle, with subcuneate ends. L. 0,156; B. 0,015 mm. Transverse striæ 15,3; longitudinal 14,3 in 0,01 mm. — *Nav. Vegæ v. subc.* Vega p. 474.

Marine: North Siberian Sea, Cape Wankarema (Grun.).

N. Kjellmanii, *O'Mearii* and *vitrea* are closely connected and form a peculiar group intermediate between *Gyrosigma* and *Navicula*, having the structure of the former and the straight

median line of the latter. I have proposed (1883 Vega p. 474) to include these forms in a Section *Vegæ*, but I now prefer to connect them with the other species of *N. orthostichæ*.

17. **N. porto-montana** Cl. N. Sp. — V. broad, linear, slightly gibbous in the middle, with broad rounded ends. L. 0,07; B. 0,017 mm. Median line with approximate median pores and bordered by a narrow silicious rib. Terminal nodules thick, terminal fissures indistinct. Transverse striæ 19 to 20, longitudinal 19 in 0,01 mm. The puncta close to the median line are larger than the others. — Pl. III f. 36.

Fresh water: Puerto Monte, Chile, fossil (Kinker Coll.)!

Gyrosigma Hassall (1845).

Valve more or less elongated and sigmoid. Central nodule small. Ends of the median line in contrary directions. Central area small or indistinct. Axial area indistinct. Structure: puncta disposed in transverse and longitudinal rows. — *Cell-contents* (of the freshwater forms) with two chromatophores along the connecting zone, which long before the division of the cell are transversely cut off and migrate in pairs to the inside of the valve. The opening between the halves of the chromatophores becomes oblique, and each half increases to a chromatophore. The margins of the chromatophores entire (Pfitzer, Bau und Entw. p. 57). Marine species (G. balticum) have irregularly serrated chromatophores the indentations being directed towards the central nodule. The median part of the chromatophores is obliquely striate, their substance being alternately thicker and thinner. The striæ of the two chromatophores cross each other in an oblique angle (O. Müller Ber. d. Deutch. Bot. Ges. 1883 p. 481).

The sigmoid Naviculæ were named *Navieula Sigma* by Ehrenberg. Hassall proposed for them the name *Gyrosigma*, which was adopted by Rabenhorst (Die Süssw. Diat. 1853), but not by other diatomists, who prefered the newer name *Pleurosigma*, formed by W. Smith, 1852, who published the first monograph of the species (Ann. Nat. Hist. 2 ser. IX p. 1). The genus Pleurosigma, as accepted by all diatomists, includes forms with a structure of small puncta or alveoli, disposed in transverse rows, which are crossed by other rows, either longitudinal, or obliquely decussating. There are no intermediate forms between these two types, and I think they may justly be considered as different genera. For the forms with the puncta in transverse and longitudinal rows, I adopt the name *Gyrosigma*, although, as Grunow remarks, this name involves tautology. For the forms with the puncta disposed in transverse and oblique rows I reserve the name *Pleurosigma*. — Among the forms of Gyrosigma are several with carinated valves, for which Ralfs 1861 (Pritch. Inf. p. 920) proposed the generic name *Donkinia*. In my opinion this genus is not acceptable, as founded on a characteristic which is subject to too much variation. The same may be the case with *Rhoicosigma*, proposed 1867 by Grunow (Hedwigia VI p. 10) for forms with genuflexed or arcuate frustules. The genus Rhoicosigma seems at first sight to be better founded, as the valves of the same frustule of *R. compactum* are (as Peragallo has shewn) dissimilar. But on the other hand some forms (as *R. robustum*) have evidently similar valves. Besides, the flexure of the frustule differs in different species to all degrees. The manuscript-name *Endosigma* Bréb. for the forms living like Schizonema, in gelatinous tubes is not admissible, on the same grounds as Schizonema, Colletonema, Endostauron etc. — From Gyrosigma may be removed *Pleurosigma staurophorum* Grun., which has no close affinity to any of the other forms, but has the characteristics of Caloneis, being a sigmoid form of that genus. — The division of the sigmoid forms of Navicula into two groups, founded on the disposition of the puncta in transverse and longitudinal, and in transverse and oblique, rows, was first proposed by W. Smith, and has been accepted by all later diatomists. In the year 1880 Grunow published (in Arctische Diat.) an elaborate monograph, in which he

introduced a classification, founded on the relative number of the transverse and the longitudinal or oblique striæ. This classification has been adopted by PERAGALLO, who published 1891 (in Diatomiste) a monograph of Pleurosigma and the allied genera Donkinia, Rhoicosigma and Toxonidea. — It seems to me that to separate the species in accordance with the relative number of the transverse and longitudinal striæ is much too artificial a method, although this characteristic may in many cases be useful. *Gyros. Fasciola* offers a striking illustration of how unnatural such a classification based on the relative number of the striæ may be. In the type the longitudinal striæ are closer than the transverse, but in the var. *sulcata* the transverse are closer than the longitudinal striæ. In some cases moreover the relation between the transverse and longitudinal striæ may be vitiated by inevitable errors in their counting. These reasons have induced me not to adopt the classification of GRUNOW and PERAGALLO. I prefer as bases of classification the outline of the valve and the flexure of the median line.

The variation of the forms in Gyrosigma is very great, and the species pass over into each other in so many cases that it is very difficult to define them.

Gyrosigma is related to Tropidoneis by the carinated forms (Donkinia). On the other hand it is related to the Naviculæ orthostichæ. The peculiar *G. spectabile* has a central nodule, which closely resembles that of the above named section (as of Nav. cuspidata).

The majority of forms, belonging to Gyrosigma live in brackish water, but a few are inhabitants of fresh, and salt, water.

Artificial key.

1.	Median line central	2.
	— — excentric	19.
2.	Ends protracted into beaks	3.
	— not — —	6.
3.	Beaks short and stout	*G. distortum* W. SM.
	— long — narrow	4.
4.	Valve abruptly attenuated into beaks	*G. macrum* W. SM.
	— gradually — —	5.
5.	Valve narrow (B. 0,005 to 0,01 mm.)	*G. prolongatum* W. SM.
	— broader (B. 0,015 to 0,024 mm.)	*G. Fasciola* EHB.
6.	Valve linear	12.
	— lanceolate, tapering from the middle	7.
7.	Longitudinal striæ wider than the transverse	8.
	— — equidistant with —	9.
	— — narrower than the —	10.
8.	Transverse striæ about 14 in 0,01 mm.	*G. attenuatum* KÜTZ.
	— — — 17 —	*G. litorale* W. SM.
9.	Transverse striæ about 14 in 0,01 mm.	*G. Terryanum* PER.
	— — 17 to 23 —	*G. acuminatum* KÜTZ.
	— — about 28 —	*G. glaciale* CL.
10.	Transverse striæ about 13 in 0,01 mm.	11.
	— — — 21 —	*G. Kützingii* GRUN.
	— — — 24 —	*G. Febigeri* GRUN.
	— — — 27 —	*G. diaphanum* CL.
11.	Central area small	*G. Strigilis* W. SM.
	— — large, oblique	*G. Baileyi* GRUN.
12.	Valve about 15 times longer than broad	*G. tenuissimum* W. SM.
	— — 10 — — —	13.
13.	Transverse and longitudinal striæ equidistant	14.
	— striæ wider than the longitudinal	15.
14.	Central area large, oblique	*G. plagiostomum* GRUN.
	— — small —	*G. balticum* EHB.

15.	Size small (L. 0,06 to 0,2 mm.)	16.
	— large (L. 0,3 to 0,5 mm.)	18.
16.	Valve with gradually narrowed ends	*G. Spencerii* W. Sm.
	— — obliquely rounded —	17.
17.	Length 0,06 mm.	*G. scalproides* Rabh.
	— 0,14 —	*G. Temperei* Cl.
18.	Transverse striæ about 9 in 0,01 mm.	*G. Grovei* Cl.
	— — — 18 —	*G. spectabile* Grun.
19.	Median line sinuose	*G. diminutum* Grun.
	— — not —	20.
20.	Valve very narrow, 17 or more times longer than broad	*G. lineare* Grun..
	— less narrow	21.
21.	Median line slightly excentric	22.
	— — coincident with the margin	24.
22.	Striæ equidistant	23.
	Transverse striæ wider than the longitudinal	*G. arcticum* Cl.
23.	Striæ about 12 in 0,01 mm.	*G. robustum* Grun.
	— — 20 —	*G. Wansbeckii* Donk.
24.	Frustule arcuate	25.
	— not	26.
25.	Valve broad, unilaterally rounded	*G. compactum* Grev.
	— narrow, lanceolate	*G. mediterraneum* Cl.
26.	Transverse and longitudinal striæ equidistant	*G. rectum* Donk.
	— striæ narrower than the longitudinal	*G. angustum* Donk.

1. **G. acuminatum** Kütz. (1833). — V. sigmoid, lanceolate, gradually tapering to the obtuse ends. L. 0,1 to 0,18; B. 0,015 to 0,02 mm. Median line central, sigmoid. Transverse and longitudinal striæ equidistant, about 18 in 0,01 mm. — *Frustulia acuminata* Kütz. Linnæa VIII p. 555 Dec. N:o 84 (accord. to Lagst.). *Pleuros. acuminatum* Grun. A. D. p. 56. V. H. Syn. 117 Pl. XXI f. 12. Per. VII f. 36, 37. *Pleur. lacrustre* W. Sm. B. D. I Pl. XXI f. 217. *Pleur. transsylvanicum* Pant. III Pl. VI f. 94?

Fresh water: Sweden! England! Saxony!

Var. *curta* Grun. (1880). — L. 0,063 to 0,086; B. 0,0145 mm. Ends subrostrate, obtuse. Striæ 18 in 0,01 mm.

Fresh water: Holstein (Grun.).

Var. *gallica* Grun. — V. sigmoid, lanceolate, with attenuate, subacute ends. L. 0,011 to 0,155; B. 0,011 to 0,018 mm. Median line sigmoid, central. Longitudinal and transv. striæ equidistant 20 to 21 in 0,01 mm. — *P. scalprum var. gallica* Grun. V. H. T. N:o 172. *P. gallic.* Per. VII f. 2.

Fresh and brackish water: Sweden (Hernösand, fossil, Rimforsa i Vestergötland, Ringsjön)! France (V. H. T.), Argentina!

Var. *Brebissonii* Grun. (1880). — V. sigmoid, linear-lanceolate, with subacute ends. L. 0,086 to 0,104; B. 0,011 to 0,013 mm. Median line central, sigmoid. Transverse and longit. striæ equidisstant, 22 to 23 in 0,01 mm. — *Pleuros. balticum* γ W. Sm. B. D. XXII f. 207 γ. *P. Bréb.* Grun. A. D. p. 56. Per. VII f. 29, 30? *P. balt. var. Bréb.* V. H. Syn. p. 117 Pl. XXI f. 6. *P. scalprum* Rabh. A. Eur. N:o 2013 (accord. to Grun.).

Fresh or slightly brackish water: Spitzbergen! Sweden! Paris! Saxony! Argentina!

2. **G. Terryanum** Per. (1891). — V. slightly sigmoid, tapering from the middle to the obtuse ends. L. 0,4 to 0,45; B. 0,038 to 0,041 mm. Median line central, flexuose near the central nodule, which is obliquely elongated. Transverse and longit. striæ equidistant, 14 in 0,01 mm. — *Pleuros. Terr.* Per. p. 18 Pl. VII f. 21.

Marine: Connecticut!

3. **G. Baileyi** Grun. (1880). — V. broadly lanceolate, strongly sigmoid, with subacute ends. L. 0,08 to 0,13; B. 0,018 to 0,021 mm. Median line central, sigmoid. Central nodule large,

elongated and oblique. Transverse striæ radiate in the middle and 14 to 16 in 0,01 mm., but 18 in 0,01 mm. at the ends. Longitud. striæ 18 in 0,01 mm. — *Pleur. Bail.* Grun. A. D. p. 59 Per. VIII f. 11.

Brackish water: Bengal (Grunow).

4. **G. Strigilis** W. Sm. (1852). — V. narrow, lanceolate, sigmoid, gradually tapering to the subacute ends. L. 0,25 to 0,36; B. 0,03 to 0,034 mm. Median line central, slightly flexuose. Transverse striæ more distant than the longitudinal. T.S. : L.S. $^{12}/_{15}$, $^{13}/_{15}$, $^{14}/_{16}$ in 0,01 mm. — *Pleur. Strig.* W. Sm. Ann. Mag. N. H. (2) IX p. 8 Pl. II f. 4. B. D. I p. 66 Pl. XXII f. 208. Per. VIII f. 4. 5.

Brackish water: Baltic! North Sea! English Channel (W. Sm.), Batavia!

Var. *Smithii* Grun. (1880). — L. 0,15 to 0.025; B. 0,012 to 0,018 mm. T.S. : L.S. $^{12}/_{18}$, $^{14}/_{18}$ in 0,01 mm. — *Pleur. Smithii* Grun. A. D. p. 58.

Brackish water: Java! Bengal (Grun.), South America (Grun.).

Var.? *tropica* Grun. (1860). — Ends obtuse. L. 0,16 to 0,3; B. 0,023 to 0,033 mm. Transv. striæ about 21 in 0,01 mm. — *Pleur. tropicum* Grun. Verh. 1860 p. 559 Pl. III f. 34. Per. VIII f. 7.

Marine: Red Sea (Grun.), West Indies (Grun.).

Var.? *capensis* Petit (1891). — L. 0,3; B. 0,017 mm. T.S. : L. S $^{10}/_{13}$, in 0,01 mm. — *Pleur. cap.* Per. p. 21 Pl. VIII f. 6.

Marine: Cape Good Hope (Petit).

5. **G. Kützingii** Grun. (1860). — V. gently sigmoid, lanceolate, with acute ends. L. 0,08 to 0,12; B. 0,012 to 0,015 mm. Central nodule somewhat elongated. Median line central, sigmoid. Transv. striæ slightly radiate in the middle, more distant than the longitudinal. T.S. : L.S. $^{21}/_{25}$, $^{20}/_{24}$, $^{22}/_{26}$, $^{23}/_{26}$ in 0,01 mm. — *Pleur. Kützingii* Grun. Verh. 1860 p. 561 Pl. VI f. 3. *P. Spencerii var. Kütz.* Grun. A. D. p. 59. V. H. Syn. p. 118 Pl. XXI f. 14. Per. VIII f. 22. *P. gracilentum* Rabh. Alg. Europ. N:o 1066 (1861). *P. Wormleyi* Sulliv. = *P. Spencerii var. acutiuscula* Grun. in V. H. Types N:o 183.

Fresh water: Sweden (Lake Mälaren)! Finland! Belgium (V. H.), Saxony! East Indies (Grun.)! Japan! Tasmania! New Zealand (Grun.), Waltham in Massachusetts! Hudson River! Argentina!

6. **G. Febigerii** Grun. (1879). — V. lanceolate, gently sigmoid, subacute. L. 0,11 to 0,15; B. 0,0145 to 0,015 mm. Central nodule rounded. Median line sigmoid, central. T.S. : L.S. $^{24}/_{29}$ in 0,01 mm. — *Pleur. Febig.* Grun. Cl. M. D. N:o 223. A. D. p. 60. *P. Spencerii var.? Febig.* Per. VIII f. 28.

Marine: California (Grun.).

7. **G. diaphanum** Cl. N. Sp. — V. lanceolate, sigmoid, subobtuse. L. 0,085; B. 0,015 mm. Median line central, sigmoid. Centralnodulerounded. T.S. : L.S. $^{27}/_{30}$ in 0,01 mm. — Part II Pl. I f. 6.

Marine: Isle de Bréhat, France! Gullmarefjord, Sweden!

8. **G. (Rhoicosigma) glaciale** Cl. (1883). — V. thin, lanceolate, gently sigmoid, gradually tapering to the acute ends. L. 0,143; B. 0,019 mm. Median line very slightly sigmoid. Transv. and longit. striæ equidistant, 28 in 0,01 mm. — *Pleur. glaciale* Cl. Vega p. 476 Pl. XXXV f. 13. Per. VII f. 15.

Marine: Cape Wankarema!

9. **G. attenuatum** Kütz. (1833). — V. gently sigmoid, lanceolate, gradually tapering from the middle to the obtuse ends. L. 0,18 to 0,24; B. 0,025 mm. Median line gently sigmoid, central. Longitudinal striæ stronger and more distant than the transverse. T.S. : L.S. $^{14}/_{10}$, $^{14}/_{12}$, $^{16}/_{11}$ in 0,01 mm. — *Frustulia attenuata* Kütz. Dec. N:o 83 (accord. to Lagst.). *Pleur. atten.* W. Sm. B. D. I p. 68 Pl. XXII f. 216. V. H. Syn. p. 117 Pl. XXI f. 11. Per. VII f. 9. *P. Hippocampus* W. Sm.

Ann. Mag. N. H. [2] X p. 10 Pl. II f. 9 (1852). B. D. l. c. f. 215. V. H. Syn. p. 117 Pl. XX f. 3. Per. VII f. 4 to 7. *P. att. var. caspia* Grun. Casp. Sea Alg. p. 18 Pl. III f. 8. Per VII f. 8.

Fresh and brackish water: Sweden! Finland! England! Saxony! Belgium (V. H.), France! Baltic! North Sea! Caspian Sea (Grun.).

Var. *Scalprum* Gaill. a. Turp. (1827). — L. 0,12 to 0,15; B. 0,019 mm. T.S. : L.S. $^{19}/_{16}$, $^{17}/_{14}$. — *Nav. Scalprum* Gaill. a. Turp. Mém. du Muséum XV Pl. X, XI f. 3 (accord. to Kütz.). *P. acuminatum* W. Sm. B. D. I p. 66 Pl. XXI f. 209. Grun. A. D. p. 55. Per. p. 17 Pl. VII f. 3. *Pl. Kochii* Pant. III Pl. IX f. 153 (1893)??

Brackish and marine: North Sea!

10. **G. litorale** W. Sm. (1852). — V. sigmoid, lanceolate, with attenuate, slightly rostrate ends. L. 0,11 to 0,19; B. 0,022 to 0,045 mm. Median line sigmoid, central. Longit. striæ very strong and distant. T.S. : L.S. $^{17}/_{10}$ in 0,01 mm. — *P. litorale* W. Sm. Ann. and Mag. N. Hist. [2] IX p. 10 Pl. II f. 8. B. D. I p. 67 Pl. XXII f. 214. Per. VII f. 1.

Marine: North Sea! English Channel (W. Sm.), Mediterranean Sea (Per.).

11. **G. distortum** W. Sm. (1852). — V. lanceolate, slightly sigmoid. Ends more or less abruptly produced into short, obtuse beaks, turned in contrary directions. L. 0,07 to 0,12; B. 0,017 mm. Median line sigmoid, central. Transv. striæ more distant than the longit. T.S. : L.S. $^{23}/_{27}$, $^{25}/_{28}$. — *Pleur. dist.* W. Sm. Ann. Mag. Nat. Hist. [2] IX p. 7 Pl. I f. 10; B. D. I p. 67 Pl. XX f. 210. Per. VIII f. 32.

Marine: Spitzbergen! North Sea! English Channel (W. Sm.), Ionian Archipelago (Grun.), Cameroon, Africa!

Var. *Parkeri* Harrison (1860). — L. 0,08 to 0,15; B. 0,015 to 0,025 mm. T.S. : L.S. $^{19}/_{22}$ (Grun.), $^{20}/_{24}$, $^{21}/_{27}$, $^{23}/_{24}$ in 0,01 mm. — *Pleur. Park.* Harri. M. J. 1860 p. 104. Grun. A. D. p. 57. V. H. Syn. p. 118 Pl. XXI f. 10. Per. VIII f. 33.

Fresh and brackish water: Baltic! England! Belgium!

Var. *stauroncoides* Grun. (1880). — Central nodule transversely dilated. T.S. : L.S. $^{24}/_{21}$ 0,01 mm. — *Pleur. Park. var. stauron.* Grun. A. D. p. 57.

Brackish water: Hudson River (Grun.).

12. **G. Fasciola** Ehb. (1839). — V. lanceolate, attenuated into long, linear beaks, curved in opposite directions. L. 0,09 to 0,15; B. 0,015 to 0,024 mm. Median line central, straight in the middle of the valve. T.S. : L.S. $^{21}/_{24}$, $^{23}/_{22}$ in 0,01 mm. — *Ceratoneis Fasciola* Ehb. Abh. 1839 (accord. to Chase). *Pleur. Fasciola* W. Sm. B. D. I p. 67 Pl. XXI f. 211. Grun. A. D. p. 58. V. H. Syn. p. 119 Pl. XXI f. 8. Hendry T. M. Soc. 1862 X p. 152. Per. VIII f. 36 to 38.

Marine: Spitsbergen! North Sea! California! Barbados!

Var. *sulcata* Grun. (1880). — Longitudinal striæ strong. T.S. : L.S. $^{19}/_{15}$ (Grun.), $^{20}/_{17}$, $^{23}/_{16}$ in 0,01 mm. — *P.* (*Fasc. var.?*) *sulcatum* Grun. A. D. p. 55 Pl. IV f. 75. V. H. Syn. XXI f. 7. Per. VIII f. 43.

Marine: Sea of Kara (Grun.), Spitsbergen! Firth of Tay (Grove), Mouth of Seine!

Var. *tenuirostris* Grun. (1880). — L. 0,14 to 1,16; B. 0,011 to 0,012 mm. T.S. : L.S. $^{22}/_{19}$, $^{23}/_{20}$ in 0,01 mm. — *P.* (*Fasc. var.?*) *tenuirostris* Grun. A. D. p. 55 Pl. IV f. 76. Per. VIII f. 42.

Marine: Sea of Kara (Grun.).

Var. *arcuata* Donk. (1858). — V. lanceolate. Ends more suddenly produced into long, narrow beaks curved in contrary directions. L. 0,1 to 0,115; B. 0,012 mm. Median line central, straight. Transv. striæ 24 to 25 (Grun.) in 0,01 mm.; longitudinal finer. — *Pleur. arcuat.* Donk. T. M. S. VI p. 25 Pl. III f. 10. Per. VIII f. 34, 35.

Marine: Coast of Sweden (Grun.)! England (Donk.).

Gyros. Fasciola is intimately connected with *G. distortum var. Parkeri*, and by the Var. *tenuirostris*, with *G. macrum*.

13. **G. macrum** W. Sm. (1853). — V. narrow, lanceolate, abruptly attenuated into very long and narrow beaks, curved in contrary directions. L. 0,2 to 0,27; B. 0,01 mm. Median line central. Transv. striæ 27 to 28 in 0,01 mm., longitudinal more than 30 in 0,01 mm. — *Pleur. macr.* W. Sm. B. D. I p. 67 Pl. XXXI f. 276. V. H. Syn. p. 119 Pl. XXI f. 9. Per. VIII f. 41.

Marine: Sea of Kara (Grun.), North Sea! Mediterranean Sea (Grun.).

14. **G. prolongatum** W. Sm. (1852). — V. narrow, lanceolate, gradually attenuated into long beaks, curved in contrary directions. L. 0,11 to 0,25; B. 0,005 to 0,015 mm. Transverse striæ 21 to 22 in 0,01 mm., longit. finer. — *Pleur. prol.* W. Sm. Ann. Mag. Nat. Hist. [2] IX p. 9 Pl. II f. 7. B. D. I p. 67 Pl. XXII f. 212. Per. VIII f. 39.

Marine: North Sea! Balearic Islands!

Var. *closteroides* Grun. (1884). — Beaks turned in the same directions. Transv. striæ 22 in 0,01 mm. — *Pleur. prol. var. closteroides* Grun. Franz Josephs Land D. p. 105 (53) Pl. I f. 58. Per. VIII f. 40.

Marine: Coasts of England (Grun.).

15. **G. tenuissimum** W. Sm. (1853). — V. very narrow, linear-lanceolate, slightly sigmoid, acute. L. 0,11 to 0,22; B. 0,005 to 0,015 mm. Median line central. Transv. striæ 18 to 22 in 0,01 mm. longitud. finer. — *Pleur. tenuiss.* W. Sm. B. D. I p. 67 Pl. XXII f. 213. Per. VIII f. 13.

Marine: Sea of Kara! East coasts of England (W. Sm.), Triest! California!

Var. *subtilissima* Grun. (1880). — L. 0,137; B. 0,0065 mm. Transv. striæ 27 in 0,01 mm. — *Pleur. ten. var. subt.* Grun. A. D. p. 58.

Marine: Sea of Kara (Grun.).

Var. *hyperborea* Grun. (1880). — V. linear, sigmoid. L. 0,084 to 0,094; B. 0,006 to 0,007 mm. T.S. : L.S. $^{21}/_{23}$, $^{22}/_{24}$ in 0,01 mm. — *Pleur. ten. var. hyperb.* Grun. A. D. p. 58 Pl. IV f. 77. Per. VIII f. 14.

Marine: Sea of Kara (Grun.).

Gyros. tenuissimum connects *G. prolongatum* with *G. Spencerii* by the Var. *hyperborea.*

16. **G. Spencerii** W. Sm. (1852). — V. linear-lanceolate, sigmoid, obtuse. L. 0.078 to 0,22; B. 0,012 to 0.025 mm. Median line central. Transv. striæ more distant than the longitudinal. T.S. : L.S. $^{17}/_{22}$, $^{21}/_{24}$, $^{22}/_{24}$ in 0,01 mm. — *Pleur. Spencerii* W. Sm. Ann. Mag. Nat. Hist. [2] IX p. 12 Pl. II f. 15. B. D. I p. 68 Pl. XXII f. 218. *P. Spenc. var. Smithii* Grun. A. D. p. 59. V. H. Syn. p. 118 Pl. XXI f. 15. Per. VIII f. 21, 23. *P. Spenc. var. Arnottii* Grun. A. D. p. 59, *P. Spenc. var. borealis* Grun. A. D. p. 60. Per. VIII f. 15. *P. Spenc. var. Antillarum* Grun. A. D. p. 60. *P. Spenc. var. curvula* Grun. A. D. p. 60. V. H. Syn. p. 118 Pl. XXI f. 3, 4, 5. Per. VIII f. 20, 24.

Brackish water: Spitsbergen! Sea of Kara! North Sea! Saxony! Canada! New York! West Indies! Bombay (Grove Coll.)!

Var. *exilis* Grun. (1880). — L. 0,05 to 0,055; B. 0,007 mm. Transv. striæ 28 to 29 in 0,01 mm. — *P. Spenc. var. exilis* Grun. A. D. p. 60. Per. VIII f. 25.

Brackish water: Normandy (Grun.), Tasmania!

Var. *minutula* Grun. (1880). — L. 0,06; B. 0,01 mm. T.S. : L.S. $^{23}/_{25}$, $^{24}/_{26}$ in 0,01 mm. — *P. Spenc. var. min.* Grun. A. D. p. 60.

Brackish water: Elbe (Grun.).

Var. *nodifera* Grun. (1880). — V. linear, slightly sigmoid, obtuse. L. 0,06 to 0,1; B. 0,011 mm. Median line central. Central nodule surrounded by an elongated, oblique area. Transv. striæ slightly radiate in the middle. T.S. : L.S. $^{17}/_{22}$, $^{20}/_{23}$ in 0,01 mm. — *P. nodif.* Grun. A. D. p. 59. *P. Spenc. var. nod.* V. H. Syn. p. 118. Pl. XXI f. 13. Per. VIII f. 26.

Fresh water: Mouth of Elbe (Grun.), Belgium (V. H.), Samoa (Grun.).

17. **G. Grovei** Cl. (1891). — V. linear, sigmoid at the attenuated, obliquely rounded, ends. L. 0,4 to 0,6; B. 0,03 to 0,06 mm. Central nodule obliquely elliptical. Median line central, scarcely flexuose. T.S. : L.S. $^{9}/_{13}$ in 0,01 mm. — *Pleur. Grovcii* Per. p. 22 Pl. VIII f. 1.

Brackish water: Java! Singapore!

18. **G. spectabile** Grun. (1891). — V. sigmoid, linear, obtuse. L. 0,3 to 0,34; B. 0,04 mm. Median line central, sigmoid, enclosed between two siliceous strings. Central nodule small, elongated. Terminal areas large. T.S. : L.S. $^{18}/_{23}$ in 0,01 mm. — *Pleur. spect.* Per. p. 21 Pl. VII f. 14.

Brackish water: Brazil!

This isolated species is very interesting, as the central nodule and the median line recall those of Frustulia and Naviculæ Orthostichæ.

19. **G. scalproides** Rabh. (1861). — V. slightly sigmoid, linear, with obliquely rounded ends. L. 0,058 to 0,068; B. 0,01 mm. Median line straight. Central nodule elongated. Median transv. striæ somewhat radiate. T.S. : L.S. $^{22}/_{29}$ in 0,01 mm. — *Pleur. scalproides* Rabh. Alg. Eur. N:o 1101. Grun. A. D. p. 60. V. H. Syn. p. 119 Pl. XXI f. 1. *P. Spencerii var. scalpr.* Per. VIII f. 31.

Fresh water: Germany! U. States, Kansas River! Cameroon, Africa!

Var. (*Endosigma*) *eximia* Thw. (1856). — V. linear, obliquely truncate. L. 0,06 to 0,08; B. 0,009 to 0,01 mm. Median line straight, somewhat excentric in the ends. T.S. : L.S. $^{23}/_{27}$, $^{25}/_{28}$ in 0,01 mm. Frustules enclosed in gelatinous tubes. — *Colletonema exim.* Thw. in W. Sm. B. D. II p. 69 Pl. LVI f. 350. *Pleur. exim.* V. H. Syn. p. 119 Pl. XXI f. 2. Per. VIII f. 47.

Fresh water: Sweden (Gulf of Bothnia, Upsala)! England (W. Sm.), Belgium (V. H.), Bengal!

Var. *obliqua* Grun. (1880). — V. linear, obliquely truncate. L. 0,069; B. 0,0145 mm. Central area elongated, oblique. Median line straight, curved at the ends, central. T.S. : L.S. $^{22}/_{24}$ in 0,01 mm. — *Pleur. obl.* Grun. A. D. p. 56. Per. VII f. 34.

Brackish water: Sierra Leone (Grun.), U. States! Savannah, Ga.!

20. **G. Temperei** Cl. (1893). — V. linear, with obliqely truncate and rounded ends. L. 0,14; B. 0,014 mm. Median line central, straight, curved only at the ends. Central nodule small, elongated. T.S. : L.S. $^{27}/_{30}$. — Diatomiste II p. 55 Pl. III f. 3.

Brackish water: Connecticut!

This form has nearly the same outline as *P. balticum*, but is smaller and has closer striation.

21. **G. plagiostomum** Grun. (1880). — V. linear, with obliquely rounded ends. L. 0,1; B. 0,013 mm. Median line central, slightly flexuose. Central nodule large, elongated and oblique. Transv. and longit. striæ equidistant, 18 to 19 in 0,01 mm. — *Pleur. plag.* Grun. A. D. p. 56. Per. VII f. 33.

Marine: Seychelles (Grun.), Sierra Leone! Barbados!

Pleur. sciotense Sulliv. (1854 Sillim. J. XXVII p. 251; Grun. A. D. p. 59), which seems to be the same as *Pl. Wansbeckii* Per. VII f. 25, 26, is probably only a variety of *G. plagiostomum*. Specimens from Hudson River (Icon. nost. Part II Pl. I f. 5) differ from that form in their somewhat larger size (L. 0,14 to 0,16; B. 0.016 to 0,018 mm. T.S. : L.S. $^{16}/_{18}$, $^{18}/_{19}$ in 0,01 mm.).

22. **G. balticum** Ehb. (1830). — V. linear, with obliquely truncate and obtuse ends. L. 0,2 to 0,4; B. 0,024 to 0,040 mm. Median line slightly excentric and somewhat flexuose. Central area small, oblique. Transv. and longit. striæ equidistant, 11 to 16 in 0,01 mm. — *Nav. baltica* Ehb. Abh. 1830 p. 114 (accord. to Chase). *Pleur. balticum* W. Sm. B. D. I 66 p. XXII f. 207. Jan. Rabh. Honduras D. Pl. III f. 3. V. H. Syn. p. 117 Pl. XX f. 1. Per. VII f. 19, 20. *P. Makron* Johnst. M. J. VIII p. 15.

Brackish and marine: Baltic! North Sea! Caspian Sea (Grun.). Mediterranean Sea! Adriatic! Red Sea! Java! Sumatra! Sandwich Islands! Samoa! Magellans Strait! Brazil! West Indies! Atlantic coasts of U. States!

Var. *similis* GRUN. (1880). — V. linear, with obtuse ends. L. 0,10 to 0,2; B. 0,02 to 0,024 mm. Median line central, slightly sigmoid, ending below the apices of the valve. Central area small. Striæ equidistant, 16 to 17 in 0,02 mm. — *Pleur. simile* GRUN. A. D. p. 56. PER. VII f. 27.

Fresh or brackish water: Lagos (Grun.), Java! Samoa (Grun.), Tasmania! China! Barbados!

Var. *sinensis* EHB. (1847). — V. gibbous in the middle and with incrassate ends. L. 0,1 to 0,2; B. 0,013 to 0,022 mm. Median line strongly flexuose. T.S. : L.S. $^{15}/_{17}$ in 0,01 mm. — *Nav. sin.* EHB. Ber. 1847 p. 485 (accord. to Chase). M. G. XXXIV, 7. f. 11. PER. VII f. 11. *Pl. sin. var. calcuttensis* GRUN. A. D. p. 57. PER. VII f. 12.

Var. *californica* GRUN. (1879). — V. linear, slightly sigmoid, with gradually attenuated ends. L. 0,25 to 0,28; B. 0,028 mm. Transv. and longit. striæ equidistant, 14 to 15 in 0,01 mm. — *Pleur. balt. var. calif.* GRUN. in Cl. M. D. N:o 246. PER. VII f. 22.

Brackish water: California!

23. **G. diminutum** GRUN. (1880). — V. linear, with obliquely truncate and rounded ends. L. 0,1 to 0,11; B. 0,016 mm. Median line strongly flexuose, excentric towards the ends. T.S. : L.S. $^{18}/_{22}$, $^{19}/_{24}$, $^{23}/_{26}$ in 0,01 mm. — *Pleur. (balt. var.?) dim.* GRUN. A. D. p. 56. PER. VII f. 31, 32.

Marine: Balearic Islands! Adriatic (Grun.)!

Var. *constricta* GRUN. (1880). — V. gibbous in the middle and at the ends. L. 0,1; B. 0,013 mm. T.S. : L.S. $^{21}/_{23}$ in 0,01 mm. — *Pleur. (balt. var.?) constr.* GRUN. A. D. p. 57. PER. VII f. 13. *Pleur. reversum* GREG. D. of Clyde p. 530 Pl. XIV f. 105. PER. VII f. 10?

Marine: Adriatic (Grun.).

Pl. biharense PANT. III Pl. XLII f. 581 seems to be an akin form.

24. **G. Wansbeckii** DONK. (1858). — V. linear, tapering towards the slightly curved and obliquely rounded ends. L. 0,11 to 0,17; B. 0,015 mm. Median line excentric, sigmoid. T.S. : L.S. $^{18}/_{20}$, $^{20}/_{18}$ in 0,01 mm. — *Pleur. balt. β* W. SM. B. D. Pl. XXII f. 207 *β*. *Pl. Wansb.* DONK. T. M. S. VI p. 24 Pl. III f. 7. PER. VII f. 23. 24.

Brackish and marine: Sea of Kara! North Sea!

Var. *Peisonis* GRUN. (1860). — L. 0,09; B. 0,01 mm. T.S. : L.S. $^{21}/_{25}$, $^{21.5}/_{26}$ in 0,01 mm. — *Pleur. Peis.* GRUN. Verh. 1860 p. 562 Pl. VI f. 8. *P. Spencerii var. Peis.* GRUN. A. D. p. 60. PER. VIII f. 27.

Brackish water: Sonderburg (Grun.), Neusiedler See, Hungary (Grun.)!

Var. *subsalina* PER. (1891). — L. 0,12 to 0,17; B. 0,012 mm. T.S. : L.S. $^{18}/_{22}$. — *Pleur. Spencerii var. subs.* PER. p. 24 Pl. VIII f. 16, 17.

Brackish water: Médoc, France (Per.).

25. **G. (Rhoicosigma) arcticum** CL. (1873). — V. slightly sigmoid, tapering from the middle to the subacute or obliquely rounded ends. L. 0.07 to 0,2; B. 0,014 to 0,02 mm. Median line more sigmoid than the valve, sometimes slightly sinuose. T.S. : L.S. $^{21}/_{28}$, $^{21}/_{30}$, $^{23}/_{30}$ in 0,01 mm. Frustule more or less arcuate to almost straight. — *Rhoicosigma arcticum* CL. D. Arc. Sea p. 18 Pl. III f. 16. PER. X f. 16, 17.

Marine: Greenland! Spitsbergen! Sea of Kara! Finmark! Grip in Norway! Firth of Tay! Barbados! Kerguelens Land!

This species varies in amount of flexure. Specimens from Kerguelens Land, named by GRUNOW *Donkinia subflexuosa* (Icon. n. Part II Pl. I f. 3, 4), are straight, so also are specimens from Barbados, but otherwise they differ in nothing of importance. The ends are subacute or obliquely rounded according to the position of the valve.

As a Var. *irregularis* PERAGALLO has (p. 33 Pl. X f. 18) figured an asymmetrical form from the North Sea, which requires a more accurate study.

26. **(Donkinia) rectum** DONK. (1858). — V. convex, linear, straight, with obliquely rounded ends. L. 0,11 to 0,23; B. 0,013 to 0,02 mm. Median line strongly excentric and sigmoid. Transverse

and oblique striæ almost equidistant, 19 to 20 in 0,01 mm. — *Pleur. rectum* Donk. T. M. S. VI p. 23 Pl. III f. 6. *Amphiprora Ralfsii* Arnott M. J. VI p. 91 (1858) ad spec. authentica. *Donkinia recta* V. H. Syn. p. 119 Pl. XVII f. 9. Per. IX f. 4. *P. Lorenzii* Grun. Verh. 1860 p. 558 Pl. VI f. 4. Per. VII f. 17.

Marine: North Sea! Mediterranean Sea! Adriatic! Labuan! China! Port Jackson! Florida!

Var. *intermedia* Per. (1891). — V. more lanceolate, with less asymmetrical ends. — *Donkinia recta var. int.* Per. p. 30 Pl. IX f. 7, 8.

Marine: Cherbourg (Per.), Firth of Tay!

Var. *Thumii* Cl. (1891). — L. 0,1 to 0,13; B. 0,011 to 0,012 mm. T.S. : L.S. $^{25}/_{21}$, $^{28}/_{28}$, $^{28}/_{27}$ in 0,01 mm. — *Donkinia Thumii* Per. p. 30 Pl. VII f. 28, IX f. 10.

Marine: Balearic Islands! Seychelles! Sumatra!

Var. *minuta* Donk. (1858). — Smaller. L. 0,06; B. 0,012 mm. Striæ 19 in 0,01 mm. — *Pleur. minutum* Donk. T. M. S. VI p. 24, Pl. III f. 8. *Donkinia min.* Ralfs in Pritch. Inf. p. 921 (1861). Per. IX f. 9.

Marine: Newcastle! Firth of Tay!

27. **G. lineare** Grun. (1880). — V. narrow, linear, almost straight, unilaterally narrowed towards the ends. L. 0,17 to 0,26; B. 0,01 to 0,015 mm. Median line sigmoid, strongly excentric. T.S. : L.S. $^{20}/_{24}$, $^{21}/_{26}$ in 0,01 mm. — *Rhoic. lineare* Grun. A. D. p. 59. Per. IX f. 11 (median line incorrectly represented as central).

Marine: Adriatic! Seychelles (Grun.), Port Jackson! Colon!

Var. *longissima* Cl. (1881). — V. very narrow, with obliquely rounded ends. L. 0,16 to 0,17; B. 0,007 mm. T.S. : L.S. $^{18}/_{21}$, $^{22}/_{22}$ in 0,01 mm. — *Pleur. (Donk.?) long.* Cl. N. R. D. p. 6 Pl. I. f. 8. Per. VII f. 16.

Marine: Mediterranean Sea (Gulf of Naples, Balearic Islands)!

28. **G. angustum** Donk. (1858). — V. very convex, thin, linear, with unilaterally attenuate, acute ends. L. 0,126 to 0,14; B. 0,015 mm. Median line diagonal in the middle and then marginal. T.S. : L.S. $^{28}/_{22}$ in 0,01 mm. — *Pleur. angustum* Donk. T. M. S. VI p. 24 Pl. III f. 9. *Donkinia angusta* Ralfs in Pritch. Inf. p. 921 (1861). Per. IX f. 3.

Marine: England (Donk.), Balearic Islands!

Var. *sumatrana* Cl. — Less convex. L. 0,14; B. 0,018 mm. T.S. : L.S. $^{29}/_{21}$ in 0,01 mm. Median line less excentric.

Marine: Sumatra (Deby Coll.)!

29. **P. (Rhoicos.) compactum** Grev. (1857). — Frustule arcuate, with dissimilar valves. V. short, linear, unilaterally attenuated to the obliquely rounded ends. L. 0,089 to 0,4; B. 0,015 to 0,05 mm. Upper valve with straight diagonal, median line T.S. : L.S. $^{16}/_{22}$, $^{14}/_{23}$, $^{16}/_{21}$, $^{17}/_{20}$ in 0,01 mm. Lower valve with strongly excentric and sigmoid median line. T.S. : L.S. $^{16}/_{22}$, $^{17}/_{19}$, $^{17}/_{22}$, $^{18}/_{22}$, $^{19}/_{23}$, $^{19}/_{24}$ in 0,01 mm. — *Lower valve: Pleur. comp.* Grev. M. J. V. p. 12 Pl. III f. 9. *Donkinia comp.* Ralfs in Pritch. Inf. p. 921 (1861). *Rhoic. comp.* Grun. M. M. J 1877 p. 182. Per. p. 33 Pl. X f. 7, 8. *Rhoic. oceanicum* Per. l. c. f. 5, 12, 15. *Rhoic. corsicanum* Per. l. c. *Rhoic. Antillarum* Cl. West. Ind. D. p. 9 Pl. II f. 14. *Pleur. Smithianum* Castr. Voyage Challenger D. p. 38 Pl. XXVIII f. 6? *Donkinia antiqua* Grove and Sturt J. Queck. M. Cl. III [2] p. 133 (1887)? — *Upper valve: Rhoic. Reichardtianum* Grun. Hedwigia VI p. 11 (1867). M. M. J. 1877 p. 181 Pl. CXCV f. 19. *Rhoic. compactum* Per. p. 33 Pl. X f. 6, 8, 10, 13.

Marine: La Rochelle (Petit Coll.)! Mediterranean Sea! Adriatic! Red Sea! Sumatra! Philippines! Port Jackson! Samoa! Tahiti! Galapagos Islands! Honduras (Grun.), West Indies!

Var. *constricta* Grun. (1877). — V. slightly constricted in the middle, with subcuneate ends. L. 0,13; B. 0,02 mm. TS. : L.S. $^{17}/_{19}$, $^{18}/_{20}$ in 0,01 mm. — *Rhoic. (Reichardtii var.?) constr.* Grun. M. M. J. 1877 p. 181.

Marine: Honduras (Grun.)! Adriatic (Grun.)!

This species is very variable as to size and number of the striæ, so that I cannot admit the separation of *Rhoic. compactum* and *Rhoic. oceanicum* PER. According to PERAGALLO *Gyr. compactum* has 20 to 24 transverse and closer longitudinal striæ, but I have not seen such closely striate forms, which are said to be frequent. Most specimens I have seen agree with *Rhoic. oceanicum*. The fact that the valves of the same frustule are dissimilar, discovered by PERAGALLO, is of great interest. The striation of the valves is somewhat dissimilar. On specimens from La Rochelle I counted on the lower valve 19 transv. and 24 longit. striæ in 0,01 mm. and on the upper valve 16 transv. and 23 longit. striæ in 0,01 mm.

30. **G. (Rhoicosigma) mediterraneum** CL. (1877). — V. narrow, with acute ends. L. 0,18 to 0,24; B. 0,022 to 0,0025 mm. Median line diagonal in the middle and then marginal. T.S. : L.S. $^{18}/_{25}$, $^{19}/_{26}$, $^{19}/_{27}$ in 0,01 mm. — *Rhoic. medit.* CL. T. R. M. S. 1877 p. 182. N. R. D. p. 6 Pl. I f. 9. PER. IX f. 29 to 32.

Marine: Balearic Islands! Adriatic! Sumatra (Deby Coll.)! Java!

Var. *calcarea* BRUN (1891). — V. smaller, with less acute ends and less asymmetrical median line. T.S. : L.S. $^{20.5}/_{27}$ in 0,01 mm. — PER. p. 32 Pl. IX f. 28.

Marine: Japan, fossil (Per.).

Var. *chinensis* CL. — L. 0,14; B. 0,018 mm. Median line as in the type. T.S. : L.S. $^{23}/_{30}$ in 0,01 mm.

Marine: China (Deby Coll.)!

31. **G. (Rhoicosigma) robustum** GRUN. (1880). — V. narrow lanceolate, sigmoid, gradually tapering from the middle to the acute ends. L. 0,27 to 0,6; B. 0,04 to 0,06 mm. Median line sigmoid, excentric. T.S. : L.S. $^{11}/_{12}$, $^{12}/_{13}$, $^{13}/_{13}$ in 0,01 mm. — *Pleur. (Rhoic.?) robustum* GRUN. A. D. p. 58. *Rhoic. robustum* PER. X f. 2, 3.

Marine: Mediterranean Sea! Java! Singapore! Samoa! Galapagos Islands! Campeachy Bay!

Var. *inflexa* PER. (1891). — Valve more narrow and sigmoid. — PER. p. 34 Pl. X f. 4.

Marine: Mediterranean Sea!

Frustulia AG. (1824).

Both valves similar. Central nodule small, indistinct or elongated. Median line enclosed between two siliceous ribs. Terminal nodules small, sometimes elongated; terminal fissures not distinct. No axial or central area. Structure: puncta arranged in transverse and longitudinal striæ. Connecting zone simple. Cellcontents: two endochrome-plates along the interior wall of the connecting zone, in the middle of the valve separated a from the wall by hemispherical plasma-masses. On division of the plates, they do not move in the cells; the fission begins at the ends of the plate (PFITZER Bau u. Entw. p. 58). On conjugating, two frustules form by their cell-contents a mass, which is transformed into two cylindrical bodies, with obtuse, rounded ends, coarsely transversely costate, parallel to the empty valves. The ends of these bodies form, later on, caps, which are thrown off. The bodies become conical, and gradually the valves are developed, one after the other. When full-grown they are twice as long as the mother-cells (PFITZER Bau u. Entw. p. 58).

From the description of the cell-contents and the process of conjugation it seems that Frustulia and Navicula differ considerably in these respects.

Some species of Frustulia (of the group of *F. rhomboides*) are, as far as regards the valve, nearly akin to the *Naviculæ orthostichæ* and, on the other hand to *Amphipleura*. The central nodule, usually small, becomes in same forms (*N. rhomboides var. amphipleuroides*) united to the strong siliceous strings, which enclose the median line, as in Amphipleura, but the central nodule is in

the latter genus much larger. Several species of Frustulia (as *F. vulgaris*) live enclosed in gelatinous tubes and have been considered as belonging to a separate genus (*Colletonema* THAW.); others live in gelatinous masses (*Frustulia* AG., EHB., KÜTZ.). No generic distinctions may be founded on such characteristics. BRÉBISSON founded 1868 (Ann. de la Soc. phytol. et microsc. de Belgique, Vol. I p. 201) the genus *Van Heurckia* on the peculiar structure of the central nodule and the median line. With PFITZER I am inclined to retain the old name *Frustulia*.

Artificial key.

1. Valve rhomboid to lanceolate . . . . . 2.
   — linear to elliptic-linear . . . . . 4.
2. Size small. L. 0,028 to 0,03 mm. . . . . *F. styriaca* GRUN.
   — larger. L. 0,05 or more . . . . . 3.
3. Median striæ slightly radiate . . . . . *F. vulgaris* THW.
   — — parallel . . . . . *F. rhomboides* EHB.
4. Terminal nodules near the margin . . . . . *F. interposita* LEWIS.
   — — distant from — . . . . . *F. Lewisiana* GREV.

1. **F. styriaca** GRUN. (1880). — V. narrow rhombic-lanceolate. L. 0,028 to 0,03; B. 0,005 to 0,006 mm. Central nodule elongated. Striæ slightly radiate, also at the ends, about 24 (middle) to 27 (ends) in 0,01 mm. — *Nav.* (*Vanheurckia?*) *styriaca* GRUN. V. H. Syn. Pl. XVII f. 7, 8.

Fresh water?

I have not seen this species, which has the appearance of a small *F. rhomboides*.

2. **F. vulgaris** THW. (1847). — V. narrow-lanceolate, with subrostrate, obtuse ends. L. 0,05—0,07; B. 0,011 mm. Central nodule elongated. Striæ 24 (middle) to 34 (ends) in 0,01 mm., slightly radiate in the middle, transverse at the ends. Frustules enclosed in unbranched gelatinous tubes. — *Colletenema vulgaris* THW. Ann. N. H. (2) I Pl. XII f. 4. W. SM. B. D. II p. 70 Pl. LVI f. 351. GRUN. Banka D. II f. 15. *Nav. dirhynchus* DONK. B. D. Pl. V f. 3 (1871) Ehb.? Kütz? *Vanheurckia vulgaris* V. H. Syn. p. 112 Pl. XVII f. 6.

Fresh water: Sweden! Norway! Finland! Saxony! Belgium (V. H.), Switzerland (Brun.), Siberia! Japan! Bengal! Australia (Orara River, Blue mountains etc.)! Tasmania! Ecuador!

Var. *asymmetrica* CL. — V. elliptical, asymmetrical, with obtuse ends. Median line excentric, more approximate to the less convex margin. Terminal nodules at some distance from the ends of the valve. Striæ 22 to 30 in 0,01 mm., somewhat radiate in the middle and closer at the ends, punctate; puncta arranged in longitudinal undulating rows, 19 to 23 in 0,01 mm. — Pl. V f. 29.

Brackish water: Sierra Leone! Cameroon! Tasmania! Newark N. Jers. fossil (Champlain epoch)!

3. **F. rhomboides** EHB. (1843). — V. rhombic-lanceolate, with obtuse ends. L. 0,07 to 0,16; B. 0,015 to 0,03 mm. Central nodule small or elongated. Transverse striæ parallel, 23 to 24 in 0,01 mm.; longitudinal striæ 20 to 25 in 0,01 mm. — *Nav. rhomboides* EHB. Am. III: 1 f. 15? W. SM. B. D. I Pl. XVI f. 129. GRUN. Banka D. Pl. II f. 14. *Vanheurckia rhomb.* BREB. Ann. Soc. phyto. et micr. de Belgique Vol. I p. 204 (1868). V. H. Syn. p. 112 Pl. XVII f. 1, 2.

Fresh water: Sweden! Finland (from Russian Lapland to Åbo)! England! Belgium (V. H.), Bengal! Australia (Daintree River, Blue Mountains)! New Zealand! Greenland! Canada! Sierra Nevada! White Mountains! Demerara River! Brazil!

Var. *lineolata* EHB. (1843). — V. with several coarse longitudinal furrows. — *N. lineolata* EHB. Am. Pl. I: 3 f. 4 a? M. G. Pl. XVI: 1 f. 3 etc.

Fresh water: Sweden (Degernäs, fossil)! Bengal! New Zealand, fossil!

Var. *oregonica* CL. — V. narrow. L. 0,1; B. 0,015 mm. Transverse striæ 30, longitudinal 25 in 0,01 mm.

Fresh water: Oregon, fossil!

Var. *amphipleuroides* GRUN. (1880). — L. 0,13; B. 0,02 mm. Central nodule elongated; median line slightly excentric. Transverse striæ 23, longitudinal striæ 18 to 19 in 0,01 mm. — *Vanheurckia rhomb. var. amphipl.* GRUN. A. D. p. 47 Pl. III f. 59.

Fresh water: Finland (Russian Lapland, Ladoga)! Mouth of Jenissey! Vancouver Island (Grove Coll.)!

Var. *saxonica* RABH. (1851). — V. lanceolate, with rostrate ends. L. 0,05 to 0,07; B. 0,013 to 0,02 mm. Striæ fine, 34 to 35 (V. H. Syn.). — *Frustulia saxonica* RABH. (Bac. exc. N:o 42. Fl. E. Alg. p. 227). GRUN. Banka D. Pl. I f. 13. *Nav. crassinervia* BRÉB. in W. Sm. B. D. p. 47 Pl. XXXI f. 271 (1853). GRUN. Verh. 1860 p. 548 Pl. V f. 12. DONK. B. D. p. 42 Pl. VI f. 12. *Vanheurckia crass.* BRÉB. Ann. Soc. phyto. et microgr. de Belgique Vol. I p. 204 (1868).

Fresh water: Spitsbergen (Lagerst.), Beeren Eiland (Lagerst.), Sweden! Finland! Germany! Australia (Blue Mountains, Daintree River)! New Zealand! Bengal!

Var. *viridula* BRÉB. (1849). — Frustules in gelatinous tubes. V. elongated, with broad, obtuse ends. L. 0,08 to 0,11; B. 0,015 mm. Striæ 28 to 30 in 0,01 mm. (V. H.). — *Colleton. viridulum* BRÉB. in Kütz. Sp. A. p. 105. *Vanheurckia virid.* BRÉB. Ann. Soc. phyt. et micr. de Belgique Vol. I p. 203 (1868). V. H. Syn. p. 112 Pl. XVII f. 3. *Frustulia torphacea* A. BR. in Rabh. Alg. Sachs. N:o 761 (1858).

Fresh water: Germany! France (Bréb.).

4. **F. interposita** LEWIS (1865). — V. linear-elliptical, with broad, rounded ends. L. 0,12 to 0,13; B. 0,025 to 0,027 mm. Central nodule small, terminal nodules small, approximate to the ends. Transverse striæ 20, longitudinal 18 in 0,01 mm. — *Nav. interposita* LEWIS Proc. Ac. Philad. 1865 Pl. II f. 19. *Nav. Martonfii* PANT. III Pl. XVII f. 247 (1893)?

Brackish water: Sierra Leone! Bombay (Grove Coll.)! Savannah Ga.! Oakland, Calif.! South America (Lewis), Hungary, Tallya fossil (Grun.).

Var. *labuensis* CL. (1883). — Narrow elliptic-lanceolate with obtuse ends. L. 0,065 to 0,072; B. 0,015 mm. Transverse striæ 17; longitudinal 18 to 21 in 0,01 mm. — *Nav. O'M. var. lab.* CL. Vega p. 496.

Marine: Labuan!

Var. *incomperta* LEWIS (1865). — Transverse striæ about 27, longitudinal 22 to 23 in 0,01 mm. — *Nav. incomperta* LEWIS l. c. f. 20.

Brackish water: Atlantic coasts of U. States (Lewis).

Var. *Julieni* BRUN a. HÉRIB. (1893). — L. 0,07; B. 0,012 to 0,017 mm. Transverse striæ about 28, longitudinal 20 in 0,01 mm. — *N. Jul.* BRUN a. HÉRIB. D. d'Auvergne p. 199 Pl. VI f. 8, 9.

Brackish water: Auvergne, fossil!

5. **F. Lewisiana** GREV. (1863). — V. linear, with broad, rounded ends. L. 0,19 to 0,21; B. 0,035 to 0,038 mm. Central nodule small, terminal nodules elongated and linear, at some distance from the ends. Transverse striæ parallel in the middle, convergent at the ends, 24 in 0,01 mm. Longitudinal striæ 25 in 0,01 mm. irregularly undulating. — *Nav. n. sp.* LEWIS Proced. Ac. Nat. Sc. Phil. Pl. II f. 3 (1861). *Nav. Lewis.* GREV. T. M. S. XI p. 15 Pl. I f. 7 (1863). *Vanheurckia Lewisiana* BRÉB. Ann. Soc. phytol. et microgr. Belgique Vol. I p. 202 (1868).

Brackish water: Sierra Leone! Cameroon! India (Wallich), Batavia! Sendaï, Japan, fossil! Brazil (Brun Coll.)! Florida and Georgia (Lewis).

Stenoneis CL. N. GEN.

Valve narrow, with rounded ends. Central and terminal nodules very small. Median line indistinct, bordered by two strong linear silicious ribs. Structure: fine, transverse, striæ. Axial area indistinct.

This genus includes one species only, which I cannot place in any other group. The thick lines on both sides of the median line seem to point to some relation to Frustulia.

1. **S. inconspicua** Greg. (1857). — V. linear, frequently gibbous in the middle, with broad, rounded ends. L. 0,05; B. 0,007 mm. Central nodule very small; terminal nodules small, somewhat distant from the ends. Median line bordered by two strong, siliceous ribs. Axial area indistinct. Central area a broad, transverse fascia. Striæ 26 in 0,01 mm., parallel throughout. — *N.? inconspicua* Greg. D. of Clyde p. 478 Pl. IX f. 3. *N. Fistula* A. S. N. S. D. Pl. II f. 29 (1874). *Stenon. incomp.* Icon. n. Pl. V f. 28.

Marine: North Sea! Scotland (Greg.), Bohuslän! Balearic Islands!

Var. *Baculus* Cl. (1883). — L. 0,065; B. 0,007 mm. Striæ 19 in 0,01 mm., crossed in the middle by a narrow lateral area. — *N. Baculus* Cl. Vega p. 474 Pl. XXXVII f. 51.

Marine: North Siberian Sea, Cape Wankarema!

Cistula Cl. N. G.

Valve broad (of the only known species, rectangular). Central nodule very small. Median line between two siliceous ribs; its central pores very approximate. Structure: slightly radiate striæ, crossed by several longitudinal, blank bands.

This group contains but one species, which I am unable to place in any other. The peculiar form of the median line is nearly the same as in *Stenoneis* and *Frustulia*.

1. **C. Lorenziana** Grun. (1860). — V. rectangular, sometimes slightly gibbous in the middle and at the ends. Striæ slightly radiate throughout, 17 in 0,01 mm., composed of elongated puncta, arranged in regular longitudinal rows, 12 in 0,01 mm., angularly bent in the middle. — *Nav. Lorenziana* Grun. Verh. 1860 p. 547 Pl. III f. 3. *Nav.? Cistella* Grev. T. M. S. XI p. 19 Pl. I fig. 12 to 14 (1863). *Cistula Lor.* Icon. n. Pl. I f. 31.

Marine: South coast of England (Roper), Balearic Islands! Adriatic! Queensland (Grev.)! Port Jackson! Campeachy Bay!

Brebissonia Grun. (1860).

Valve symmetrical, lanceolate or subrhomboid. Central nodule elongated. Terminal fissures almost straight. No longitudinal lines. Structure: coarse, transverse, costate striæ and very fine puncta arranged in very fine longitudinal striæ. Connecting zone simple. Cell-contents: a single chromatophore-plate as in Cymbella.

The only species of this genus was in 1838 described by Ehrenberg as *Cocconema Boeckii*. It was in 1853 placed by W. Smith in the genus *Doryphora* together with *Rhaphoneis amphiceros*. Grunow in 1860 formed for this species the genus *Brebissonia* (Verh. 1860 p. 512), principally characterized by the occurence of the symmetrical frustules on gelatinous stalks. Heiberg in 1863 placed it in *Navicula*, a genus to which it has scarcely any affinity, and from which, according to the researches of Pfitzer (Bau u. Entw. p. 76) it differs greatly in its cell-contents, which are similar to those of *Cymbella*. There is no doubt good reason for placing it in the separate genus *Brebissonia*. By its elongated central nodule it seems to approach to *Amphipleura*, but the structure of the valve is different, and is more like that of the group *Lineolatæ* in the *Naviculæ*. It is at any rate an isolated form of doubtful place in the system. The only known species occurs in brackish water attached by gelatinous stalks to water-plants.

1. **B. Boeckii** Ehb. (1838). — Frustule stipitate. V. lanceolate. L. 0,12; B. 0,023 mm. Central nodule elongated. Terminal fissures straight, at a short distance from the ends. Striæ 10 (middle) to 13 (ends), radiate at the ends. Puncta of the exterior stratum forming fine lineolæ, about 30 in 0,01 mm. — *Cocconema Boeckii* Ehb. Inf. Pl. XIX f. 5. *Doryphora Boeckii* W. Sm. B. D. Pl. XXIV f. 223. *Brebissonia Boeckii* Grun. Verh. 1860 p. 512.

Brackish water: Baltic (from Roslagen and Bay of Finland to Kiel)! Coasts of England! Connecticut to North Carolina!

Var. *minor* Cl. — L. 0,058; B. 0,016 mm. Striæ in the middle 12, at the ends 15 in 0,01 mm.

Brackish water: Amsterdam (Kinker Coll.)!

Amphipleura Kütz (1844).

Valve elongated, fusiform or linear, without longitudinal lines or ridges. Central nodule elongated into a rib, extending throughout the whole valve, furcate towards the ends. Structure: very fine puncta arranged in parallel, transverse and straight longitudinal striæ. Cell-contents: two endochrome-plates along the inside of the connecting zone. Median plasma-mass distinct. On conjugating two cells give origin to two auxospores (»Berkeleya Dillwynii» Lüders Beob. p. 59).

The genus *Amphipleura* was founded in 1844 by Kützing (Bac. p. 103) for *Frustulia pellucida*, known already by him in 1833. *Nitzchia Sigma*, under the name of *Amphipleura rigida*, was also included in the new genus. According to Kützing and all later authors (compare the ideal section in Van Heurck synopsis Pl. XVII f. 14 A) the valve of Amphipleura has on both sides of the axis an elevated line or ridge, which I have always failed to discover. Certain small forms of *Amphipleura* live in gelatinous tubes, and for these the genera *Berkeleya* Grev. (1827), *Rhaphidogloea* (Kütz. 1844) were founded. They have also been included in *Schizonema*, *Micromega*, *Bangia*, *Monema*. *Conferva* etc., but there is no more reason for separating these forms from *Amphipleura* than for distinguishing *Encyonema*, *Endosigma*, *Endostauron*, *Schizonema* and *Colletonema* from *Cymbella*, *Gyrosigma*, *Navicula* and *Frustulia*. The frustules of the forms living in tubes are exactly similar to those of the true *Amphipleura*, only smaller. The shape of the gelatinous tubes is in my opinion of little importance. Grunow in 1880 (Bot. Centralblatt) wrote an elaborate monograph of these forms, to which I refer.

The diatoms most nearly akin to *Amphipleura* are to be found in the genus *Frustulia*. In this genus one meets with forms, having a small central nodule and obscure median line, enclosed between two, strong interior silicious ridges, forming at the ends of the valve a »porte-crayon»-shaped figure. In some forms the central nodule becomes fused together with the siliceous ridges. If the fusion extends farther, we get the forms of the central nodule, characterizing *Amphipleura*. The »forks» in *Amphipleura* correspond to the »port-crayons» in *Frustulia* and to the »horns» in *Diploneis*. Another genus, to a certain degree akin to *Amphipleura* is *Brebissonia*. Perhaps the curious and isolated *Hydrosilicon* Brun, (*Amphiprora rimosa* O'Meara) may be a distant relative. *Amphipleura Debyi* appears in some respects to be intermediate.

All species of Amphipleura, except *A. Debyi*, are nearly related, have the same important characteristics, and differ only in the size, some slight differences in the outline, the length of the forks, and number of striæ. They inhabit fresh as well as brackish or salt water. Freshwater forms are larger, live free or enclosed in mucous, amorphous masses, the marine live enclosed in tubes. Of the freshwater-forms those living in warmer or tropical countries are the largest and in structure coarsest.

1. *Smaller, marine or brackish forms, enclosed in gelatinous tubes* ***(Berkeleya, Raphidogloea).*** [1]

1. **A. rutilans** Trentepohl (1806). — V. short and narrow, obtuse, linear-elliptical or linear-lanceolate. L. 0,015 to 0,035; B. 0,004 to 0,006 mm. Forks about $^1/_3$ as long as the length of the valve. Striæ 28 in 0,01 mm., slightly radiate at the ends. — *Conferva rutilans* Trent. in Roth Cat. III p. 179. *Berkeleya Dillwynii* V. H. Syn. p. 113 Pl. XVI f. 15. *Schizonema Dillw.* W. Sm. B. D. II p. 77 Pl. LVIII f. 366. *Berkel. obtusa* V. H. Syn. l. c. f. 16 and var. *adriatica* f. 17, 18.

Brackish and marine: Baltic (Gulf of Bothnia, at Torneå, Gotland, Bay of Finland)! Caspian Sea (Grun.)! North Sea, English Channel! Mediterranean Sea! Japan!

Var. *antarctica* (Harw.) Grun. 1881. — Striæ 36 in 0,01 mm. — *Berkel. antarct.* Grun. in V. H. Syn. Pl. XVI f. 20. *Berk. Harveyana* Grun. l. c. 14. *Berk. parasitica* Grun. l. c. f. 19. *Berk. finnica* Dannf. Baltic D. Pl. II f. 19 (1882)?

Marine: North Sea (Grun.), Falklands Islands (Grun.), Friendly Islands (Grun.).

2. **A. micans** Lyngb. (1819). — V. linear, with broad and rounded ends, elongated. L. 0,065 to 0,125; B. 0,01 mm. Forks more than $^1/_3$ of the length of the valve. Striæ about 27 in 0,01 mm. — *Bangia micans* Lyngb. Tentamen hydrophytol. p. 84 Pl. XXV. *Berkeleya mic.* Grun. in V. H. Syn. p. 113 Pl. XVI f. 11. *Berk. pumila* V. H. Syn. l. c. f. 13. *Berk. adriatica* Grun. in T. R. M. S. 1877 p. 180 Pl. CXCV f. 15.

Marine: North Sea! Mediterranean Sea (Grun.), Adriatic (Grun.).

Var. *fragilis* (Grev.) Grun. — Striæ 32 to 36 in 0,01 mm. — *Berkel. fragilis* Grev. Scot. Crypt. Fl. Pl. 294. V. H. Syn. Pl. XVI f. 12.

Marine: North Sea (Grun.), Mediterranean Sea (Grun.).

2. *Larger, brackish or freshwater forms, free or in mucous masses* ***(Amphipleura).***

3. **A. pellucida** Kütz. (1833). — V. fusiform, acute. L. 0,08 to 0,14; 0,007 to 0,009 mm. Forks 0,02 mm. Transverse striæ 37 in 0,01 mm. — *Frustulia pellucida* Kütz. Linnea VIII Pl. 13 f. 11. Dec. N:o 83 (1834) accord. to Lagerst. *A. pellucida* Kütz. Bac. p. 103 (1844). W. Sm. B. D. XV f. 127. Grun. Verh. 1862 p. 154. Grun. T. R. M. S. 1877 p. 179. V. H. Syn. p. 113 Pl. XVII f. 14, 15 A.

Fresh and slightly brackish water: Baltic (Gotland, Dannf. Torneå!), Sweden (Mälaren, Vestergötland)! Finland! Belgium (V. H.), England (W. Sm.), Austria (Grun.), Switzerland (Brun.), Japan!

Var. *brasiliensis* Cl. — L. 0,009; B. 0,01 mm. Forks 0,015 to 0,03 mm. Transverse striæ 33, longitudinal 27 in 0,01 mm. — *A. Lindheimeri* Grun. in Cl. M. D. N:o 298.

Fresh water: Brazil! Ecuador!

Var. *Lindheimeri* Grun. (1862). — L. 0,15 to 0,16; B. 0,024 mm. Forks 0,036 mm. Terminal nodules short, rounded. Transverse striæ 26, longitudinal 26 in 0,01 mm. — *A. Lindheim.* Grun. Verh. 1862 p. 155 Pl. XIII f. 11. T. R. M. S. 1877 p. 179 Pl. CXCV f. 13.

Fresh water: Texas (Grun.), Costa Rica (Grove).

Var. *intermedia* Grun. (1877). — L. 0,019 to 0,2; B. 0,013 to 0,015 mm. Forks 0,044 mm. Terminal nodules short rounded. Striæ somewhat finer than in var. Lindheimeri. — Grun. T. R. M. S. 1877 p. 179.

Fresh water: Oregon, fossil (Grun.).

Var. *oregonica* Grun. (1877). — 0,33; B. 0,027 mm. Forks 0,063 mm. Terminal nodules elongated, linear. Striæ as in var. Lindheimeri. — Grun. l. c. p. 179.

Fresh water: Oregon, fossil (Grun.).

[1] See Grunows Monograph in Bot. Centralblatt 1880 N:o $^{47}/_{48}$.

Var. *maxima* H. L. SMITH (1886). — L. 0,37; B. 0,04 mm. Forks 0,01 mm. Striæ 32 in 0,01 mm. — *A. maxima* WALKER and Chase N. R. D. p. 2 Pl. II f. 5.

Fresh water: Oregon, fossil.

Var. *Truani* V. H. — V. fusiform, acute. L. 0,26; B. 0,023 mm. Forks 0,006 mm. Terminal nodules elongated. Transverse and longitudinal striæ 26 in 0,01 mm. — *A. Lindheimeri var. Truani* V. H. T. N:o 166. TRUAN D. Astur. Pl. II f. 34, 35 (according to De Toni). *A. pell. var. Tr.* Icon. n. Pl. VI f. 1.

Fresh water: Spain!

Var. *recta* KITTON (1884). — V. linear, with gently cuneate ends. L. 0,226; B. 0,019 mm. Forks 0,05 mm. Terminal nodules elongated. Striæ 26 in 0,01 mm. — KITTON J. Quekett M. C. (2) II p. 21 Pl. IV f. 4.

Marine: Japan (Kitton).

Var. *Schumannii* GRUN. (1877). — L. 0,18 to 0,02; B. 0,014 mm. Striæ 16 in 0,01 mm. — *A. pellucida* SCHUM. Preuss. D. II N. p. 53 Pl. I f. 9. *A. Schum.* GRUN. T. R. M. S. 1877 p. 180.

Brackish water: Baltic (Schum.)

4. **A. Weissflogii** GRUN. (1877). — V. linear, with rounded ends. L. 0,19 to 0,25; B. 0,012 to 0,013; Forks 0,06 to 0,08 mm. Striæ 25 in 0,01 mm. — GRUN. T. R. M. S. 1877 p. 180 Pl. CXCV f. 14.

Fresh water: Oregon, fossil (Grun.).

5. **A. hungarica** PANT. (1889). — V. narrow fusiform, obtuse. L. 0,08 to 0,1; B. 0,014 mm. Forks a third as long as the valve. Striæ 11 in 0,01 mm. — *Berkeleya hung.* PANT. II p. 55 Pl. IX f. 165.

Marine: Hungary, fossil (Pant.).

A similar form, but with a longitudinal line (?) on each side of the median line is *Berkeleya neogradensis* PANT. III Pl. XXXVI f. 508 (1893).

6. **A. Debyi** LEUD. FORTM. (1892). — V. gibbous in the middle and with very long and narrow protracted ends, of unequal length. L. 0,22; B. 0,02 mm. Forks very elongated. Margin of the valve with coarse »pearls» (loculi?). Striæ not seen. — LEUD. FORTM. D. de la Malaisie p. 22 Pl. II f. 10.

Marine: Sumatra (Leud. Fortm.).

I have had no opportunity of examing this very curious diatom, which to judge from the figure seems to have a loculiferous marginal rim as in Mastogloia.

Naviculæ Mesoleiæ CL.

Valve symmetrical, linear to elliptical, with usually obtuse or rostrate ends. Axial area narrow or indistinct. Central area large, quadrate, or a transverse fascia. Striæ usually fine, punctate and radiate throughout. Connecting zone not complex.

This Section comprises a number of usually small forms, inhabiting fresh, rarely salt water. By *N. Pupula* and *N. bacilliformis* this section is closely connected with *Naviculæ bacillares*. There is also some relation between some species of this group and of the section *Naviculæ punctatæ*.

Artificial key.

1.	Valve constricted in the middle	*N. binodis* EHB.
	— not — — —	2.
2.	Length about 0,12 mm.	*N. Szaboi* PANT.
	— — 0,04 mm. or less	3.
3.	Terminal nodules with lateral expansions	*N. Pupula* KÜTZ.
	— — without — —	4.

4.	Central area reaching nearly to the margin	5.
	— — — not more than half the breadth of the valve	9.
5.	Valve trochiform	*N. Lagerheimii* Cl.
	— elliptical	6.
6.	Central area with a single marginal stria	7.
	— — without — — —	8.
7.	Isolated stria on one side only	*N. asymmetrica* Pant.
	— — — both sides	*N. ulvacea* Berkel.
8.	Striæ 20 in 0,01 mm.	*N. obliqua* Greg.
	— 27 — —	*N. Rotœana* Rabh.
9.	Central area with a stigma	*N. mutica* Kütz.
	— — without —	10.
10.	Ends capitate	*N. Heufleriana* Grun.
	— not —	11.
11.	Length about 0,04 mm. or more	*N. bacilliformis* Grun.
	— — 0,025 mm.	*N. Haradaœ* Pant.
	— 0.014 to 0,02 mm. or less	12.
12.	Ends rostrate	13.
	— rounded	15.
13.	Valve biconstricted	*N. nivalis* Ehb.
	— elliptical to lanceolate	14.
14.	Striæ distinct	*N. Kotschyi* Grun.
	— very delicate	*N. depressa* Cl.
15.	Valve centrally gibbous	*N. Seminulum* Grun.
	— not — —	*N. minima* Grun.

1. **N. minima** Grun. (1880). — V. linear with broad rounded ends. L. 0,015; B. 0,0045 mm. Central area small, quadrate. Striæ 26 in 0,01 mm., more distant in the middle of the valve, radiate throughout. — *N. minutissima* Grun. Verh. 1860 p. 552 Pl. IV f. 2. *N. minima* Grun. in V. H. Syn. p. 107 Pl. XIV f. 15, 16. *N. Saugerri var.* Grun. in V. H. S. f. 16 b. *Synedra pusilla* Kütz. (according to Grun.).

Fresh water: Belgium (V. H.).

Var. *atomoides* Grun. (1880). — V. elliptical. L. 0,008; B. 0,004 mm. Striæ 27 to 30 in 0,01 mm. — *N. atomoides* Grun. in V. H. Syn. Pl. XIV f. 12—14.

Fresh water: Belgium (V. H.).

2. **N. Seminulum** Grun. (1860). — V. sublinear, gibbous in the middle, with broad, subtruncate ends. L. 0,015; B. 0,004 mm. Central area quadrate, not very large. Striæ 20 in 0,01 mm., radiate throughout. — *N. Seminulum* Grun. Verh. 1860 p. 552 Pl. IV f. 3. Lagst. Spitsb. D. Pl. II f. 9. V. H. Syn. p. 107 Pl. XIV f. 8, 9. *N. Saugerri* Desmaz in V. H. Syn. f. 8 a'.

Fresh or slightly brackish water: Spitsbergen (Lagst.), Sweden (Bollnäs in Helsingland, Koön in Bohuslän)! Belgium (V. H.), Japan! Greenland!

Var. *fragilarioides* Grun. (1880). — Striæ somewhat coarser. — Grun. in V. H. Syn. f. 10.

3. **N. Rotæana** Rabh. (1852). — V. elliptical with rounded ends. L. 0,013 to 0,024; B. 0,006 to 0,008 mm. Central area large and broad, reaching near to the margin. Terminal fissures of the median line in contrary direction. Striæ about 28 in 0,01 mm., radiate throughout. — *Stauroneis Rotœana* Rabh. Hedw. I p. 103 Pl. XIII f. 7 (1852). Grun. Verh. 1860 p. 565 Pl. VI f. 14. *Stauron. minutissima* Lagst. Spetsb. D. p. 39 Pl. I f. 13 (1873). *Stauron. ovalis* Greg. M. J. IV Pl. I f. 36 (1856). *Stauron. Cohnii* Brun D. des Alpes p. 91 Pl. IX f. 10 (1880). *Navic. Rotœana* V. H. Syn. Pl. XIV f. 17—19.

Fresh water: Spitsbergen (Ldt), Sweden! Finland! Austrian alps (Grun.).

Var. *excentrica* Grun. (1880). — Median line somewhat excentric. — Grun. in V. H. Syn. XIV f. 20.

Var. *oblongella* Grun. (1880). — Valve narrow elliptical. — Grun. in V. H. S. XIV f. 21. *Nav. oblongella* Grun. Verh. 1860 p. 551 Pl. IV f. 4?

4. **N. Haradaæ** PANT. (1893). — V. broadly elliptical, with broad, rounded ends. L. 0,025; B. 0,018 mm. Axial area indistinct. Central area large, somewhat transverse, half as broad as the valve. Striæ 20 in 0,01 mm. radiate throughout. — PANT. III Pl. VI f. 100.

Habitat? »Sentenaï» (Pant.).

5. **N. depressa** CL. (1891). — V. elliptical, with rostrate ends. L. 0,022; B. 0,009 mm. Surface of the valve depressed between the margin and the longitudinal and transverse area. Central area about $^1/_3$ of the breadth of the valve. Striæ 27 in 0,01 mm., more distant (about 24 in 0,01 mm.) in the middle, slightly radiate, especially near the ends. — CL. D. of Finl. p. 35 Pl. II f. 4.

Fresh water: Sweden, Åreskutan in Jämtland! Wernamo, fossil! Finland (Imandrian Lapland, Suomenniemi, fossil)!

6. **N. binodis** EHB. (1840). — V. strongly constricted in the middle, with rostrate-capitate ends. L. 0,025; B. 0,008 mm. Axial area indistinct. Central area small. Striæ about 30 in 0,01 mm., sligthly radiate. — EHB. Ber. 1840 p. 18. W. SM. B. D. I p. 53 Pl. XVII f. 159. GRUN. Verh. 1860 p. 551 Pl. II f. 42. DONK. B. D. p. 38 Pl. VI f. 3. V. H. Syn. p. 108, Suppl. Pl. B. f. 33.

Fresh water: England (Sm.), Belgium (V. H.), Switzerland! Japan!

7. **N. (Dickieia) ulvacea** BERKL. (1844). — V. linear-elliptical, with rounded ends. L. 0,025 to 0,035; B. 0,008 to 0,012 mm. Axial area indistinct. Central area a narrow, transverse fascia furcate at the margin. Striæ 16 in 0,01 mm., slightly radiate at the ends. Frustules in leaf-like, flat and stipitate gelatinous mass, in length about 1 to 5 cm. — *Dickieia ulv.* BERKL. in Kütz. Bac. p. 119. V. H. Syn. Pl. XVI f. 10.

Marine: Scotland (Dickie), Ireland (O'Meara), Balearic Islands!

8. **N. asymmetrica** PANT. (1893). — V. narrow elliptical, obtuse. L. 0,025; B. 0,01 mm. Central area a broad fascia, reaching the margins, where is, unilaterally, in the middle of the area a single stria. Striæ radiate, 19 in 0,01 mm. — PANT. III Pl. VII f. 110.

Habitat? »Sentenaï» (Pant.).

9. **N. mutica** KÜTZ (1844). — V. of variable shape, elliptic-lanceolate, frequently with undulated margins. L. 0,013 to 0,033; B. 0,007 to 0,011 mm. Axial area narrow. Central area large, transversely dilated, with an isolated punctum on one side of the central nodule. Striæ 18 to 20 in 0,01 mm. radiate at the ends, distinctly punctate. A few of the median striæ shorter than the rest. — KÜTZ Bac. p. 93 Pl. III f. 32 (according to Arnott). GRUN. A. D. p. 40.

Forma Cohnii HILSE (1860). — V. elliptic-lanceolate, with rounded ends. — *Stauron. Cohnii* HILSE Beitr. p. 83. *N. mutica v. Coh.* V. H. Syn. p. 95 Pl. X f. 17. *Stauron. polymorpha* LAGST. Spitsb. D. p. 39 Pl. I f. 12.

Brackish water: Spitsbergen! Belgium (V. H.), Bengal! Daintree River, Australia! Lost Spring Ranch, Calif.!

Forma Göppertiana BLEISCH (1861). — V. lanceolate. — *Stauroneis Semen* EHB. M. G. XXXVIII A 20 f. 1 (1854)? *Stauron. Göppertiana* BLEISCH Rabh. A. E. N:o 1183 (1861). *Nav. mutica* GRUN. Verh. 1860 p. 538 Pl. V f. 16. *Stauron. Cohnii* SCHUM. Tatra p. 78 Pl. IV f. 61. *N. mut. v. Göppertiana* V. H. Syn. p. 95 Pl. X f. 18, 19.

Fresh or brackish water: Belgium (V. H.), Nova Scotia! West Indies! Ecuador!

Forma producta GRUN. (1880). — V. lanceolate, with broad, truncate ends. — GRUN. A. D. p. 41.

Forma ventricosa KÜTZ (1844). — V. inflated, with capitate ends. L. 0,016 to 0,022; B. 0,06 to 0,08 mm. Striæ 17 in 0,01 mm. — *Stauron. ventric.* KÜTZ Bac. p. 105 Pl. XXX f. 27. GREG. M. J. IV Pl. I f. 10 (1856). *Nav. (St.) vent.* V. H. Syn. p. 96 Pl. IV f. 1 b.

Brackish water: Argentina!

Var. *Peguana* GRUN. (1879). — V. lanceolate, slightly triundulate with subacute ends. L. 0,04; B. 0,01 mm. Striæ in the middle 15 at the ends 20 in 0,01 mm. — GRUN. Cl. M. D. N:o 188.

Brackish water: Bengal!

Var. *Legumen* CL. — V. linear, triundulate, with cuneate, acute ends. L. 0,035; B. 0,009 mm. Striæ 21 in 0,01 mm.

Fresh water: Surinam!

Forma undulata HILSE (1860). — V. with three to four undulations on the margins. — *Stauroneis undulata* HILSE Beitr. p. 83. *Nav. mutica v. undulata* GRUN. A. D. p. 41. V. H. Syn. p. 95 Pl. X f. 20 c.

Brackish water: South Africa! Ecuador!

N. mutica is a very variable species, having the appearance of a Stauroneis, under a low power. All varieties have the unilateral isolated punctum in the area.

10. **N. Kotschyii** GRUN. (1860). — V. lanceolate, rostrate, with obtuse ends. L. 0,0136 to 0,022; B. 0,0054 to 0,0068 mm. Axial area narrow. Central area large transversely dilated, without an isolated punctum. Striæ 19 to 23 in 0,01 mm., closer near the ends, radiate, distinctly punctate. — GRUN. Verh. 1860 p. 538 Pl. IV f. 12. A. D. p. 41. *Nav. Kotschyana* V. H. Syn. Pl. X f. 22.

Fresh water, hot springs: Buda-Pest!

11. **N. Heufleriana** GRUN. — V. inflated, with large capitate and flattened ends. L. 0,0244 to 0,032; B. 0,008 to 0,009 mm. Axial area indistinct. Central area large, almost quadrate, without an isolated punctum. Striæ 16 in 0,01 mm. — *Stauron. Heufleriana* GRUN. Verh. 1863 p. 155 Pl. IV f. 10. *St. Heufleri.* V. H. Syn. Pl. IV f. 1 a.

Fresh water: Tyrol (Grun.).

This form is very nearly connected with *N. mutica var. ventricosa*, almost only difference being absence of an isolated punctum in the central area.

12. **N. nivalis** EHB. (1854). — V. with triundulate margins and rostrate-truncate ends. L. 0,0122 to 0,018; B. 0,0054 mm. Axial area indistinct, central area large, rounded-quadrate, without an isolated punctum. Striæ 18 to 19 in 0,01 mm. radiate to the ends and composed of distinct puncta, 18 to 24 in 0,01 mm. — EHB. M. G. XXXIII B. a f. 5. *N. quinquenodis* GRUN. Verh. 1860 p. 522 Pl. III f. 33. Verh. 1863 p. 149 Pl. IV f. 9. CL. D. of Finland p. 33 Pl. II f. 5. *N. undosa* DONK. B. D. p. 37 Pl. VI f. 1 (1871).

Fresh water: Sweden (Upsala)! Finland! Belgium (V. H.), Brünn (Grun.), Blue Mountains, Australia!

13. **N. obliqua** GREG. (1856). — V. broad, elliptic-lanceolate. L. 0,04; B. 0,016 mm. Median line slightly sigmoid, with the ends in contrary directions. Axial area very narrow or indistinct; central area a broad transverse fascia, almost reaching to the margin, where it becomes somewhat wider. Striæ 21 in 0,01 mm., in the middle a little more distant, almost parallel, distinctly punctate; puncta about 21 in 0,01 mm., arranged in somewhat undulating longitudinal rows. — *Stauroneis obliqua* GREG. M. J. IV p. 11 Pl. I f. 35. *N. obl.* Icon. n. Pl. V f. 26.

Fresh water: Scotland (Loch Leven) Greg., Engl. Windermere, Grove Coll.! Sweden, bottom-mud from Vettern!

GREGORY's figure shews no structure and a decided sigmoid bent of the median line. The above description is from a specimen in GROVES collection, which perfectly agrees with the description of Gregory. On original specimens from Loch Leven in Deby's collection I could not distinctly see the sigmoid flexure of the median line. Neither could I find the median line sigmoid on specimens from Åbo (Diat. of Finl. p. 34 Pl. III f. 1), Oregon and the mouth of the Jenissey. Having had no opportunity of reexamining these specimens I am unable to state whether I am guilty of a mistake on this point, or these forms represent a variety with straight median line. In all cases the above description refers to a specimen, doubtless identical with *Stauroneis obliqua* GREG.

14. **N. Szaboi** Pant. (1889). — V. linear elliptical, with rounded ends. L. 0,123; B. 0,029 mm. Central area large, dilated outwards. Striæ 12 in 0,01 mm. parallel, convergent at the ends, punctate, puncta forming longitudinal rows. — Pant. II p. 54 Pl. VI f. 120.

Brackish water: Hungary fossil (Pant.).

This species is unknown to me and I have placed it with some hesitation in this section as it seems to be most nearly related to *N. obliqua*.

15. **N. Lagerheimii** Cl. N. Sp. — V. rhomboid, very dilated in the middle, with truncate ends. L. 0,027 to 0,033; B. 0,013 to 0,014 mm. Axial area very narrow; central area a broad transverse fascia, reaching nearly to the margin, without an isolated punctum. Striæ 18 in 0,01 mm., radiate at the ends, coarsely punctate; puncta about 16 in 0,01 mm.

Fresh water (moist rocks): Ecuador, Pichincha!

This species has the outline of *Anomoeoneis Follis* and is remarkable for its large central area. The central nodule seems to be stauroid.

16. **N. bacilliformis** Grun. (1880). — V. linear, with broad, rounded ends, frequently somewhat gibbous in the middle and at the ends. L. 0,032 to 0,045; B. 0,009 to 0,01 mm. Central area rectangular, half as broad as the valve. Striæ 12 to 15 in 0,01 mm. at the middle, 20 to 22 in 0,01 mm. at the ends, where they are radiate and curved. — Grun. A. D. p. 44 Pl. II f. 51. V. H. S. Pl. XIII f. 11. Pant. III Pl. III f. 49.

Fresh water: Norway, Dovre (Grun.). Finland! Australian Alps (Riewa Lagoons)! Ecuador!

17. **N. Pupula** Kütz. (1844). — V. linear, frequently gibbous in the middle, with broad, rounded or subtruncate ends. L. 0,022 to 0,037; B. 0,007 to 0,009 mm. Terminal nodules with two lateral expansions. Central area about $^1/_2$ as broad as the valve, quadrate. Striæ 13 to 15 in 0,01 mm. at the middle, 22 to 23 in 0,01 mm. at the ends, radiate at the ends, very finely punctate. — Kütz. Bac. p. 93 Pl. XXX f. 40. *N. Pup. var. genuina* Grun. A. D. p. 45 Pl. II f. 53. V. H. Syn. p. 106 Pl. XIII f. 15, 16. *Stauroneis Wittrockii* Ldt. Spitsb. D. p. 38 Pl. II f. 15 (1873) (perhaps N. bacilliformis). *Stauroneis tatrica* Gutwinsky Mat. fl. Galicyi 1890 p. 24 Pl. I f. 20 (perhaps N. bacilliformis)? *Schizostauron? tatric.* De Toni Notarisia 1890 p. 196.

Fresh water: Spitzbergen! Sweden! Finland! Norway! Belgium! England! Bengal! Australian Alps! Japan! New Zealand! Sandwich Islands! South Africa! Greenland! Kansas! Argentina! Ecuador!

Var. *rectangularis* Greg. (1854). — V. linear with broad, subrostrate ends. — *Stauroneis rectangularis* Greg. M. J. II Pl. IV f. 17. *N. Pup. v. rect.* Grun. A. D. p. 45.

Fresh water: Scotland (Greg.).

Var. *bacillaroides* Grun. (1880). — V. linear with rounded ends. — Grun. A. D. p. 45.

Naviculæ Entoleiæ Cl.

Valve symmetrical, linear-lanceolate or fusiform to elliptical, rarely constricted. Median line with somewhat distant central pores. Axial and central areas combined in a more or less broad, lanceolate space. Striæ fine, finely punctate, radiate at the ends. Connecting zone not complex.

This section comprises forms in some respects intermediate between those of the sections *Nav. microstigmaticæ* and *Nav. lævistriatæ*. Some of them appear to be related to the *Nav. fusiformes*, but differ in the more distant central pores and in the axial area.

The species of this section partly inhabit fresh, and partly salt water. Some of the small fresh-water species usually grow in filaments, and are then called *Diadesmis*.

Artificial key.

1.	Small forms. L. 0,02 mm. or less	2.
	Larger — L. 0,04 or more	7.
2.	Striæ 13 to 16 in 0,01 mm.	3.
	— much finer	4.
3.	Striæ nearly parallel	*N. Scutum* V. H.
	— radiate —	*N. infirma* Grun.
4.	Striæ about 21 in 0,01 mm.	*N. confervacea* Kütz.
	— — 33 — —	5.
5.	Valve gibbous in the middle and at the ends	*N. contenta* Grun.
	— — — — but not at the ends	6.
6.	Valve sublinear	*N. Flotowii* Grun.
	— subelliptical	*N. perpusilla* Grun.
7.	Valve with undulated margins	*N. polygibba* Pant.
	— — non — —	8.
8.	Valve elliptical with rounded ends	9.
	— lanceolate or fusiform	11.
9.	Terminal fissures in contrary direction	*N. fallax* Cl.
	— — — the same —	10.
10.	Puncta twice as close as the striæ	*N. Beta* Cl.
	— as close as the striæ	*N. Hochstetteri* Grun.
11.	Valve broadly lanceolate	12.
	— narrow — or fusiform	16.
12.	Puncta forming straight, longitudinal rows	*N. Iota* Cl.
	— — undulating — —	13.
13.	Area broad	14.
	— narrow	15.
14.	Striæ 10 in 0,01 mm.	*N. semitecta* A. S.
	— 13 —	*N. occidentalis* Cl.
	— 19 —	*N. definita* Grove a. Sturt.
15.	Valve rostrate	*N. mocsarensis* Pant.
	— obtuse	*N. Bäumleri* Pant.
	— acute	*N. Kappa* Cl.
16.	Valve fusiform	17.
	— narrow lanceolate	*N. Foliola* Brun a. Temp.
17.	Striæ radiate in the ends	*N. monmouthiana* Grun.
	— almost parallel	18.
18.	Striæ »crossed by two lines»	*N. fusoides* Grun.
	— not	*N. inornata* Grun.

1. **N. contenta** Grun. (1880). — V. linear, gibbous in the middle, with broad capitate ends. L. 0,007 to 0,01; B. 0,002 to 0,0025 mm. Axial area narrow, linear, slightly dilated in the middle. Striæ almost parallel 36 in 0,01 mm. — *N. trinodis* V. H. Syn. Pl. XIV f. 31 a. *N. contenta* Grun. in V. H. Syn. p. 109.

Fresh water (on moist rocks and mosses): Sweden (Trollhättan)! Finland (Åbo)! Belgium (V. H.), Salzburg! Amsterdam Island!

Var. *biceps* Arnott Ms. — V. not gibbous in the middle. — *Diadesmis biceps* Arnott (according to Grun.). *Nav. trinodis var. biceps* V. H. Syn. XIV f. 31 b.

Fresh water: Belgium (V. H.), Ecuador!

2. **N. (Diadesmis) Flotowii** Grun. (1880). — V. narrow, lanceolate, with broad, obtuse ends. L. 0,015; B. 0,004 mm. Area narrow, lanceolate. Striæ radiate, 35 in 0,01 mm. — Grun. V. H. Syn. p. 109 Pl. XIV f. 41.

Fresh water: Belgium (V. H.), France (V. H. T.).

3. **N. perpusilla** GRUN. (1860). — V. subelliptical, gibbous in the middle and with broad, subtruncate ends. L. 0,012; B. 0,004 to 0,005 mm. Area lanceolate, narrow. Striæ about 30 in 0,01 mm., radiate throughout. — GRUN. Verh. 1860 p. 552 Pl. IV f. 7. V. H. Syn. Pl. XIV f. 22, 23.

Fresh water (on moist rocks, earth etc.): Scotland (Aberdeen)! Sweden (Taberg in Småland)! Finland (Lapland to Åbo)! Arctic America!

4. **N. (Diadesmis) confervacea** KÜTZ (1844). — V. thick, lanceolate, obtuse. L. 0,02; B. 0,005 to 0,007 mm. Area lanceolate. Striæ 20 to 22 in 0,01 mm. radiate throughout, finely punctate. Frustules cohering in long bands. — KÜTZ Bac. p. 109 Pl. XXX f. 8. GRUN. Novara p. 21 Pl. I f. 19. *N.* (*Diad.*) *conf.* V. H. Syn. XIV f. 36.

Fresh water, tropics: Jamaica! Rio Janeiro! Marquesas Island! Sandwich Islands!

Var. *peregrina* W. SM. (1861). — V. elliptical. L. 0,012 to 0,015; B. 0,006 to 0,0065 mm. Striæ 22 in 0,01 mm. — *Diadesmis peregrina* PRITCH Inf. p. 923. GRUN. Novara Pl. I f. 20. *Nav. confervacea var. peregrina, et hungarica* GRUN. in V. H. Syn. Pl. XIV f. 37, 38.

Fresh water: Rangoon! Australian Alps (Riewa Lagoon)! Tahiti (Grun.), Jamaica! Ecuador!

5. **N. Scutum** (SCHUM.?) V. H. (1880). — V. narrow elliptical, with rounded ends. L. 0,03; B. 0,01 mm. Area narrow, lanceolate, dilated around the central nodule. Striæ 16 in 0,01 mm., very slightly radiate, finely punctate. — SCHUM. Pr. D. p. 188 f. 45 (1862)? V. H. Syn. p. 98 Pl. XI f. 14.

Fresh water: Belgium (V. H.).

N. Scutum V. H. and *N. infirma* GRUN. are, as far as I may judge from the descriptions and the figures, closely akin, the only difference being that the striæ of the former are less radiate. The *Nav. Scutum* SCHUM. from the Königsberg deposit has about the same size, and 14 striæ in 0,01 mm., but no area, so it seems doubtful whether it be the same species as Van Heurck's. The *Nav. Scutum* SCHUM. is perhaps a form of *Cocconeis Placentula*. Another small form of about the same outline and size and with 15 parallel striæ in 0,01 mm., but without area is *Nav. ignobilis* PANT. (II p. 48 Pl. XXV f. 367, 1889) from the brackish strata of Kavna, Hungary. A similar form is *N. debilis* PANT. III Pl. VI f. 98. Having had no opportunity of examining these forms I am unable to decide whether or not they are identical.

6. **N. infirma** GRUN. (1882) — V. linear elliptical, with rounded ends. L. 0,02; B. 0,007 mm. Area narrow, lanceolate. Striæ 13 (middle) to 17 (ends) in 0,01 mm. radiate throughout and finely punctate. — GRUN. Foss. D. Öster. Ung. p. 146 Pl. XXX f. 53.

Fresh water: Hungary fossil (Dubravica Grun.).

7. **N. inornata** GRUN. (1880). — V. fusiform, convex. L. 0,05 to 0,09; B. 0,088 mm. Median line with approximate central pores. Area narrow, lanceolate. Striæ 19 to 21 in 0,01 mm. at the middle, 23 to 24 in 0,01 mm. at the ends, almost parallel. — GRUN. A. D. p. 46 Pl. III f. 56. *N. Acus* CL. A. D. p. 14 Pl. III f. 55. *N. Hahnii* PETIT Cape Horn D. p. 124 Pl. X f. 11 (1888). *N. filiformis* PANT. III Pl. XXXIX f. 538 (1893)?

Marine: Finmark! Bohuslän! Mediterranean (Pithuisian Island)! Ile de Brehat, Manche! Cape Horn!

N. inornata seems to have a longitudinal line crossing the striæ, but this line is an optical illusion, arrising from the convexity of the valve. This species forms a passage from this group to the section N. fusiformes, which has no distinct area, parallel striæ, and very approximate central pores.

8. **N. fusoides** GRUN. (1880). — V. narrow, linear-lanceolate, with more or less obtuse ends. L. 0,05 to 0,12; B. 0,007 to 0,012 mm. Axial area narrow. Striæ 21 to 25 in 0,01 mm. slightly radiate, crossed by two longitudinal lines. — *N. subula* GRUN. Verh. 1860 p. 548 Pl. III f. 24. *N. fusoides* GRUN. A. D. p. 46.

Marine: Bohuslän (Grun.), Mediterranean Sea (Grun.).

I have not seen this species, which according to GRUNOW resembles *N. inornata*. The two distinct longitudinal lines seem to indicate that *N. fusoides* is a Caloneis.

9. **N. Foliola** BRUN a. TEMP. (1889). — V. narrow-lanceolate, subacute. L. 0,08 to 0,1; B. 0,015 to 0,017 mm. Central pores of the median line distant. Striation fine, most visible near the margin. — BRUN a. TEMP. D. f. du Japon p. 43 Pl. VII f. 15.

Marine: Japan, fossil (Brun a. Temp.).

I have not seen this species, which is not sufficiently figured and described to acertain its proper place.

10. **N. monmouthiana** GRUN. (1880). — V. fusiform. L. 0,062 to 0,09; B. 0,011 to 0,022 mm. Median line with somewhat distant central pores and small comma-like terminal fissures turned in the same direction. Area linear. Striæ 16 (middle) to 20 (ends) in 0,01 mm., almost parallel in the middle, radiate at the ends. — GRUN. A. D. p. 46. Icon. n. Pl. V f. 20.

Fresh water: N. America fossil (Cherryfield, Monmouth)!

11. **N. Bäumlerii** PANT. (1886). — V. elliptic-lanceolate, with obtuse ends. L. 0,096 to 0,11; B. 0,018 mm. Area narrow, linear-lanceolate. Striæ 9 in 0,01 mm. almost parallel in the middle, radiate at the ends, coarsely punctate; puncta 13 in 0,01 mm., forming longitudinal undulating rows. — PANT. I p. 22 Pl. XII f. 108; II Pl. XXIII f. 347.

Marine: Hungary, fossil (Pant.).

Var. *interrupta* PANT. (1886). — Striæ 12 to 14 in 0,01 mm. crossed by a marginal line. — PANT. I l. c. f. 103.

Marine: Hungary, fossil (Pant.).

I have not seen this species, which I have provisionally placed in this section. It is perhaps akin to *Nav. rhombica*. The terminal fissures seem, according to the fig. 103 in Pantocseks work, to be turned in contrary directions.

12. **N. occidentalis** CL. N. Sp. — V. lanceolate, with slightly protracted ends. L. 0,04 to 0,045; B. 0,015 to 0,02 mm. Axial area moderately broad somewhat dilated in the middle. Striæ 13 in 0,01 mm. radiate throughout coarsely punctate; puncta about 16 in 0,01 mm.

Fresh water: Pitt River (Oregon), fossil (Grove Coll.)!

This species has some resemblance to *N. lacustris*, from which it differs by its much broader area.

13. **N. semitecta** A. S. (1874). — V. lanceolate. L. 0,042; B. 0,013 mm. Area lanceolate, broad. Striæ 10 in 0,01 mm., slightly radiate throughout, coarsely punctate. — A. S. Atl. Probetafel f. 11.

Marine: Campeachy Bay (Atl.).

I do not know this species, which may perhaps be a Mastogloia.

14. **Navicula Iota** CL. N. Sp. — V. elliptic-lanceolate, gradually tapering from the middle to the subacute ends. L. 0,1; B. 0,021 mm. Median line with somewhat distant central pores and small terminal fissures. Axial area broad, lanceolate. Striæ 13,5 (middle) to 16 (ends) in 0,01 mm., slightly radiate throughout, of equal length in the middle, distinctly punctate; puncta 16 in 0,01 mm. arranged in regular, longitudinal rows. — Pl. V. f. 22.

Marine: Madagascar (Van Heurck Coll.)!

15. **N. Kappa** CL. N. Sp. — V. narrow lanceolate, with elevated, acute ends. L. 0,17; B. 0,028 mm. Median line with transversely dilated median pores and elongated terminal fissures, turned in the same direction. Area narrow near the ends of the valve, gradually widened towards the middle. Striæ 16 in 0,01 mm., not closer near the ends, of equal length and slightly radiate

in the middle, transverse at the ends, punctate, puncta, 14 in 0,01 mm. forming undulating, longitudinal rows. — Pl. V f. 21.

Marine: Oamaru, New Zealand, fossil!

16. **N. definita** Grove a. Sturt (1887). — V. elliptic-lanceolate. Ends obtuse and with short diaphragms. L. 0,15; B. 0,04 mm. Median line with the terminal fissures in contrary directions. Area linear-lanceolate, broad, Striæ 18 in 0,01 mm., not closer near the ends, punctate; puncta, 17 in 0,01 mm., forming longitudinal undulating rows. — Grove a. Sturt Q. M. Cl. III p. 73 Pl. VI f. 11.

Marine: Oamaru, New Zealand, fossil!

Var. *intermedia* Cl. — V. subelliptical, with rounded ends. L. 0,09; B. 0,028 mm. Striæ 18 in 0,01 mm., crossed near the margin by a line. — Pl. V f. 24, 25.

Marine: Oamaru, New Zealand fossil (Tempère)!

The *var. intermedia* is a form connecting *N. fallax* with *N. definita.*

17. **N. fallax** Cl. N. Sp. — V. elliptic-lanceolate, with rounded ends. L. 0,085; B. 0,032 mm. Median line with the terminal fissures in contrary direction. Area very broad, lanceolate. Striæ 20 in 0,01 mm., radiate throughout, punctate; puncta about 23 in 0,01 mm. The striæ seem to be crossed near the margin by a fine line. — Pl. V f. 27.

Marine: Oamaru, New Zealand, fossil (Grove Coll.)!

This interesting species seems at the first view to be *Nav. nebulosa*, having the outline and marginal striate band of the latter, but a closer inspection shews that it is entirely different, having no rows of striæ along the median line. In fact it is nearly akin to *N. definita.*

18. **N. Hochstetteri** Grun. (1863). — V. elliptical with broad, rounded ends. L. 0,027 to 0,057; B. 0,019 to 0,032 mm. Area broad, subrhomboidal. Striæ 15 (middle) to 20 (end) in 0,01 mm. radiate throughout, in the middle alternately longer and shorter, distinctly punctate; puncta about 17 in 0,01 mm., and close to the area uniting into short lines. — Grun. Verh. 1863 p. 153 Pl. V f. 2. Novara p. 19. A. S. Atl. VIII f. 53—55.

Marine: Nicobar Island (Grun.), Java! Carpentaria Bay (Atl.), California (Su Pedro, fossil, Kinker Coll.)! Cape Horn (Petit), Brazil (Atl.).

Var. *placita* Grove a. Sturt (1887). — L. 0,045; B. 0,025 mm. Striæ 14 (middle) to 19 (ends) in 0,01 mm., a few only in the middle being shorter than the others, punctate; puncta 14 in 0,01 mm. — *N. placita* Grove a. Sturt Q. M. Cl. III p. 133 Pl. X f. 14.

Marine: Oamaru, New Zealand, fossil!

As Grunow has already remarked there is no specific distinction between *N. placita* and *N. Hochstetteri.* Nearly akin to *N. Hochstetteri* is *N. Beta*, which differs only by its less coarsely punctate striæ.

19. **N. Beta** Cl. N. Sp. — V. elliptical, with broad rounded ends. L. 0,043; B. 0,025 mm. Median line with the terminal fissures in the same direction. Area broad, lanceolate. Striæ 13 (middle) to 17 (ends) in 0,01 mm. radiate at the ends, in the middle alternately longer and shorter, finely punctate; puncta about 26 in 0,01 mm. — Pl. V f. 30.

Marine: Japan (Tempère)!

20. **N. polygibba** Pant. (1893). — V. lanceolate subapiculate, ends; margins with four undulations. L. 0,055; B. 0,025 mm. Axial area narrow, not dilated in the middle. Striæ radiate throughout, 16 in 0,01 mm. punctate; puncta 16 in 0,01 mm. — Pant. III Pl. V f. 85.

Habitat:? Kavna-Bremia, Hungary, fossil.

Unknown to the author. It has a considerable likeness to *N. mutica var. undulata.*

21. **N. mocsarensis** Pant. (1893). — V. broad, elliptic-lanceolate, rostrate. L. 0,053; B. 0,026 mm. Axial area narrow, dilated towards the middle, where it expands into a somewhat trans-

verse central area. Striæ 9 in 0,01 mm., radiate throughout, coarsely punctate; puncta 12 in 0,01 mm. — PANT. III Pl. XXIII f. 340.

Habitat:? Mocsár. (Pant.).

This form resembles *N. amphibola* or *N. Placentula*. Unknown to the author.

Naviculæ Bacillares CL.

Valve linear to elliptical, usually with broad and rounded ends. Median line straight, enclosed by siliceous thickenings. Terminal nodules incrassate. Axial area usually narrow or indistinct; central area very small. Structure: fine transverse striæ, more distant in the middle than elsewhere, slightly radiate throughout and curved, very finely punctate. Connecting zone simple.

This section comprises forms, which are nearly akin to the *N. mesoleiæ*, and it would perhaps be more natural to include in this group *N. Pupula* and *N. bacilliformis*, which are closely connected with *N. Pseudobacillum*. On the other hand, the nature of the striæ, which are more distant in the middle, indicates a relationship to the section *N. decipientes*. In the section Bacillares I have included a form, which in some respects is aberrant from the rest, viz. *N. americana*, which has a broad, axial area and almost equidistant striæ. Nevertheless, this form is connected by *N. Lambda* with *N. Bacillum*, and I think it better to place it in this group rather than in the section *N. mesoleiæ*, with which it has still less affinity, or to form a separate group for this single species as VAN HEURCK has done in his synopsis.

Artificial key.

1.	Axial area broad	*N. americana* EHB.
	— — narrow or indistinct	2.
2.	Central and terminal areas with stigmas	*N. trinotata* PANT.
	— — — — without —	3.
3.	Terminal nodules laterally expanded	*N. Pseudobacillum* GRUN.
	— — not — —	4.
4.	Length 0,06 to 0,1 mm.	5.
	— 0,055 or less	6.
5.	Valve linear	*N. Lambda* CL.
	— elliptical	*N. Riojæ* CL.
6.	Terminal fissures comma-like	*N. subhamulata* GRUN.
	— — not prolonged	*N. Bacillum* GRUN.

1. **N. americana** EHB. (1843). — V. broad, linear, with rounded ends. L. 0,055 to 0,1; B. 0,014 to 0,017 mm. Central nodule strong, with one or two pore-like puncta. Axial and central areas uniting in a very broad space, somewhat dilated in the middle. Striæ 16 in 0,01 mm., of equal length, parallel in the middle, radiate in the ends. — EHB. Am. p. 129 M. G. II: 2, f. 16. V. H. Syn. p. 105 Pl. XII f. 37. *N. am. var. bacillaris* HÉRIB. a. PÉRAG. D. d'Auvergne p. 116 Pl. IV f. 13. *N. am. var. minor* HÉRIB. a. PERAG. l. c. f. 12 (1893).

Fresh water: Sweden (Lake Rosslängen in Calmar län)! Finland (Åbo)! Belgium (V. H.), Australian Alps (Riewa Lagoons)! America (Crane Pond, Boxford, Mass. etc.)!

This species is very characteristic and not to be mistaken for any other. It is widely distributed, but seems to be rare everywhere.

2. **N. Lambda** CL. N. Sp. — V. linear slightly constricted in the middle, with broad, rounded ends. L. 0,05 to 0,1; B. 0,016 mm. Terminal fissures straight in the thick nodules. Axial area narrow but distinct, linear; central area small orbicular. Striæ 13 (middle) to 20 (ends) in 0,01 mm. divergent in the middle, parallel at the ends, distinctly but finely punctate. — Pl. V f. 19.

Fresh water: Demerara River!

3. **N. Riojæ** Cl. (1881). — V. elliptical, with rounded ends. L. 0,06 to 0,07; B. 0,023 to 0,024 mm. Median line in a thick silicious rib, combining the large central nodule with the thick terminal nodules. Terminal fissures slightly curved. Axial and central area united in a linear space very slightly dilated in the middle. Striæ 17 (middle) to 19 (ends) in 0,01 mm., radiate throughout, indistinctly punctate, crossed by a shallow, longitudinal depression. — Cl. D. fr. Grönl. and Argentina p. 12 Pl. XVI f. 2.

Fresh water: Argentina (Sierra Famatina)!

4. **N. Bacillum** Ehb. (1843). — V. linear with rounded ends. L. 0,035 to 0,055; B. 0,01 to 0,015 mm. Median line in a thick siliceous rib. Axial area narrow slightly enlarged around the central nodule and expanded at the ends on each side to the full width of the valve. Striæ 14 (middle) to 20 (ends) very slightly radiate. — Ehb. Am. Pl. IV: 5, f. 8. Grun. A. D. p. 44 Pl. II f. 50. V. H. Syn. p. 105 Pl. XIII f. 8. Ströse Kliecken f. 8. *N. lævissima* Donk. B. D. p. 28 Pl. V f. 2 1871?

Fresh water: Sweden (Skåne)! Finland! Siberia, Mouth of Jenissey (Grun.), North Australia! New Zealand!

Var.? *mexicana* Grun. (1880). — V. gibbous in the middle. L. 0,05; B. 0,01 mm. Terminal nodules larger; area abruptly dilated around the central nodule. Striæ 18 in 0,01 mm., closer at the ends, in the middle frequently alternately longer and shorter. — Grun. A. D. p. 44.

Fresh water: Mexico, fossil (Grun.).

Var. *Gregoryana* Grun. (1880). — V. slightly constricted in the middle. — *N. Bacillum* Greg. M. J. IV, Pl. I f. 4 (1856). *N. bac. var. Greg.* Grun. A. D. p. 44.

Fresh water: Loch Leven, Scotland Greg.

Var. *minor* V. H. (1885). — V. half as large as the typical form. Striæ 16 (middle) to 20 (ends) in 0,01 mm. — V. H. Syn. p. 105 Pl. XIII f. 10.

Fresh water: Belgium (V. H.).

Var. *lepida* Greg. (1856). — V. elliptical with rounded ends. L. 0,02 to 0,025; B. 0,01 mm. Axial area indistinct, central small. Striæ 17 (middle) to 26 (ends) in 0,01 mm., slightly radiate throughout. — *N. lepida* Greg. M. J. IV Pl. I f. 25. V. H. Syn. Pl. XIII f. 12. Icon. n. Pl. V f. 14.

Fresh water: Sweden (Hernösand foss.)! Finland (Åbo)! Scotland (V. H. T.). Argentina (Sierra Famatina)!

5. **N. trinotata** Pant. (1893). — V. linear, with broad, rounded ends. L. 0,056; B. 0,014 mm. Axial area narrow, slightly dilated in the middle, where is an unilateral stigma. Near the ends of the median lines is also an elongated stigma, placed on contrary sides of the median line. Striæ 21, somewhat radiate in the middle, else parallel. — Pant. III Pl. IX f. 152.

Habitat? »Köpecz» (Pant.).

6. **N. Pseudo-bacillum** Grun. (1880). — V. linear-elliptical, with rounded ends. L. 0,035 to 0,045; B. 0,01 to 0,015 mm. Terminal nodules with two lateral expansions. Axial area narrow, central area small, rounded. Striæ in the middle 13 (Grun. 21 V. H.) in 0,01 mm. at the ends 20 (Grun. 24 V. H.) in 0,01 mm.; radiate throughout, very finely punctate. — *N. lævissima* Kütz. Bac. p. 96 Pl. XXI f. 14 (1844)? V. H. Syn. Pl. XIII f. 13? *N. leptogongyla* Ehb. p. p.? according to Grun. *N. Granum* Schum. P. D. II N. p. 58 Pl. II f. 46? according to Grun. *N. lævissima* and *N. Pseudo-bac.* Grun. A. D. p. 45 Pl. II f. 52 1880. *N. Pseudo-bac.* V. H. Syn. p. 106 Pl. XIII f. 9. *N. Bacillum var. β* Ströse Kliecken f. 9?

Fresh water: Sweden (Borås)! Finland! Belgium (V. H.), Java, foss.! Japan! New Zealand! Australian Alps! Canada, foss.!

This species described and figured by Grunow in A. D. was at first believed by him to be *N. lævissima* Kütz. But as this name may denote some form of *N. Silicula* Grunow proposed the

name *N. Pseudobacillum*. The same form has been since figured in V. H. Syn. f. 9, but on the same plate GRUNOW figures (f. 13) a smaller form as *N. lærissima* KÜTZ. In this, somewhat obscure figure, the lateral extensions of the terminal nodules are not visible, and it seems uncertain whether it may be a variety of *N. Pseudobacillum* or of *N. Bacillum* or perhaps *N. subhamulata*.

7. **N. subhamulata** GRUN. (1885). — V. linear, slightly gibbous in the middle, with broad, rounded ends. L. 0,02; B. 0,005 mm. Terminal nodules not laterally extended. Terminal fissures comma-like. Axial area indistinct, central very small. Striæ about 26 in 0,01 mm. slightly radiate throughout. Frustule with triundulated margins. — GRUN. in V. H. Syn. p. 106 Pl. XIII f. 14.

Fresh water: Belgium (V. H.).

Naviculæ Decipientes GRUN. (1880).

Valve lanceolate to linear, with subacute to truncate, frequently rostrate or capitate, ends. Axial and central areas small or indistinct. Terminal nodules not very thick. Central nodule frequently transversely dilated. Structure: finely punctate striæ, slightly radiate or almost parallel, more distant in the middle, than at the ends. Connecting zone not complex.

This group is nearly akin to the *Nav. bacillares*, which differ in the incrassate terminal nodules, and also to *Nav. microstigmaticæ*. Some few forms are slightly asymmetrical and have for this reason been considered as *Cymbellæ*, but they are, no doubt, more closely allied to the symmetrical forms of this section. On the other hand some *Cymbellæ* (as *C. æqualis*) appear to be related to species of this group.

Artificial key.

1.	Valve acute	*N. ramphoides* PANT.
	— obtuse	2.
2.	Median line broad, flexuose	*N. Semen* EHB.
	— — straight, filiform	3.
3.	Margins undulated	4.
	— not —	5.
4.	Valve lanceolate	*N. integra* W. SM.
	— linear	*N. Lagerstedtii* CL.
5.	Ends rostrate or capitate	6.
	— not — —	9.
6.	Median striæ alternately longer and shorter	*N. inflata* DONK.
	— — not — — — —	7.
7.	Striæ 20 or less in 0,01 mm.	8.
	— 30 or more - -	*N. subtilissima* CL.
8.	Striæ radiate throughout	*N. Lundströmii* CL.
	— parallel at the ends	*N. protracta* GRUN.
9.	Linear-elliptical with broad ends	*N. seminoides* CL.
	Lanceolate — narrow —	*N. brasiliana* CL.
10.	Valve lanceolate	*N. Cruciculа* W. SM.
	— linear	11.
11.	Valve centrally gibbous	*N. gibbula* CL.
	— not — —	12.
12.	Median striæ shortened	*N. subinflata* DONK.
	— — not —	*N. Kälfvensis* GRUN.

1. **N. Semen** EHB. (1843). — V. elliptic-lanceolate, with broad, almost truncate, frequently slightly rostrate, ends. L. 0,05 to 0,09; B. 0,023 to 0,029 mm. Median line flexuose. Axial area narrow, linear; central area small, orbicular. Striæ in the middle 8 in 0,01 mm., of equal length,

radiate; terminal striæ 13 in 0,01 mm., slightly convergent; all finely punctate. — Ehb. Am. I: 2, f. 17. M. G. XVI, I f. 11? W. Sm. B. D. I p. 50 Pl. XVI f. 141. Donk. B. D. p. 21 Pl. III f. 8. A. S. Atl. LXXII f. 1. Grun. Franz Josephs Land D. p. 99 (47) Pl. I f. 34. *Amphiprora navicularis* Ehb. Micr. G. III: 1, f. 10, 11.

Fresh water: Franz Josephs Land (Grun.), Sweden (Lule Lappmark living, common in post-glacial, lacustrine deposits)! Finland, foss.! England (Hull) Donk., Germany, Harz (Atl.); Bohemia, Eger fossil! North America: common in diatomaceous earths (Nova Scotia, Canada West, Washington territory etc.)!

What Nav. Semen of Ehrenberg may denote is impossible to decide, as the figures published by Ehrenberg cannot be recognized. The figure in W. Smith Brit. Diat. is not good, but leaves little doubt that the author meant the same species, which now is generally believed to be N. Semen. On the other hand there can be no doubt that *Amphiprora naviculoides* of Ehrenberg is the same species as our N. Semen. N. Semen seems to be a northern species, rarely found living, but frequently in postglacial deposits of Scandinavia and North America. It is not mentioned by Brun as an inhabitant of the Alps, nor by Belloc as occurring in the Pyrenées. Its occurrence in a living state in the Harz is an interesting fact and suggests that it may be a survival from the post-glacial epoch.

2. **N. (Diadesmis) seminoides** Cl. & Grove N. Sp. — V. elliptic-lanceolate, with truncate ends. L. 0,027 to 0,045; B. 0,01 to 0,012 mm. Axial area narrow linear, suddenly dilated to a small, orbicular central area. Striæ in the middle 16 in 0,01 mm., alternately longer and shorter, divergent; striæ at the ends about 23 in 0,01 mm. slightly convergent, all finely punctate.

Slightly brackish water: West Indies, Jamaica (Grove Coll.)! Ecuador!

This small form resembles in outline *N. Semen*. The frustules form in living state coherent filaments.

3. **N. brasiliana** Cl. (1881). — V. lanceolate, with subacute ends, often slightly asymmetrical. L. 0,035 to 0,065; B. 0,012 to 0,018 mm. Median line straight; its terminal fissures in the same direction. Axial area narrow, linear, somewhat dilated around the central nodule. Striæ in the middle 18 in 0,01 mm, divergent alternately longer and shorter; towards the ends 21 to 22 in 0,01 mm.; at the ends convergent; all distinctly punctate; puncta (on the median striæ about 18 in 0,01 mm.) forming undulating, longitudinal rows. — *Cymbella brasil.* Cl. N. R. D. p. 4 Pl. I f. 4.

Fresh water: Brazil! Calif. (St. Rosa in Grove Coll.)! Ecuador in mineral springs at Tesalia Prov. Pichincha!

4. **N. inflata** Donk. (1870). — V. lanceolate with capitate ends. L. 0,022 to 0,026; B. 0,007 to 0,008 mm. Axial area indistinct, central area small, irregular. Striæ in the middle 19 in 0,01 mm., somewhat divergent and of unequal length; other striæ 22 to 23 in 0,01 mm., convergent at the ends, all indistinctly punctate. — Donk. B. D. p. 21 Pl. III f. 9 (nec Kütz. = *N. hungarica?*) Cl. D. of Finl. p. 37 Pl. II f. 2 (1891).

Fresh water: Ireland (Lough Mourne foss. Donk.), Sweden (Lake Rosslängen in Kalmar län, Rimforsa in Westergötland)! Finland, foss.! N. America (Houghton, Michigan, foss.)!

5. **N. ramphoides** Pant. (1889). — V. narrow, rhombic-lanceolate, with acute ends, very convex. L. 0,086 to 0,09; B. 0,013 mm. Median line with approximate central pores. Axial area indistinct. Central area (by the distant median striæ) a narrow transverse fascia. Striæ about 14 in 0,01 mm. (the median more distant) very slightly radiate, at the ends transverse, indistinctly punctate. — Pant. II p. 53 Pl. V f. 97, 98.

Brackish water: Hungary, fossil!

6. **N. Crucicula** W. Sm. (1853). — V. lanceolate to elliptic-lanceolate, with somewhat obtuse ends. L. 0,045 to 0,07; B. 0,015 to 0,019 mm. Central nodule transversely dilated. Axial and

central areas indistinct. Striæ about 16 in 0,01 mm. the median stronger and more distant, very slightly radiate, at the ends parallel, all finely punctate. — *Stauroneis Crucicula* W. Sm. B. D. I p. 60 Pl. XIX f. 192. Ldt. Spitsb. D. p. 37 Pl. II f. 14. *N. cruc.* Donk. B. D. p. 44 Pl. VI f. 14. V. H. Syn. p. 96 Pl. X f. 15. *Stauroneis dilatata* W. Sm. B. D. l. c. f. 191?

Brackish water: Spitsbergen! Baltic! Coasts of the North Sea (Sweden! England! Belgium V. H.), Atlantic coasts of North America!

Var. *obtusata* Grun. (1880). — Smaller, broadly lanceolate, with rounded obtuse ends. L. 0,025 to 0,05; B. 0,01 to 0,016 mm. Striæ 17 in 0,01 mm. — *Nav. Crucic. var. obt.* Grun. A. D. p. 35 Pl. II f. 37.

Brackish water: Grun.

Var. *minuta* Grun. (1860). — V. broadly lanceolate, with slightly rostrate ends. — L. 0,02; B. 0,01 mm. Striæ 19 in 0,01 mm. — *Staur. Crucicula var. minuta* Grun. Verh. 1860 p. 567 Pl. VI f. 15.

Marine: Adriatic (Grun.).

7. **N. gibbula** Cl. N. Sp. — V. linear, slightly gibbous in the middle, with broad, truncate ends. L. 0,033 to 0,043; B. 0,0085 to 0,01 mm. Axial area indistinct. Central area very small, rounded. Striæ 16 (middle) to 21 (ends) radiate in the middle, where they are of equal length, slightly radiate in the ends, distinctly punctate, puncta (about 22 in 0,01 mm.) forming longitudinal rows. — *N. gibberula* Lagst. Spitsb. D. p. 30 Pl. I f. 7 (1873). — *N. gibbula* Icon. n. Pl. V f. 17.

Fresh water (moist earth etc.): Spitsbergen! Beeren Eiland (Ldt.).

Var. *oblonga* Lagst. (1873). — V. linear not gibbous in the middle. — *Nav. gibberula var. oblonga* Lagst. l. c. p. 31.

Fresh water: Spitsbergen (Lagst.).

Var. *capitata* Lagst. (1873). — V. strongly gibbous in the middle, with dilated, rounded truncate ends. — *N. gibberula var. capitata* Lagst. l. c. p. 31 Pl. I f. 7 *a'*.

Fresh water: Spitsbergen (Lagst.), Beeren Eiland (Lagst.).

8. **N. Lundströmii** Cl. (1880). — V. linear-lanceolate, with subrostrate, broad ends. L. 0,034 to 0,051; B. 0,011 to 0,013 mm. Median line with the terminal fissures in the same direction. Axial area narrow, slightly dilated around the central nodule. Striæ 16 (middle) to 20 (ends) in 0,01 mm., radiate throughout, finely punctate, in the middle of equal length. — Cl. A. D. p. 13, 36, Pl. II f. 39.

Brackish water: Sea of Kara (Jamal)!

Var. *Frieseana* Grun. (1879). — V. with broad rostrate-capitate ends, slightly asymmetrical. L. 0,032 to 0,048; B. 0,012 to 0,015 mm. Striæ 16 to 18 in 0,01 mm. (middle) or 20 to 22 in 0,01 mm. at the ends, in the middle radiate and of equal length, at the ends radiate, distinctly punctate, puncta (about 20 in 0,01 mm.) forming undulating longitudinal rows. — *Cymbella Frieseana* Grun. in Cl. M. D. N:o 261. Icon. n. Pl. V f. 18.

Brackish water: Finmark (Tana Elf)!

9. **N. protracta** Grun. (1880). — V. linear, with rostrate and truncate ends. L. 0,022 to 0,035; B. 0,008 to 0,01 mm. Axial area very narrow; central very small. Striæ 12 (middle) to 20 (ends) in 0,01 mm., slightly radiate in the middle, transverse at the ends, coarsely punctate, puncta about 17 in 0,01 mm. — *N. Cruc. var.? prot.* Grun. A. D. p. 35 Pl. II f. 38. V. H. Syn. p. 96 Suppl. Pl. B f. 27. Foss. D. Öster. Ung. p. 146 Pl. XXX f. 47. *N. Troglodytes* Pant. II p. 54 Pl. XI f. 184 (1889)?

Brackish water: Salines of the mainland of Europe (Grun.), Belgium (V. H.), Hungary, foss. (Pant.) — Cameroon!

Var. *maxima* Cl. — L. 0,08; B. 0,016 mm. Striæ about 14 to 15 in 0,01 mm.

Fresh water: Rio Purus, Brazil (Deby Coll.)!

10. **N. integra** W. Sm. (1856). — V. lanceolate-elliptical, margins with 3 to 5 undulations, and rostrate-apiculate ends. L. 0,027 to 0,03; B. 0,008 to 0,009 mm. Axial area indistinct, central very small. Striæ about 23 in 0,01 mm., more distant in the middle, slightly radiate at the ends. — *Pinnularia rostrata* Greg. M. J. IV Pl. I f. 14 (1856). *Pinn. integra* W. Sm. D. II p. 96. *Nav. integra* Ralfs. in Pritch. p. 895 (1861). Donk. B. D. p. 40 Pl. VI f. 8. Grun. A. D. p. 36. V. H. Syn. p. 96 Pl. XI f. 22. *Cymbella integra* A. S. Atl. Pl. LXXI f. 64—66. *Stauroneis Janischii* Rabh. Alg. Eur. 848 (1859)?[1]

Brackish water: Holstein! England (W. Sm.), Belgium (V. H.).

11. **N. Lagerstedtii** Cl. N. Sp. — V. linear with triundulated margins and broad, obtuse ends. L. 0,028; B. 0,006 mm. Areas indistinct. Striæ 11 (middle) to 15 (ends) in 0,01 mm. slightly radiate, parallel at the ends. — *Nav. sp.* Lagst. Spitsb. D. p. 35 Pl. II f. 12 (1873).

Fresh water; Spitsb. (Lagst.).

12. **N. subtilissima** Cl. (1891). — V. linear, with capitate ends. L. 0,032; B. 0,005 mm. Axial area indistinct, central small. Striæ about 40 to 45 in 0,01 mm. in the middle stronger, more distant and more radiate; other striæ slightly radiate. — Cl. D. of Finl. p. 37 Pl. II f. 15. *Stauroneis linearis* Lagst. Spitsb. D. p. 37 Pl. II f. 13?

Fresh water: Finland (Imandra Lappmark)! Sweden (Westerbotten, Degernäs)! Spitsbergen (Lagst.).

13. **N. Kälfvensis** Grun. Ms. — V. linear with rounded ends. L. 0,02; B. 0,005 mm. Areas indistinct. Striæ 24 (middle) to 27 (ends) in 0,01 mm.

Fresh water: Kälfva, Ålands socken, Sweden, fossil (Grun.).

14. **N. subinflata** Grun. (1883). — V. linear, more or less gibbous in the middle, with rounded ends. L. 0,025 to 0,04; B. 0,008 mm. Axial area indistinct, central small irregular. Striæ about 19 in 0,01 mm., almost parallel. The three or four median striæ are shorter and much more distant than the others. Frustule in the zonal view rectangular; the connecting zone with faint longitudinal lines. — Grun. in Cl. Vega p. 470 Pl. XXXVII f. 50.

Marine: Cape Wankarema! Arctic America! Norway, Grip!

Var. *elliptica* Cl. — V. elliptical with rounded ends. L. 0,035; B. 0,013 mm. Striæ 20 in 0,01 mm.

Marine: Adriatic (Cl. M. D. N:o 210).

Naviculæ Microstigmaticæ Cl.

Valve elongated, usually lanceolate to linear, never panduriform. Axial area narrow or indistinct. Central area small and rounded, or a transverse stauros. Structure: small, but distinct, puncta arranged in parallel, or slightly radiate, transverse striæ, and undulating longitudinal rows, the median transverse striæ not alternately longer and shorter, connecting zone complex or simple.

This large section comprises a number of species, hitherto placed in *Navicula*, *Stauroneis*, *Pleurostauron*, *Schizostauron* and *Schizonema*. The may be classed in the following divisions:

1. *Stauroneis*. Central nodule transversely dilated into a simple stauros. No diaphragms at the ends of the valve. Connecting zone simple.

2. *Pleurostauron*. Like Stauroneis, but with diaphragms at the ends of the valve.

3. *Schizostauron*. Central nodule transversely dilated into a furcate or bifid stauros.

[1] To judge from the figure. I have not seen any specimens in the material.

4. *Libellus*. Zone complex or with longitudinal divisions. Central nodule dilated into a stauros, or not dilated.

5. *Microstigma*. Zone simple. Central nodule not transversely dilated.

This division of the whole group cannot be completely carried out at present, as the connecting zones of many species have not been observed. I consequently class all the forms now in two groups, viz. those with transversely dilated central nodules in Stauroneis, and those without such dilated central nodules in Microstigma; at the same time indicating as far as can yet be made out to which of the five groups named above each species belongs.

The genus *Stauroneis* (Ehr. 1843) has always been regarded as distinguished from Navicula by the transversely dilated central nodule; but the difference between a dilatation of the nodule itself, or *stauros*, and a more transverse extension of the central area, or *fascia*, has not hitherto been strictly carried out, and several forms with transverse areas only have been placed in Stauroneis. These I now remove to Pinnularia or Navicula.

Still, if we include in Stauroneis all the naviculoid forms which have transversely dilated central nodules, we shall not have a natural genus, as it will comprise species of Trachyneis, Mastoneis, Pseudoamphiprora, and other groups. All these I also remove to their respective groups and confine Stauroneis to such forms as possess the structure described above as belonging to the Microstigmaticæ.

Stauroneis has affinities with Amphora, particulary with the group Psammamphora, in which the structure is identical, and in which occur species with and without a stauros, which may be regarded as asymmetrical forms of Stauroneis and Microstigma.

In all the true species of Stauroneis the striæ are radiate at the ends. This is the case also in the group *Pleurostauron*, which is nearly related to Stauroneis and passes over into it by gradual transitions.

Many species of both these groups are met with in fresh water in all countries, arctic or tropical, a few inhabit brackish waters, but there is scarcely any undoubted marine species.

The fresh water species of *Schizostauron* are closely allied to those of Pleurostauron, but I am not sufficiently acquainted with the marine species of the former to be able to speak as to their affinities.

The division *Libellus* comprises forms with and without stauros. They are all marine and some of them live enclosed in gelatinous tubes, for which reason they have been classed in the very unnatural genus Schizonema. As there are free forms, so closely connected with those living in gelatinous tubes, that they cannot be specifically distinguished, there is no reason to retain the genus Schizonema. As early as 1873 I proposed the generic name Libellus for Naviculæ with complex zone, but this view was not accepted until recently by De Toni, who placed in this genus *N. aponina*. Whether this be admissible or not I cannot say, as I have not examined this species sufficiently; but as it is figured in Van Heurcks Synopsis as having subsidiary longitudinal lines it may belong to Caloneis.

The species of Libellus are no doubt closely connected with those of the division Microstigma, in which are some forms the zone of which has longitudinal rows of short striæ (*N. auklandica* and *N. Garkeana*). Still closer allied are the forms of the section *Oxyamphora* among the asymmetrical naviculoid diatoms. The same structure exists in these Amphoræ as in Libellus; the zone is similar and there are in Oxyamphora species with, and without stauros, exactly as in Libellus. Most forms of Libellus have the terminations of the median line at some distance from the ends of the valve.

The division *Microstigma* comprises forms without stauros, and with a simple connecting zone, which however, as stated above, has in some species longitudinal rows of short striæ. I have enclosed in this division several forms, classed in different genera by authors, as *Scoliopleura tumida*, and *Rhoiconeis Garkeana*, the former having a sigmoid median line, the latter arcuate frustules. On the sigmoid median line alone no natural genus can be founded, forms with

a sigmoid median line occuring in the groups *Lævistriatæ* (*N. Raeana*), *Caloneis* (*C. staurophora*), *Lineolatæ*, *Eucocconeis* etc. Moreover there are gradual transitions from forms with sigmoid median line to forms with straight median line and terminal fissures in contrary directions (*N. auklandica*) while many such forms are closely connected with others having the terminal fissures in the same direction. In *N. tumida* some specimens occur in which the median line is scarcely sigmoid.

As to *Rhoiconeis*, this genus is also inadmissible, as it contains widely different forms, and the degree of flexure in the frustule varies in the same species. Some forms of the section *Lineolatæ* are more or less arcuate, and in Gyrosigma and Pleurosigma we meet with species, which in some varieties are straight, in others arcuate.

Microstigma is doubtless akin to Libellus and has also a resemblance to the symmetrical forms of Tropidoneis, which differ principally by their highly elevated valves. Among the other groups of Navicula, Microstigma has affinities with the *Decipientes* and *Fusiformes*, the former having the median striæ wider (as in *N. tumida*), the latter having the puncta arranged in longitudinal rows; and with the *Entoleiæ*, which have a distinct axial area. In fact it is impossible to trace any absolute limit between these groups of forms.

Artificial key.

1.	Central nodule stauroid	2.
	— — not	29.
2.	Stauros bifid	24.
	— not	3.
3.	Ends of the valves with diaphragms	17.
	— — — without	4.
4.	Ends protracted	5.
	— not —	7.
5.	Stauros broad	*S. dilatata* Ehb..
	— narrow	6.
6.	Striæ 15 in 0,01 mm.	*S. Phyllodes* Ehb. (*S. anceps var. nobilis*).
	— 20 to 30 in 0,01 mm.	*S. anceps* Ehb.
7.	Size small (L. 0,013 to 0,025 mm.)	8.
	— median (L. about 0,05 mm.)	10.
	— large (L. 0,07 to 0,2 mm.)	16.
8.	Linear-elliptical	*S. septentrionalis* Grun.
	Lanceolate	*S. perpusilla* Grun.
	Elliptical	9.
9.	Striæ about 18 in 0,01 mm.	*S. kryophila* Grun.
	— — 22 —	*S. perminuta* Grun.
10.	Ends broad, capitate or truncate	11.
	— obtuse or rounded	12.
	— cuneate	*S. Demeraræ* Cl.
	— subacute	15.
11.	Striæ 14 to 19 in 0,01 mm.	*S. desiderata* Cl.
	— 29 — —	*S. pachycephala* Cl.
12.	Stauros small and short	*S. pellucida* Cl.
	— pervious	13.
13.	Zone broad with numerous distinct divisions	*S. Biblos* Cl.
	— narrow with faint divisions	14.
14.	Stauros broad	*S. Gregorii* Ralfs.
	— narrow	*S. constricta* W. Sm.
15.	Striæ 17 to 18 in 0,01 mm.	*S. salina* W. Sm.
	— 23 — —	*S. africana* Cl.
16.	Linear	*S. Schinzii* Brun.
	Rhomboid-lanceolate	*S. Phoenicenteron* Ehb.
17.	Apiculate	*S. Smithii* Grun.
	Non-apiculate	18.

18. Valve biconstricted . . . . . 19.
— not — . . . . . 20.

19. Small (L. 0,03 to 0,04 mm.) . . . . . *S. Legumen* Ehr.
Large (L. 0,2 mm.) . . . . . *S. Fulmen* Btw.

20. Valve fusiform . . . . . *S. Frauenfeldtiana* Grun.
— rhombic-lanceolate . . . . . *S. acuta* W. Sm.
— lanceolate or linear-lanceolate . . . . . 21.

21. Large (L. 0,12 to 0.2 mm.) . . . . . *S. javanica* Grun.
Small (L. less than 0,07 mm.) . . . . . 22.

22. Striæ about 15 in 0,01 mm. . . . . *S. oblonga* Grun.
— fine 23 — . . . . . 23.

23. Ends rostrate . . . . . *S. parvula* Grun.
— non-rostrate . . . . . *S. obtusa* Lagst.

24. Branches of the stauros parallel . . . . . *S. Sagitta* Cl.
— — divergent . . . . . 25.

25. Freshwater habitat . . . . . 26.
Marine . . . . . 27.

26. Ends rostrate . . . . . *S. Crucicula* Grun.
— non-rostrate . . . . . *S. andicola* Cl.

27. Valve lanceolate, subrostrate . . . . . *S. Reichardtiana* Grun.
— broadly elliptical . . . . . 28.

28. Stauros with very divergent branches . . . . . *S. Lindigiana* Grun.
— — less — — . . . . . *S. ovata* Grun.

29. Median line sigmoid or with the terminal fissures in contrary directions . . . . . 30.
— — not sigmoid . . . . . the same — or indistinct 31.

30. Median line sigmoid . . . . . *N. tumida* Bréb.
— — straight . . . . . *N. auklandica* Grun.

31. Ends with diaphragms . . . . . *N. inelegans* Grove & Sturt.
— without — . . . . . 32.

32. Median line flexuose . . . . . *N. plicatula* Grun.
— — straight . . . . . 33.

33. Frustule arcuate . . . . . *N. Garkeana* Grun.
— not . . . . . 34.

34. Striæ very fine (28 to 30 in 0,01 mm.) . . . . . 35.
— 15 to 20 in 0,01 mm. . . . . 37.

35. Zone broad . . . . . *N. Hyalosira* Cl.
— narrow . . . . . 36.

36. Ends acute . . . . . *N. aponina* Kütz.
— rostrate-capitate . . . . . *N. Bulnheimii* Grun.

37. Valve linear, obtuse . . . . . *N. Scopulorum* Breb.
— — lanceolate . . . . . 38.
— rhombic — . . . . . 39.
— elliptic — . . . . . *N. suavis* Cl. & Grove.
— — rostrate . . . . . *N. Jimboi* Pant.

38. Zone broad . . . . . *N. complanata* Grun.
— narrow . . . . . *N. plicata* Donk.

39. Frustules in gelatinous tubes . . . . . *N. Grevillei* Ag.
— free . . . . . 40.

40. Obtuse . . . . . *N. Weissflogii* Grun.
Acute or subacute . . . . . 41.

41. Median line reaching to the ends . . . . . *N. Libellus* Greg.
— — not — — . . . . . 42.

42. Terminal fissures indistinct . . . . . *N. rhombica* Greg.
— — hook-shaped . . . . . *N. hamulifera* Grun.

1. **S.? pellucida** Cl. (1883). — V. elliptical, with broad, rounded ends, thin and convex. L. 0,053 to 0,06; B. 0,016 to 0,023 mm. Median line with the terminal fissures indistinct because the convexity of the valve. Central nodule transversely dilated to a short stauros. Axial area indistinct; central small. Striæ 16 to 21 in 0,01 mm. obscure, punctate.

Forma arctica. Stauros narrow. Striæ 19 to 21 in 0,01 mm. — *S. pellucida* Cl. Vega p. 475 Pl. XXXV f. 10.

Marine: Cape Wankarema (North Siberian Sea)!

Forma mediterranea. Stauros broad, irregularly subquadrate. Striæ 16 in 0,01 mm.

Marine: Barcelona! Balearic Islands!

This is a curious form, not closely connected with any other known species, so that its position in a natural system is uncertain. I have placed it here only provisionally. It always occurs very sparingly.

2. **S. (Libellus) constricta** (Ehb. 1843?), W. Sm. (1853). — V. membranaceous, linear, convex, sometimes constricted in the middle, with subacute, rounded or subcuneate ends. L. 0,05 to 0.14; B. 0,0075 mm. Stauros pervious, narrow linear. Axial area indistinct. Striæ 25 to 27 in 0,01 mm. transverse. Frustule with complex connecting zone. — *Stauron. constricta* Ehb. Am. Pl. I: 2 f. 12 b.? *Amphiprora constricta* W. Sm. B. D. I Pl. XV f. 126. *Stauron. amphoroides* Grun. in A. S. Atl. XXVI f. 35 to 39. *Nav. simulans* Donk. B. D. p. 60 Pl. IX f. 3 (1873)?

Marine or brackish: Davis Strait! North Sea (coasts of Sweden, England, Normandy)! Adriatic (Grun.).

It is not very probable that *St. constricta* of Ehrenberg represents this species, whatever it may be.

3. **S. (Libellus) Biblos** Cl. (1892). — V. thin and very convex, linear-elliptical with obtuse ends. L. 0,055; B. 0,015 mm. Central pores approximate. Central nodule transversely dilated into a narrow stauros. Terminal nodules distant from the ends of the valve. Striæ about 30 in 0,01 mm. composed of fine puncta somewhat less close, forming undulating, longitudinal rows. Frustule quadrate. Zone broad, with numerous longitudinal divisions. — Cl. Diatomiste I p. 77 Pl. XII f. 9, 10.

Marine (pelagic.): Barbados!

This species is of interest as it has a very complex connecting zone and at the same time a well developed stauros. The former characteristic as well as the sculpture of the valve and the distant terminal nodules, prove that it is nearly akin to *N. rhombica.* The latter characteristic shews an affinity to *Stauroneis salina.*

4. **S. (Libellus) africana** Cl. (1881). — V. lanceolate, with subacute ends, convex. L. 0,05 to 0,06; B. 0,01 to 0,013 mm. Stauros narrow, pervious. Striæ 23 in 0,01 mm. transverse. Connecting zone with faint longitudinal divisions. — Cl. N. R. D. p. 15 Pl. III f. 42.

Brackish water: South Africa! Ceylon (Weissflog Coll.)!

Var. *acuminata* Grun. — V. acuminate. Striæ 23 in 0,01 mm. Grun. in V. H. T. N:o 137.

Marine: Norfolk.

This species is intermediate between *S. constricta* and *S. salina*, having the fine striæ of the former and the form of the latter. It is more silicious than *S. constricta.*

5. **S. salina** W. Sm. (1853). — V. lanceolate, with subacute ends. L. 0,05 to 0,08; B. 0,012 to 0.014 mm. Axial area indistinct. Stauros narrow, slightly dilated towards the margins, pervious. Striæ 17 to 18 in 0,01 mm. transverse, finely punctate. — W. Sm. B. D. I p. 60 Pl. XIX f. 188. V. H. Syn. p. 68 Pl. X f. 16. Lagst. Boh. D. p. 47 f. 5.

Marine: North Sea! Mediterranean Sea (Balearic Islands)! Black Sea (Sebastopol)!

Var.? *latior* Dannf. (1882). — V. broadly lanceolate, with rostrate ends. Striæ? — Dannf. Balt. D. p. 32 Pl. III f. 21.

Brackish water: Baltic, Bay of Finland (Dannf.).

6. **S. Gregorii** Ralfs (1861). — V. lanceolate, gradually tapering from the middle to the obtuse ends. L. 0,05 to 0,1; B. 0,01 to 0,013 mm. Stauros broad, pervious. Striæ 16 to 20 in

0,01 mm. almost parallel. — Ralfs Prich. Inf. p. 913. *St. Amphioxys* Greg. T. M. S. IV p. 48 Pl. V f. 23 (1856). *St. Gregorii* Grun. A. D. p. 47 Pl. III f. 64 (1880). V. H. Syn. p. 68 Suppl. Pl. A. f. 4.

Brackish water: Sea of Kara! North Sea (coasts of Sweden! Scotland! and Belgium V. H.), Black Sea (Sebastopol)! Caspian Sea (? Grun.), Atlantic coast of N. N. America (Cape May)!

S. Gregorii differs from *S. salina* by its broad stauros. Probably a variety with more lanceolate outline is *S. pacifica* Castr. (Chall. Voy. p. 23 Pl. XX f. 9), which is too insufficiently described for identification.

A small form of *S. Gregorii* from the mouth of the Somme has been named by Grunow (in Cl. M. D. 247, 255) var. *diminuta*.

7. **S. perminuta** Grun. (1881). — V. elliptical, with rounded ends. L. 0,013 to 0,025; B. 0,005 to 0,007 mm. Stauros narrow, pervious. Striæ 22 to 23 in 0.01 mm. slightly radiate. — Grun. in Cl. D. fr. Grönl. Arg. p. 12 Pl. XVI f. 9.

Brackish water: South Africa (Grun.), Patagonia (Arroyo de Olivera)!

8. **S. perpusilla** Grun. (1884). — V. lanceolate. L. 0,018 to 0,02; B. 0,0038 mm. Stauros narrow, pervious. Striæ not seen. — Grun. Franz Josephs Land D. p. 105 (53) Pl. I f. 50.

Marine: Franz Josephs Land (Grun.).

Var. *obtusiuscula* Grun. — V. shorter, with more obtuse ends. Grun. l. c. f. 49.

Marine: Franz Josephs Land (Grun.).

9. **S. desiderata** Cl. (1880). — V. linear to lanceolate with broad, capitate ends. L. 0,05; B. 0,016 mm. Terminal fissures of the median line hook-shaped and turned in contrary directions. Stauros narrow, linear, reaching nearly to the margins. Striæ 14 to 19 in 0,01 mm. slightly radiate, especially at the ends, very finely punctate. — Cl. in A. D. p. 14 Pl. III f. 58.

Brackish and marine: Sea of Kara! Behrings Island!

10. **S. septentrionalis** Grun. (1884). — V. linear-lanceolate. L. 0,024; B. 0,0048 mm. Stauros narrow, not reaching the margin. Striæ 23 in 0,01 mm. transverse, in the middle subradiate. Grun. Franz Joseps Land D. p. 105 (53) Pl. I f. 48.

Marine: Franz Josephs Land (Grun.).

11. **S. kryophila** Grun. (1884). — V. elliptic-lanceolate, with obtuse ends. L. 0,019; B. 0,007 mm. Stauros narrower towards the margins. Striæ in the middle 16, at the ends 20 in 0,01 mm. slightly radiate, distinctly punctate. — Grun. Franz Josephs Land D. p. 105 (53) Pl. I f. 47.

Marine: Franz Josephs Land (Grun.).

12. **S. pachycephala** Cl. (1879). — V. linear, gibbous in the middle, with broad, capitate ends. L. 0,04 to 0,055; B. 0,007 to 0,009 mm. Median line with contrary and hook-shaped terminal fissures. Stauros pervious. Striæ about 29 in 0,01 mm. radiate. — Cl. M. D. N:o 197. N. R. D. p. 15 Pl. III f. 43.

Brackish water: South Africa! Tasmania!

13. **S. Schinzii** Brun. (1891). — V. linear, somewhat gibbous in the middle and at the broad, rounded ends. L. 0,13 to 0,17; B. 0,011 to 0,12 mm. Stauros pervious. Terminal fissures turned in the same direction. Terminal nodules large. Axial area narrow, linear. Striæ 19 to 20 in 0,01 mm. slightly divergent in the middle and slightly convergent at the ends, distinctly punctate. Puncta 19 to 20 in 0,01 mm. arranged in irregular, longitudinal rows. — Brun. D. espèces n. p. 38 Pl. XVI f. 1.

Fresh water: South West Africa (Brun Coll.)!

This form is very distinct from all other known species. The narrow axial area is bordered by conspicuous, thick silicious ribs.

14. **S. Demeraræ** Cl. N. Sp. — V. linear, gibbous in the middle, with broad cuneate ends. L. 0,045; B. 0,009 mm. Stauros linear, pervious. (Terminal fissures, not seen). Striæ very fine, transverse in the middle, slightly radiate at the ends. — Pl. III f. 15.

Fresh water: Demerara River!

Of this species, remarkable for its form, I have seen only a few specimens, in which I have not succeeded in making the terminal fissures visible, for which reason the description is somewhat incomplete.

15. **S. anceps** Ehr. (1843). — V. lanceolate to linear-lanceolate, with rostrate or rostrate-capitate ends. L. 0,024 to 0,13; B. 0,006 to 0,017 mm. Stauros linear, reaching the margin or not. Axial area indistinct. Striæ 20 to 30 in 0,01 mm. slightly radiate, finely punctate. — *S. anceps* Ehb. Am. Pl. II: 1, f. 18.

S. anceps is extremely variable, and it does not appear to me possible to separate the forms into definite species. The numerous fresh-water species of Stauroneis, named by Ehrenberg, are founded on very slight differences in the outline, which is very variable, and they cannot be identified, as no indication of the number of striæ exists. Moreover the forms included here under the name of *S. anceps*, pass gradually, without any limit, into others, which can scarcely be distinguished from smaller forms of *S. Phoenicenteron*. The simplest method had perhaps been to unite S. anceps and S. Phoenicenteron, but the species would then have comprised, as extremes, very different forms. From a practical point of view it seems to be best to arrange the forms into a few varieties, however arbitrary the limits may be. The central nodule reaches usually to the margin of the valve and corresponds to a transverse area, which however, is frequently narrower than the central nodules. Under good lenses the marginal part of the stauros seems to be covered with shorter striæ.

A. *Lanceolate forms, with more or less protracted, not capitate ends.*

Var. *siberica* Grun. (1880). — V. lanceolate. L. 0,064; B. 0,015 mm. Stauros not reaching to the margin. Striæ very fine (more than 30 in 0,01 mm.). — Grun. A. D. p. 48 Pl. III f. 65.

Fresh water: Mouth of Jenisey (Grun.).

Var. *hyalina* Br. a. Perag. (1893). — V. lanceolate, with very protracted ends. L. 0,04 to 0,085; B. 0,009 to 0,012 mm. Stauros pervious. Striæ very fine. — Br. a. Perag. in Hérib. D. d'Auvergne p. 78 Pl. III f. 19.

Fresh water: Puy de Dôme, fossil (Hérib.), Australia (Blue Mountains, Rieva Lagoons, Austr. Alps)!

Var. *gracilis* (Ehb. 1843?). — V. lanceolate. L. 0,04 to 0,05; B. 0,008 mm. Stauros pervious. Striæ 27 in 0,01 mm. — *S. grac.* Ehb. Am. Pl. I: 2, f. 14 etc.

Fresh water: Dovre, Norway!

Var. *birostris* (Ehb. 1843?). — V. lanceolate. L. 0,065 to 0,13; B. 0,014 to 0,017 mm. Striæ 24 in 0,01 mm. distinctly punctate. — *S. birostris* Ehb. Am. Pl. II: 2 f. 1? *S. anceps var.* Cl. D. f. Grönland and Argentina p. 12 Pl. XVI f. 5. *St. gallica* Hérib. a. Perag. D. d'Auvergne p. 77 Pl. III f. 21 (1893).

Fresh water: Puy de Dôme, fossil (Hérib.), Waltham, Mass.! Argentina, Rioja!

Var. *derasa* Grun. Ms. — V. narrow lanceolate, with somewhat protracted ends. L. 0,05 to 0,07; B. 0,008 to 0,01 mm. Stauros broad pervious. Striæ about 26 in 0,01 mm. visible only along the median line.

Fresh water: Förarm in Åsnen, Sweden, fossil!

Var. *linearis* Ehb. (1843). — V. with parallel margins, rostrate. L. 0,045 to 0,05; B. 0,008 to 0,012 mm. Striæ 20 to 25 in 0,01 mm. — *S. linearis* Ehb. Am. 1: 2, f. 11 etc.? *S. anceps var. lin.* V. H. Syn. p. 69 Pl. IV f. 7, 8.

Fresh water: Holstein! Belgium (V. H.), Australia, Blue Mountains!

Var. *obtusa* GRUN. Ms. — V. linear, with broad, rostrate ends. L. 0,024; B. 0,006 mm. Striæ 21 in 0,01 mm. closer towards the ends (24 in 0,01 mm.).

Fresh water: Sandwich Islands, Mauna Kea (Cl. M. D. N:o 141).

Var.? *nobilis* SCHUM. (1867?). — V. lanceolate, rostrate. L. 0,11; B. 0,023 mm. Stauros narrowed towards the margins. Striæ 16 in 0,01 mm., slightly radiate, composed of coarse, elongate puncta, 15 in 0,01 mm., arranged in oblique, somewhat undulating rows. — *S. nobilis* SCHUM. P. D. II Nachtr. p. 59 Pl. II f. 60?

Slightly brackish water: Kläckeberga, Kalmar län, Sweden, fossil (Ancylus-epoch)!

I am not convinced that this form is really the same as SCHUMANN's, the puncta of which are figured as arranged in obliquely decussating rows as in Pleurosigma Else the outline and the size agree pretty well with SCHUMANN's figure.

B. *Forms with capitate ends.*

Var. *elongata* CL. — V. narrow linear-lanceolate. L. 0,055; B. 0,009 mm. Striæ 26 in 0,01 mm. — *S. linearis var.* in Cl. M. D. N:o 56.

Fresh water: Germany!

Var. *amphicephala* KÜTZ. (1844). — V. lanceolate. L. 0,04 to 0,08; B. 0,009 to 0,015 mm. Striæ 21 to 22 in 0,01 mm. distinctly punctate. — *S. amph.* KÜTZ. Bac. p. 105 Pl. XXX f. 25. *S. anceps* W. SM. B. D. I Pl. XIX f. 190. V. H. Syn. p. 69 Pl. IV f. 4. 5. *S. linearis* GRUN. Verh. 1860 Pl. VI f. 11.

Fresh water: Spitsbergen! Sweden (Westerbotten to Småland)! Belgium (V. H.), England (W. Sm.), Switzerland (Brun), Japan! Bengal! Greenland! Maine! California! Brazil! Ecuador!

Var. *recta* CL. — V. linear. L. 0,045; B. 0,009 mm. Striæ 23 in 0,01 mm.

Fresh water: Kuopio, Finland!

Var. *fossilis* CL. (1891). — V. lanceolate, with flattened, capitate ends. L. 0,09; B. 0,016 mm. Striæ 23 in 0,01 mm. — CL. D. of Finland p. 40 Pl. II f. 18.

Fresh water: Sweden (Degernäs in Westerbotten, fossil; Lake Rosslängen)! Finland (Savitaipale, foss.)!

Var. *argentina* CL. (1881). — V. lanceolate. L. 0,065; B. 0,013 mm. Stauros not reaching to the margins. Striæ 16 in 0,01 mm. — *S. gracilis var. arg.* CL. D. från Grönl. och Argentina p. 12 Pl. XVI f. 4.

Fresh water: Sierra de Velasco, Argentina!

16. **S. Phyllodes** EHB. (1843). — V. lanceolate, with protracted, obtuse ends. L. 0,105; B. 0,025 mm. Stauros narrower towards the margins. Striæ 15 (middle) to 18 (ends) in 0,01 mm. radiate throughout, punctate; puncta about 15 in 0,01 mm., arranged into irregularly undulating rows. — EHB. Am. Pl. II: 1, f. 16 etc.? Icon. n. Pl. III f. 27. *S. Sieboldii* EHB. M. G. Pl. XXXIV: 8, f. 12?

Fresh water: Demerara River!

17. **S. dilatata** EHB. (1843). — V. with parallel margins and rostrate, truncate ends. L. 0,065 to 0,068; B. 0,018 to 0,02 mm. Stauros broad, linear, reaching near to the margin. Striæ 18 in 0,01 mm., radiate throughout, distinctly punctate, puncta 24 in 0,01 mm., forming undulating, longitudinal rows. — EHB. Am. I: 2 f. 12. CL. A. D. p. 48 Pl. III f. 62.

Fresh water (larger lakes): Sweden, Mälaren! Finland, Ladoga! Siberia, Mouth of Jenissey!

18. **S. Phoenicenteron** EHB. (1843). — V. lanceolate, usually with slightly protracted, obtuse ends. L. 0,07 to 0,2; B. 0,028 to 0,04 mm. Stauros linear. Striæ radiate throughout 13 to 21 in 0,01 mm. distinctly punctate, puncta forming undulating, longitudinal lines. — EHB. Am. Pl. II: 5 f. 1 etc.

Var. *amphilepta* EHB. (1843). — L. 0,07 to 0,1; B. 0,015 to 0,02 mm. Striæ and puncta 18 to 21 in 0,01 mm. — *S. amph.* EHB. Am. I: 2 f. 9? M. G. Pl. XIV f. 18? HÉRIB. D. d'Auvergne p. 77 Pl. III f. 18 (1893). *S. gracilis* W. SM. B. D. XIX f. 186. *S. lanceolata* GRUN. Verh. 1860 p. 563. *S. boryana* PANT. III Pl. V f. 78; 1893 (*S. javanica?*).

Fresh water: Sweden! Finland! Holstein! England (Sm.), Greenland! Australia, Murray River!

Var. *genuina* CL. — L. 0,1 to 0,15; B. 0,03 to 0,04 mm. Striæ 14 to 17, puncta about 12 in 0,01 mm. — *S. phoenicenteron* W. SM. B. D. Pl. XIX f. 185. GRUN. Verh. 1860 p. 563. V. H. Syn. p. 67 Pl. IV f. 2. PANT. III Pl. VIII f. 134. *S. Brunii* PER. in Hérib. d'Auvergne p. 76 Pl. III f. 22 (1893).

Fresh water: Sweden! Finland! England! Belgium (V. H.), Switzerland! North America (Canada, Calif.)! Brazil! Argentina! New Zealand!

Var. *Baileyi* EHB. (1843). — L. 0,15 to 0,2; B. 0,045 mm. Striæ and puncta 12 to 14 in 0,01 mm. — *S. Bail.* EHB. Am. p. 143. *S. pteroidea* BAIL. (accord. to Ehb.) M. G. Pl. XIV f. 5.

Fresh water: North America (Cherryfield etc. fossil)!

19. **S. (Pleurostauron) parvula** GRUN. (1878). — V. linear-lanceolate, with obtuse or slightly rostrate ends. L. 0,02 to 0,025; B. 0,005 mm. Stauros broad, pervious. Striæ 23 in 0,01 mm. radiate. — GRUN. in Cl. M. D. N:o 139.

Fresh water: Berlin!

Var. *prominula* GRUN. Ms. — Linear, with rostrate ends. L. 0,02 to 0,04; B. 0,004 to 0,008 mm. Striæ 25 to 28 in 0,01 mm.

Fresh or slightly brackish water: Greenland! Finmark, Tana Elf (Grun.), Gulf of Bothnia!

Var. *producta* GRUN. (1880). — V. linear lanceolate, with rostrate ends. L. 0,03 to 0,04; B. 0.008 mm. Striæ 18 to 20 in 0,01 mm. — *Stauron. producta* GRUN. in V. H. Syn. Pl. IV f. 12.

Fresh water: Sweden Skåne! Holstein! (Grun.).

As *S. parvula* JANISCH has described, but not figured, a form from Angamos Guano (Charac. d. Guano II p. 14), which cannot be identified, for which reason Grunow's name may be retained. — *S. parvula* GRUN. differs from *S. producta* only by its smaller size and finer striæ, and they may be united. The var. producta is nearly akin to, and seems to graduate into *S. Legumen.*

20. **S. (Pleurostauron) oblonga** GRUN. (1867). — V. linear, with broad, rounded ends. L. 0,038 to 0,05; B. 0,0122 mm. Stauros linear, reaching to the margin. Striæ transverse, 15 in 0,01 mm. — GRUN. Nov. p. 20 Pl. I f. 15.

Fresh water: Java, foss. (Grun.).

I have not succeeded in finding this form in the edible earth from Java, and cannot say anything about its affinities.

21. **S. (Pleurostauron) obtusa** LAGST. (1873). — V. linear-lanceolate, with broad, obtuse, not rostrate ends. L. 0,06 to 0,07; B. 0,01 mm. Stauros broad, reaching to the margin, where it becomes somewhat broader. Striæ 19 to 21 in 0,01 mm. — LAGST. Spitsb. D. p. 36 Pl. I f. 11.

Fresh water: Spitsbergen (Lagst.).

A similar form from Australia (Blue Mountains) has slightly rostrate ends. Another similar form, but with narrow, subacute ends, is described by LEWIS (Proc. N. Sc. Philad. 1865 Pl. II f. 14) as a variety of *S. Legumen.*

22. **S. (Pleurostauron) Legumen** EHB. (1843). — V. elongated, biconstricted. Median inflation not larger than the others. Ends rostrate. L. 0,03 to 0,035; B. 0,008 mm. Stauros reaching nearly to the margin and not dilated outwards. Striæ 27 in 0,01 mm., slightly radiate. Frustules coherent in short bands. — *Stauroptera Legumen* EHB. Am. p. 135 Pl. I: 2, f. 5 (fide Kütz.). *Stauroneis Leg.* KÜTZ. Bac. p. 107 Pl. XXIX f. 11. GREG. M. J. IV Pl. I f. 9. V. H. Syn. p. 69 Pl. IV f. 11.

Fresh or slightly brackish water: Sweden, Åreskutan! Gulf of Bothnia! Lake Älmten in Småland! Scotland (Greg.), Belgium (V. H.).

S. Legumen is nearly akin to *S. parvula* and may be regarded as a biconstricted variety of that species. If so Legumen should be the specific name.

23. **S. (Pleurostauron) Smithii** Grun. (1860). — V. rhomboid-lanceolate, with slightly triundulate margins; the median inflation being larger. Ends apiculate. L. 0,02 to 0,03; B. 0,007 mm. Stauros narrow, reaching to the margins. Striæ 28 to 30 in 0,01 mm., almost parallel. — *S. linearis* W. Sm. B. D. p. 60 Pl. XIX f. 193 (1853). *S. Smithii* Grun. Verh. 1860 p. 464 Pl. VI f. 16. V. H. Syn. p. 69 Pl. IV f. 10. *Pleurostauron linearis* Hilse Rab. A. E. N:o 1161 (1861).

Fresh or slightly brackish water: Sweden, Gulf of Bothnia! Upsala! Saxony! Belgium (V. H.), England! Illinois! Surinam!

This is a small, very characteristic form, which occurs isolated among other diatoms.

24. **S. (Pleurostauron) Frauenfeldiana** Grun. (1867). — V. fusiform, subacute. L. 0,07 to 0,11; B. 0,008 to 0,009 mm. Stauros strong and dilated at the margins. Striæ 21 in 0,01 mm. parallel, minutely punctate. — *Pleuros. Frauenf.* Grun. Nov. p. 21 Pl. I f. 13.

Fresh water: Java (fossil)! New Zealand!

25. **S. (Pleurostauron) javanica** Grun. (1867). — V. lanceolate with rounded obtuse ends. L. 0,12 to 0,21; B. 0,027 to 0,04 mm. Stauros linear, reaching the margin. Striæ 12 to 14 in 0,01 mm. slightly radiate, punctate; puncta about 13 in 0,01 mm. — *Pleurost. javanic.* Grun. Novara p. 21 Pl. I f. 14. *S. Szontaghii* Pant. III Pl. VIII f. 143 (1893).

Fresh water: Europe, Hungary, Bory (fossil)! Java! Australia (Blue Mountains)! Nova Scotia! Canada! Chicago, interglacial peat!

This form is scarcely specifically distinct from *S. acuta*, although its form is nearly the same as that of *S. phoenicenteron.*

26. **S. (Pleurostauron) acuta** W. Sm. (1853). — V. rhombic-lanceolate, gradually tapering from the middle to the narrow, obtuse ends. L. 0,08 to 0,15; B. 0,015 to 0,04 mm. Stauros broad, dilated outwards, reaching the margin. Striæ 12 to 16 in 0,01 mm. composed of distinct puncta, 12 to 16 in 0,01 mm. Frustules coherent in short bands. — W. Sm. B. D. I p. 59 Pl. XIX f. 187. V. H. Syn. p. 68 Pl. IV f. 3. *S. Kochii* Pant. III Pl. VI f. 92 (1893).

Fresh water: Franz Josephs Land (Grun.), Sweden! Finland! England! Belgium (V. H.), Germany! Greenland! Nova Scotia! Canada! Massachusetts! Argentina! Australia! New Zealand!

Var. *Terryana* Temp. — V. in L. 0,35; B. 0,055 mm. Striæ and puncta 13 in 0,01 mm.

Brackish water: Connecticut!

Var. *undulata* Cl. — V. with triundulate margins. L. 0,16; B. 0,03 mm. Diaphragms broad. Striæ 15 to 16, puncta 15 in 0,01 mm

Fresh water: Murray River, Australia!

27. **S. (Pleurostauron) Fulmen** Btw (1859). — V. elongated, biconstricted. Median inflation of about the same size as the others. Ends capitate. L. 0,2 to 0,22; B. 0,0028 to 0,03 mm. Stauros reaching to the margins and somewhat dilated outwards. Striæ 15 in 0,01 mm., slightly radiate, punctate; puncta 13 in 0,01 mm. forming undulating, longitudinal rows. — Btw M. J. VII p. 180 Pl. IX f. 6.

Fresh water: Java (foss.)! N. Zealand! Australia (Carpentaria Bay, Murrey River)!

St. Fulmen is very nearly akin to *S. acuta* and might be regarded as a variety. There is the same relation between *S. Fulmen* and *S. acuta* as between *S. Legumen* and *S. parvula.*

Subdivision Schizostauron Grun.

In the year 1867 Grunow founded (Hedwigia VI p. 28) this genus for some marine diatoms from Honduras. The diagnosis is «Frustulia naviculacea, valvis ovatis vel lanceolatis, nodulo centrali transversim dilatato, lineari, utroque fine bifido (vel laciniato fimbriato)».

The last characteristic »nodulo laciniato fimbriato» refers to *S. fimbriatum*, which has since been discovered to be the upper valve of *Achnanthes danica*. The other species named by Grunow *S. Lindigianum*, *S. ovatum* and *S. Reichardtianum* are entirely unknown to me. I have since found three species of fresh water habitat, which agree with Stauroneis, but have a cloven stauros.

28. **S. Sagitta** Cl. (1881). — V. lanceolate, with slightly triundulate margins and apiculate ends having short diaphragms. L. 0,03 to 0,04; B 0,006 to 0,01 mm. Stauros bifid with parallel branches. Striæ slightly radiate, 21 in 0,01 mm. — Cl. N. R. D. p. 15 Pl. III f. 45.

Slightly brackish water: Tana Elf in Finmark! Gulf of Bothnia!

This little form has a great resemblance to *S. Smithii*, but has coarser striæ and a bifid stauros.

29. **S. Crucicula** Grun. (1881). — V. lanceolate, with rostrate, obtuse ends, having narrow diaphragms. L. 0,03; B. 0,009 mm. Stauros bifid with divergent branches. Striæ radiate, 25 in 0,01 mm. — *Schizost. Crucic.* Grun. in Cl. N. R. D. p. 16 Pl. III f. 44.

Fresh water: Merrimac River! Rio Purus, Brazil!

30. **S. andicola** Cl. (1881). — V. convex, linear with rounded ends. L. 0,032 to 0,036; B. 0,007 to 0,008 mm. Terminal fissures in contrary directions. Stauros bifid, its branches divergent. Striæ almost transverse, 22 in 0,01 mm. — *S. andic.* Cl. Diat. fr. Groen. and Argentina Pl. XVI f. 8.

Fresh water: Sierra de Velasco, Argentina! Cameroon!

31. **S. Lindigiana** Grun. (1867). — V. broadly elliptical or suborbicular. L. 0,029; B. 0,021 mm. Median line complex. Central nodule transversely dilated, at the ends bifurcate; its branches parallel to the margin. Striæ 36 in 0,01 mm. parallel. — *Schiz. Lindigianum* Grun. Hedwigia VI p. 28. *S. Lindigii* Grun. T. R. M. S. 1877 p. 181 Pl. CXCV f. 17.

Marine: Honduras (Grun.).

32. **S. ovata** Grun. (1867). — Valve, size and median line as in *S. Lindigiana*. Stauros linear, with short, slightly divergent branches prolonged to the margins of the valve. Striæ 26 in 0,01 mm, parallel. — *Schiz. ovatum* Grun. Hedwigia VI p. 28.

Marine: Honduras (Grun.).

33. **S. Reichardtiana** Grun. (1867). — V. broadly lanceolate, with subrostrate ends. L. 0,026 to 0,036; B. 0,016 to 0,019 mm. Median line straight. Central nodule transversely dilated, bifurcate, with arcuate, divergent branches. Striæ 12 in 0,01 mm. punctate, subradiate. — *Schiz. Reichardtianum* Grun. in Hedw. Vol. VI p. 28 (name only). *Schiz. Reichardii* Grun. T. R. M. S. 1877 p. 181 Pl. CXCV f. 18.

Marine: Adriatic (Grun.).

Subdivisions Microstigma and Libellus.

34. **N. Scopulorum** Bréb. (1849). — V. linear, slender, often gibbous in the middle and at the ends, with broad, rounded ends. L. 0,1 to 0,26; B. 0,009 to 0,016 mm. Median line with approximate central pores and distant terminal nodules. Terminal fissures indistinct. Axial area indistinct; central very small. Striæ 18 to 20 in 0,01 mm. radiate in the middle, convergent at the ends, distinctly punctate, puncta about 19 in 0,01 mm., forming undulating longitudinal rows. — Bréb. in Kütz. Sp. Alg. p. 81. Grun. Verh. 1860 p. 547 Pl. III f. 6. Donk. B. D. p. 73 Pl. XII

f. 5. *Pinnularia Johnsonii* W. Sm. B. D. XIX f. 179 (1853). *Nav. Johns.* V. H. Syn. p. 99 Suppl. B. f. 28.

Brackish water: S. coasts England (W. Sm.), Mediterranean Sea! Adriatic! Sumatra! Labuan! Japan (Deby Coll.)! East Cape. North Siberia! Brazil (Deby Coll.)!

Var. *belgica* V. H. (1885). — V. linear slightly gibbous in the middle. L. 0,06 to 0,07; B. 0,0075 mm. Striæ 24 in 0,01 mm. — *N. John. v. belg.* V. H. Syn. Suppl. B. f. 29.

Marine: Belgium!

Var. *fasciculata* Grun. (1879). — V. linear, not gibbous in the middle. L. 0,08 to 0,12 mm. Striæ in the middle 16 to 18, at the ends 21 in 0,01 mm. — Grun. in Cl. M. D. N:o 178.

Brackish water: Bengal!

N. Scopulorum is a very characteristic form, which seems not to be very nearly allied to any other species but the following. It occurs frequently with numerous transverse siliceous bars, or in a craticular state, and has then been named *Climaconeis Frauenfeldii* Grun. Verh. 1862 p. 421 Pl. IV f. 2. *Cl. Lorenzii* Grun. l. c. Pl. V f. 7. *Cl. linearis* Jan. Rab. Hond. p. 6 Pl. II f. 2 (1862). *Stictodesmis australis* Grev. Ed. N. Phil. J. XVIII p. 34 Pl. I f. 1—4 (1863).

Var. *perlonga* Brun (1891). — V. very narrow, linear. L. 0,33 to 0,4; B. 0,007 mm. Striæ in the middle 18, in 0,01 mm., almost parallel, at the ends 20 in 0,01 mm. convergent, punctate, puncta about 27 in 0,01 mm. — Brun D. Esp. n. p. 39 Pl. XV f. 2. *N. famelica* Castr. Osserv. Cicloph. p. 9 (1889) accord. to De Toni.

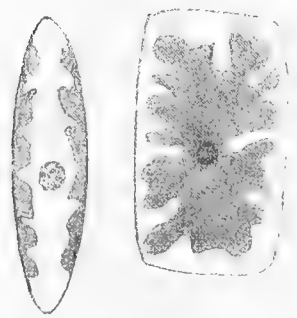
Marine: Gulf of Naples (Brun Coll.)!

35. **N. Weissflogii** Grun. (1878). — V. rhomboid, with obtuse ends. L. 0,08 to 0,085; B. 0,026 to 0,034 mm. Median line with distant median and terminal pores. Terminal fissures indistinct. Axial area indistinct.; central area small and elongated. Striæ 15 (middle) to 20 (ends) in 0,01 mm., radiate at the ends, punctate, puncta 11 in 0,01 mm. forming longitudinal undulating rows. — *Brebissonia? Weissflogii* Grun. in Cl. West. Ind. D. p. 7 Pl. I f. 9.

Marine: Campeachy Bay! Colon (Deby Coll.)!

This species is scarcely a Brebissonia, but in my opinion nearer akin to *N. rhombica*, having as the last, the terminal nodules at some distance from the ends, and the striæ more distant in the middle.

36. **N. (Libellus) rhombica** Greg. (1855). — V. rhombic-lanceolate, with subacute ends. L. 0,055 to 0,125; B. 0,013 to 0,024 mm. Median line with the terminal nodules at some distance from the ends. Terminal fissures indistinct. Axial area indistinct. Central area small, orbicular. Striæ 14 (middle) to 17 (ends) in 0,01 mm. nearly parallel on the middle part of the valve, convergent in the ends, punctate, puncta 13 in 0,01 mm. forming undulating longitudinal rows. Frustules in zonal view quadrate, with complex connecting zone. — Greg. M. J. III p. 40 Pl. IV f. 16. T. M. S. IV p. 38 Pl. V f. I.



N. rhombica wiht cell-contents 500 times magnified.

Marine: Coasts of Scotland (Greg.), Greenland! Sumatra! Japan (fossil, Tempère)!

Var. *japonica* Brun 1891. — L. 0,13 to 0,2; B. 0,035 to 0,05 mm. Striæ 13 (middle) to 14 (ends) in 0,01 mm. — *Schizonema Japonicum* Brun D. Esp. n. p. 43 Pl. XIV f. 6.

Marine: Sendaï, Japan, fossil!

The living frustules of *N. rhombica* have two deeply indented plates along the connecting zone.

37. **N. (Schizonema Libellus) Grevillei** Ag. (1830). — V. lanceolate-elliptical, with obtuse ends. L. 0,03 to 0,07; B. 0,015 mm. Median pores distant, terminal pores at some distance from the end. Axial area indistinct, central area small. Striæ 18 to 20 in 0,01 mm. (closer, 20 to 27

in 0,01 mm. at the ends), the 4 to 5 median striæ being stronger and more radiate than the others, which become transverse towards the ends. Connecting zone with numerous longitudinal divisions. Frustules enclosed in mucous tubes of various shape. — *Schizonema Grev.* Ag. Consp. p. 18. W. Sm. B. D. II p. 77 Pl. LVIII f. 364. Grun. A. D. p. 42. V. H. Syn. p. 110 Pl. XVI f. 2. *Schizonema sectio comoidea* Grun. Bot. Centr. 1880. *Schiz. comoides* V. H. Syn. XVI f. 3. *Schiz. apiculatum* and var. V. H. Syn. l. c. f. 4—8. *Navic. Delognei* V. H. Syn. p. 110 Pl. XI f. 13.

Marine: Spitsbergen! Finmark! North Sea! Coasts of England (Sm.), Arctic America! Greenland! Cape Deschneff (North Siberian Sea)! West Indies! Kerguelens Land! California!

N. Grevillei is closely connected with *N. rhombica*, and it is questionable whether they should not be united. A great number of species of Schizonema have been founded on the shape of the gelatinous tubes, in which the frustules are enclosed in the living state. As the frustules of these forms are in all essential respects similar, there seems to be no sufficient reason for adopting these species.

38. **N. Libellus** Greg. (1857). — V. rhombic-lanceolate, convex, with acute ends. L. 0,065 to 0,15; B. 0,016 to 0,035 mm. Terminal nodules near the ends; terminal fissures indistinct. Axial and central areas indistinct. Striæ 13 to 14 in 0,01 mm., on larger form, or about 18 in 0,01 mm. on smaller forms, very slightly radiate, almost parallel at the ends, distinctly punctate, puncta (13 to 16 in 0,01 mm.) forming undulating, longitudinal rows. Connecting zone with numerous, longitudinal divisions. — Greg. D. of Cl. p. 528 Pl. XIV f. 101. *N. rhombica* Donk. B. D. Pl. IX f. 1.

Marine: Scotland (Greg.), Macassar Straits! Oamaru, fossil! Sendaï, Japan, fossil!

N. Libellus is very similar to *N. rhombica*, but has the terminal nodules closer to the ends and the striæ almost parallel at the ends. The terminal fissures are difficult to observe as the ends of the valve are curved downwards.

39. **N. (Libellus) complanata** Grun. (1867). — V. linear-lanceolate, acute. L. 0,035; B. 0,005 mm. Striæ 18 to 19 in 0,01 mm. Frustule rectangular. L. 0,054; B 0,033 mm. Connecting zone with numerous, longitudinal divisions. — *Amphora complanata* Grun. Hedwigia VI p. 25. A. S. Atl. XXVI f. 45. *Navic.? compl.* Grun. A. D. p. 42 (1880).

Marine: Davis Strait! Sea of Kara (Grun.), Finmark! Bohuslän! Adriatic (Grun.).

Var. *subinflata* Grun. (1875). — Frustule rectangular. L. 0,04; B. 0,012 to 0,018 mm. Slightly inflated in the middle. — *Amphora subinfl.* Grun. A. S. Atl. XXVI f. 48, 49.

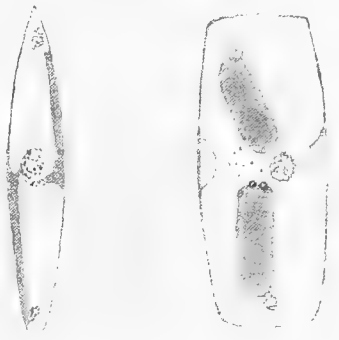
Marine: Adriatic (Grun.).

Var. *hyperborea* Grun. (1884). — Frustule rectangular. L. 0,05; B. 0,0165 mm. Striæ 24 in 0,01 mm. — *Amphora hyperborea* Grun. Franz Josephs Land D. p. 55 (3) Pl. I f. 10.

Marine: Franz Josephs Land (Grun.), Sweden, Fiskebäckskil!

Nav. complanata is nearly akin to *N. Libellus*, but is no Amphora, though the frustules have some resemblance to that genus. The valves are rarely met with and difficult to observe. *N. subinflata* and *hyperborea* are scarcely specifically distinct.

The living frustule has two chromatophore-plates, each extending along the connecting zone from the ends towards the central nodule.



N. complanata with cell-contents 500 times magnified.

40. **N. (Libellus) Hyalosira** Cl. (1822). — V. convex, thin, lanceolate, rostrate or with rounded ends. L. 0,025 to 0,03; B. 0,0066 mm. Striæ 29 in 0,01 mm. punctate. Frustule slightly siliceous, quadrate. L. 0,025; B. 0,017 mm. Connecting zone broad, with numerous and distant longitudinal divisions. — Cl. M. D. N:o 309. Diatomiste I p. 77 Pl. XII f. 11.

Marine: Firth of Tay! Cresswell (Deby Coll.)!

41. **N. (Libellus) aponina** Kütz. (1836). — V. narrow, lanceolate, acute. L. 0,025; B. 0,004 mm. Axial and central areas indistinct. Striæ about 30 in 0,01 mm. Connecting zone longitudinally striate. — *Brachysira aponina* Kütz. Dec. N:o 153 (according to Lagst.). *Nav. apon.* Kütz. Bac. p. 91 Pl. IV f. 1. V. H. Syn. Pl. XII f. 15. Lagst. Öfvers. af K. Sv. Vet.-Akad. Förh. 1884 Pl. X f. 8. *Libellus apon.* De Toni Atti del R. Inst. de Scienze (ser. VII) VII p. 967.

Hot springs: Abano (Italy).

The above description is from the figure in V. H. Syn. as I have had no opportunity of examining this species.

42. **N. (Libellus) Bulnheimii** Grun. (1880). — V. linear-lanceolate, with rostrate to capitate ends. L. 0,02; B. 0,003 mm. Areas indistinct. Striæ parallel, 30 in 0,01 mm., the two median stronger. — Grun. in V. H. Syn. p. 108 Pl. XIV f. 6 a.

Salines: »Sulza» (Rabh. Alg. 1301)!

Var. *belgica* Grun. — V. with somewhat obtuse ends. Connecting zone with fine, longitudinal striæ (V. H. Types N:o 113).

Marine: Ostend.

43. **N. (Libellus) hamulifera** Grun. (1880). — V. lanceolate, sometimes slightly asymmetrical, with subacute ends. L. 0,051 to 0,058; B. 0,012 to 0,014 mm. Median line with somewhat approximate central pores. Its terminal fissures distinct, hook-shaped, turned in the same direction and at some distance from the ends of the valve. Areas indistinct. Striæ in the middle 19 to 21 in 0,01 mm. slightly radiate, at the ends 25 in 0,01 mm., parallel, punctate; puncta, about 20 in 0,01 mm., forming undulating longitudinal rows. — Grun. A. D. p. 44. Icon. n. Pl. III f. 16, 17, 18.

Marine: Mediterranean Sea (Grun.), Adriatic (Grun.), Sebastopol! Ceylon (Weissflog Coll.)! Java! Barbados!

Var. *interrupta* Cl. — L. 0,1; B. 0,02 mm. V. as in *N. Libellus*. Striæ interrupted on each side of the median line by a narrow longitudinal area. Striæ 20 to 21 in 0,01 mm. Puncta 23 in 0,01 mm. — Pl. III f. 19.

Marine: Japan!

N. hamulifera closely resembles *N. Libellus* and is characterized by its hook-shaped, terminal fissures.

44. **N. (Libellus) plicata** Donk. (1873). — V. linear, convex, with obtuse ends. L. 0,06 to 0,09; B. 0,012 to 0.016 mm. Terminal nodules close to the ends. Areas indistinct. Striæ in the middle 17 to 19 in 0,01 mm., almost transverse, at the ends 20 to 21 in 0.01 mm.. also transverse, finely punctate, puncta about 18 in 0,01 mm. forming longitudinal, undulating rows. Frustule in the zonal-view with fine, longitudinal striæ on the connecting zone. — Donk. B. D. p. 59 Pl. IX f. 2. Grun. A. D. p. 36.

Marine: Kara Sea (Grun.), England! Scotland! Baltic (Grun.), Balearic Islands! Triest (Grun.), Labuan! Brazil!

Var. *sumatrana* Cl. — V. very convex with more acute ends. L. 0,13 to 0,17; B. 0,017 to to 0,02 mm. Axial area indistinct; central small, orbicular. Striæ 15 (middle) to 16 (ends) in 0,01 mm. transverse throughout, coarsely punctate, puncta about 17 in 0,01 mm., forming undulating longitudinal rows. — *N. oxeia* Castr. D. Challenger Exp. p. 31 Pl. XX f. 8 (1886)?

Marine: Island of Muntok, Sumatra (Grove Coll.)! Java!

45. **N. Garkeana** Grun. (1863). — V. linear, with obtuse ends. L. 0,04 to 0,095; B. 0,011 to 0,015 mm. Axial area indistinct; central very small, elongated. Striæ 18 to 19 in 0,01 mm., almost parallel, distinctly punctate; puncta about 20 in 0,01 mm., forming longitudinal rows. Frustule in zonal-view arcuate, subrectangular, with broad connecting zone, on which are 2 to 4 rows of short striæ (13 in 0,01 mm.). — *Rhoiconeis Gar.* Grun. Verh. 1863 p. 148 Pl. IV f. 12.

Marine: Behrings Strait! Kamortha! California! North Pacific Ocean (Grun.).

This species is remarkable for its arcuate valves, but in its essential characteristics seems to be nearest allied to *N. plicata*.

46. **N. suavis** Cl. and Grove N. Sp. — V. elliptic-lanceolate, flat. L. 0,115; B. 0,04 mm. Axial area very narrow. Central area small, rounded. Median line ending close at the margin. Striæ 18 in 0,01 mm. equidistant throughout, finely punctate; puncta about 18 in 0,01 mm., somewhat coarser around the central nodule, forming undulating longitudinal rows. — Pl. III f. 31, 32.

Marine: Oamaru, New Zealand, fossil (Grove Coll.)!

47. **N. plicatula** Grun. Ms. — V. elliptic-lanceolate, with subacute ends, convex, with a more or less distinct longitudinal depression on each side of the median line. L. 0,075 to 0,115; B. 0,02 to 0,025 mm. Median line with approximate central pores and small terminal nodules at the ends of the valve, flexuose. Areas indistinct. Striæ 15 to 19 in 0,01 mm. at the middle, slightly divergent, and 18 to 20 in 0,01 mm. at the ends, parallel, and finely, but distinctly punctate. — Pl. III f. 28.

Marine: Gulf of Naples! Balearic Islands! Madagascar! Seychelles! Japan (Brun Coll.)!

This is a very characteristic species, remarkable for its undulating median line.

48. **N. inelegans** Grove and Sturt (1887). — V. lanceolate, gradually tapering from the middle to the somewhat obtuse ends, where are short transverse diaphragms. L. 0,18; B. 0,03 mm. Median line with elongated central nodule and small terminal nodules at the ends of the valve. Terminal fissures indistinct. Areas indistinct. Striæ 13 in 0,01 mm. radiate at the ends, sometimes crossed on each side of the central nodule by a short and narrow lateral area, punctate; puncta, about 15 in 0,01 mm., forming undulating longitudinal rows. — Grove and Sturt Q. M. Cl. J. III p. 132 Pl. X f. 6. Icon. n. Pl. V f. 16.

Marine: Oamaru, New Zealand, fossil!

This species is a very characteristic form, remarkable for the diaphragms in the ends, as in Pleurostauron. It bears some resemblance to *N. Kappa* of the same habitat.

49. **N. (Scoliopleura) tumida** Bréb. (1849). — V. lanceolate, gradually attenuated to the subacute ends. L. 0,1 to 0,16; B. 0,025 mm. Median line slightly sigmoid. Axial area very narrow; central area small, somewhat elongated. Striæ 13 to 14 in 0,01 mm., in the middle where a few frequently are shorter than the others, more distant, slightly radiate (at the ends transverse) finely punctate. Frustule in the zonal-view rectangular with rounded angles. Connecting zone slightly oblique, not complex. — Bréb. in Kütz. Sp. Alg. p. 77. *N. Jennerii* W. Sm. B. D. I p. 49 Pl. XVI f. 134 (1853). *Scoliopleura tumida* V. H. Syn. p. 112 Pl. XVII f. 11. 13. Pant. III Pl. XVII f. 245.

Marine and brackish: Franz Josephs Land (Grun.), North Sea! Sebastopol! Ceylon! Sydney!

Var. *adriatica* Grun. (1860). — V. 0,027; B. 0,008 mm. Median line strongly sigmoid. Striæ 12 in 0,01 mm. — *Scoliopleura adriatica* Grun. Verh. 1860 p. 554 Pl. V f. 24.

Marine: Adriatic (Grun.).

I have seen a few living specimens of *N. tumida*. They had along the zone two chromatophore-plates, with entire margins. Each plate contained a row of 6 large, orbicular pyrenoids. At the ends of the frustules a number of small granules in lively motion was visible.

N. tumida with cell-contents 500 times magnified.

50. **N. auklandica** Grun. (1863). — V. linear, with broad rounded ends, convex. L. 0,05 to 0,06; B. 0,018 mm. Median line straight, somewhat excentric; its terminal fissures turned in contrary directions and of somewhat unequal length. Axial area indistinct; central very small. Striæ 10 (middle) to 14 (ends) in 0,01 mm., slightly radiate throughout, punctate, puncta about 18 in 0,01 mm. Frustule rectangular with rounded corners, somewhat constricted in the middle. Connecting zone with several longitudinal rows of short striæ (Grun.). — Grun. Verh. 1863 p. 151 Pl. V f. 14. Novara p. 17. Icon. n. Pl. V f. 15.

Marine: Auckland (Grun.), Port Jackson! Australia!

A very characteristic species, which seems to be related to *N. tumida*.

51. **N. Jimboi** Pant. (1893). — V. lanceolate, rostrate, obtuse. L. 0,042; B. 0,019 mm. Axial area indistinct. Central area small, transverse, with a stigma, close to the central nodule. Striæ 13 in 0,01 mm. radiate, but parallel at the ends, punctate; puncta about 16 in 0,01 mm. — Pant. III Pl. V f. 81.

Habitat?: »Sentenaï» (Pant.).

This form resembles *N. mutica*, which also has a stigma on the central area, but the central area of *N. Jimboi* is very small. It is doubtful whether it should be placed in this group.

Cymbella Ag. (1830).

Valve elongated, boat-shaped or more or less asymmetrical to the longitudinal axis. Median line excentric. The terminal nodules near the ends of the valve, and the terminal fissures turned to the dorsal, or ventral, side, or straight. Structure transverse, usually radiate, rows of puncta, or finely lineate striæ on both sides of the median line. Connecting zone not complex. Cell-contents a single chromatophore, the longitudinal axis of which follows the dorsal part of the connecting zone. The chromatophore covers the inside of the frustule, with the exception of the ventral part of the connecting zone and the branches of the median line. The division of the chromatophore begins in the ends of the plate on the dorsal side. In conjugating, the mother-cells, usually produced by division of a parent cell, and enclosed in a gelatinous mass produce two auxospores, parallel to the mother-cells. Before conjugation the cell-contents of one of the mother-cells is divided into two masses, each of which unites with a similar mass of the other mother-cell.

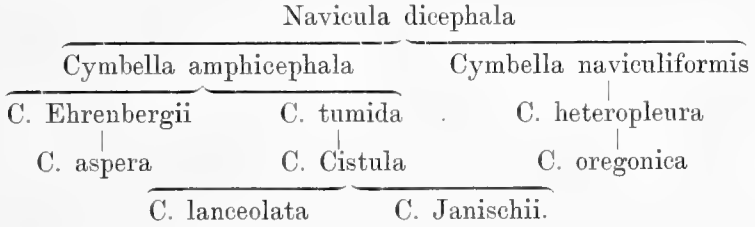
As early as 1817 Nitszch described some Cymbellæ under name the of *Bacillaria fulva* and *B. phoenicenteron*, and in 1829 Ehrenberg founded the genus *Cocconema* for the stipitate forms. Agardh in 1830 founded the genus *Cymbella* (Consp. crit. 1) for diatoms with »frustula elliptica, libera vel muco amorpha involuta, binatim conjuncta». Some of the species included by Agardh in this genus belong doubtless to what we now name *Cymbella*. Later on, in 1830, Kützing created the genus *Encyonema* for the cymbelloid forms included in gelatinous tubes. Most authors since then have adopted these three genera and have regarded as Cymbella, forms which live free; as Cocconema, forms attached to gelatinous stalks; and as Encyonema, forms included in tubes. The valves of all these forms are in all essential points similar, and frustules of stipitate or enclosed forms frequently occur free; for which reasons Heiberg (Consp. Crit. Diat. p. 107) 1863 united them in one genus, for which he considered the name Cymbella more adequately fitting, although a little more recent than Cocconema. There can be no doubt as to the advisability of uniting Cymbella and Cocconema, but some hesitation may be felt in uniting Encyonema which has somewhat differently shaped terminal fissures. On the other hand transitions exist between the downward turned terminal fissures of Encyonema and the reflexed fissures of Cymbella, as for instance in *C. helvetica;* and I think it most convenient to follow the proposition of Heiberg.

The most characteristic feature of Cymbella is the asymmetrical form of the valves, but this characteristic is subject to much variation. There are all transitions from boat-like to almost

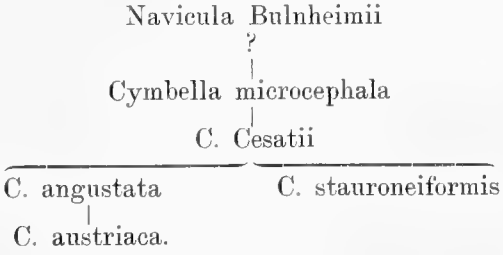
symmetrical naviculoid forms. On the other hand several species in other groups of naviculoid diatoms are more or less decidedly asymmetrical. For instance, all the larger forms of Pinnularia shew a tendency to asymmetry. The same is the case with numerous varieties of *Trachyneis aspera*. All the Amphoræ are asymmetrical, and usually in a more decided manner than the Cymbellæ. From some groups of the old genus Amphora the Cymbellæ differ only by their connecting zone not being complex. From other groups of the same genus the distinction is attended with more difficulty, especially in the new group *Cymbamphora*, the valves of which are still more asymmetrical, having the median line close to the ventral margin. But the Cymbamphoræ are marine or brackish, while the Cymbellæ usually are of fresh-water habitat.

The structure of the Cymbellæ consists of puncta disposed in rows or of transverse striæ, which are more or less transversely lineate. The striæ in the middle of the valve are radiate and somewhat more distant than in other parts of the valve. In the ends they are parallel or radiate. They either reach the median line, or end at some distance from it, leaving a narrow axial area, frequently dilated around the central nodule. In some species there is a shallow depression on the ventral side of the central nodule, the median ventral striæ appearing to be crossed, below the central nodule, by a semicircular furrow. In one division of Cymbella there is in the middle of the central nodule or on its ventral side a peculiar punctum or pore, for which I use the name *stigma*. If the stigma is below the nodule, a fine, fissure-like line proceeds from it into the nodule. The median line is in some species oblique and therefore broad, shewing a complex structure, as in some Pinnularias. The terminal nodules are usually close to the end of the valve, and the fissures, especially in the boat-like forms, reflexed to the dorsal side. In the naviculoid forms it is comma-like, and in *C. helvetica* straight, in the direction of the median line, thus forming a passage to Encyonema, which has the terminal fissures bent downwards.

The Cymbellæ are certainly nearly akin to the Naviculæ of the section *Lineolatæ*. *Navicula dicephala* is closely connected with *C. amphicephala*, and *C. naviculiformis*, and with these a number of forms are more or less related:



Cymb. microcephala shews some signs of affinity to *Navicula Bulnheimii*, and we may thus trace passages to a number of forms



Cymbella alpina is an isolated form, without, so far I can see, any close relation to the *Lineolatæ*, although the structure of the striæ is the same as in the typical form of that group of Navicula. *Cymb. sinuata* is also an isolated form, which seems to have its nearest relatives in Gomphonema.

The species of Cymbella are frequently very variable and transitorial. Many names have been proposed for forms, which differ only in trifling characteristics. The descriptions and figures in the literature leave very much to desire; and in many cases, where original specimens are not accessible, it is impossible to decide what the names given by the authors actually denote. Under such circumstances it is extremely difficult to treat the numerous forms of this genus.

Most Cymbellæ live in fresh water, a few only in slightly brackish water, and none is marine. They occur in all parts of the world, from Spitsbergen and arctic America to the Tropics. Many species live, attached to gelatinous stalks, in enormous masses, in rivulets, on moist rocks, and water-plants.

In the following artificial key some imperfectly known forms, marked * in the text are not included. The key must not be regarded as absolutely exact, its definitions being somewhat elastic, as indeed the forms themselves are.

Artificial key.

1.	Valve cymbiform	2.
	— naviculoid	33.
2.	Central nodule with a stigma	3.
	— — without stigma	7.
3.	Stigma below the nodule	4.
	— in —	5.
4.	Striæ coarsely punctate	*C. australica* A. S.
	— finely —	*C. tumida* Bréb.
5.	Ends broad, rounded	*C. Janischii* A. S.
	— subtruncate, obtuse	6.
6.	Central area small	*C. mexicana* Ehb.
	— — large	*C. punctifera* Cl.
7.	Median ventral striæ ending with isolated puncta	8.
	— — — not — — —	12.
8.	Punctum one	*C. cymbiformis* Kütz.
	Puncta two or more	9.
9.	Puncta two	*C. turgidula* Grun. (*C. Cistula* var.)
	— several	10.
10.	Median line dilated towards the ends	*C. Sturii* Grun.
	— — not — —	11.
11.	Striæ coarse	*C. Cistula* Hempr.
	— fine	*C. Stuxbergii* Cl.
12.	Median line straight, approximate to the ventral margin	13.
	— — arcuate, distant from — — —	22.
13.	Terminal nodules, distant from the ends	14.
	— — near the ends	15.
14.	Striæ coarse	*C. protracta* Berk.
	— fine	*C. helvetica monstrosity.*
15.	Striæ coarsely punctate	16.
	— finely —	17.
16.	Axial area very narrow	*C. Triangulum* Ehb.
	— — distinct	*C. turgida* Greg.
17.	Median line close to the margin	18.
	— — at some distance from the margin	19.
18.	Ends capitate	*C. Jordani* Grun.
	— obtuse, reflexed	*C. inelegans* Cl.
	— — incurved	*C. ventricosa* Kütz.
19.	Valve lunate, broad	*C. hebridica* Grun.
	— — narrow	20.
20.	Acute	21.
	Obtuse	*C. norvegica* Grun.

21. Axial area indistinct . . . . . *C. gracilis* Ehb.
— — distinct, linear . . . . . *C. yarrensis* A. S.

22. Valve subclavate . . . . . *C. Beccarii* Grun.
— not clavate . . . . . 23.

23. Axial area broad . . . . . *C. aspera* Ehb.
— — narrow or indistinct . . . . . 24.

24. Ventral and dorsal margins parallel . . . . . *C. Botellus* Lagst.
— — — — not — . . . . . 25.

25. Obtuse or truncate . . . . . 26.
Acute . . . . . 31.

26. Stria delicate . . . . . *C. delicatula* Kütz.
— coarse . . . . . 27.

27. Terminal fissures straight . . . . . *C. helvetica* Kütz.
— — reflexed . . . . . 28.

28. Striæ coarsely punctate . . . . . *C. Cistula* var.
— finely punctate . . . . . 29.

29. L. about 0.04 mm. . . . . 30.
L. about 0,12 mm. . . . . *C. lanceolata* Ehb.

30. Median line almost straight . . . . . *C. parva* W. Sm.
— — arcuate . . . . . *C. affinis* Kütz.

31. Median striæ radiate . . . . . *C. pusilla* Grun.
— — not — . . . . . 32.

32. Strongly asymmetrical . . . . . *C. lævis* Nægeli.
Slightly — . . . . . *C. rupicola* Grun.

33. Ends capitate . . . . . 34.
— rostrate . . . . . 37.
— apiculate . . . . . 46.
— not protracted . . . . . 47.

34. Striæ very fine . . . . . *C. microcephala* Grun.
— distinct . . . . . 35.

35. Axial and central areas indistinct . . . . . 36.
— — — — distinct . . . . . *C. naviculiformis* Auersw

36. Valve almost symmetrical . . . . . *C. angustata* W. Sm.
— decidedly asymmetrical . . . . . *C. amphicephala* Nægeli.

37. Median ventral striæ ending with isolated puncta . . . . . *C. tumidula* Grun.
— — — not — — — . . . . . 38.

38. Central area small or indistinct . . . . . 39.
— — orbicular . . . . . 45.

39. L. 0,02 to 0,05 mm. . . . . 40.
L. 0,07 mm. or more . . . . . 42.

40. L. about 0,025 mm. . . . . *C. obtusiuscula* Grun.
L. about 0,05 mm. . . . . 41.

41. Median striæ about 9 in 0,01 mm. . . . . *C. lata* Grun.
— — — 12 — . . . . . *C. spuria* Cl.

42. Valve stout . . . . . 44.
— narrow . . . . . 43.

43. Striæ 11 in 0,01 mm. . . . . *C. Stodderi* Cl.
— 17 — — . . . . . *C. amphioxys* Grun.

44. Ends broad . . . . . *C. Cucumis* A. S.
— not very broad . . . . . *C. Ehrenbergii* Kütz.

45. Small . . . . . *C. hybrida* Grun.
Large . . . . . *C. heteropleura* Ehb.

46. Valve with undulated margins . . . . . *C. Schmidtii* Grun. [1]
— — non — — . . . . . *C. cuspidata* Kütz.

47. Ends obtuse . . . . . 48.
— acute . . . . . 59.

48. Valve linear . . . . . 49.
— lanceolate . . . . . 51.

[1] *C. conifera* Br. and Hérib.

49. { Median striæ more distant than the others . . . . . 50.
— — not — — — . . . . . *C. incerta* Grun.

50. { Central area dilated to the ventral margin . . . . . *C. sinuata* Greg.
— — not — — — . . . . . *C. æqualis* W. Sm.

51. { Valve almost symmetrical . . . . . 52.
— decidely asymmetrical . . . . . 53.

52. { Central area large . . . . . *C. Mölleriana* Grun.
— — small . . . . . *C. lacustris* Ag.

53. { Axial area narrow . . . . . 54.
— — moderately broad . . . . . 56.

54. { Length about 0,03 to 0,04 mm. . . . . 55.
— — 0,06 to 0,07 mm. . . . . *C. borealis* Cl.

55. { Striæ 5 in 0,01 mm. . . . . *C. alpina* Grun.
— about 10 in 0,01 mm. . . . . *C. æqualis* W. Sm.

56. { Axial area dilated to a small central area . . . . . 57.
— — not — — — — . . . . . 58.

57. { Striæ coarsely punctate . . . . . *C. Hauckii* V. H.
— finely — . . . . . *C. Reinhardtii* Grun.

58. { Length about 0,03 mm. . . . . *C. leptoceros* Grun.
— — 0,06 mm. . . . . *C. austriaca* Grun.

59. { Median ventral striæ ending in isolated puncta . . . . . *C. tumidula var. salinarum.*
— — — not . . . . . 60.

60. { Terminal nodules distant from the ends . . . . . *C. Cesatii* Rabh.
— — approximate to — . . . . . 61.

61. { Median line straight, strongly excentric . . . . . 62.
— — subarcuate, nearly central . . . . . 63.

62. { Valve broad. B. 0,02 mm. . . . . *C. Triangulum* Ehb.
— narrow. B. less than 0,01 mm. . . . . *C. hebridica* Greg.

63. { Central area not dilated in the middle . . . . . *C. acutiuscula* Cl.
— — abruptly dilated into a central area . . . . . 64.

64. { Large. L. 0,05 to 0,1 mm. . . . . 65.
Small. L. 0,03 to 0,04 mm. . . . . 66.

65. { Striæ about 10 in 0,01 mm. . . . . *C. acuta* A. S.
— — 17 — — . . . . . *C. oregonica* Cl.

66. { Central area rounded . . . . . *C. lapponica* Grun.
— — dilated outwards . . . . . *C. stauroneiformis* Lagst.

1. **C. microcephala** Grun. (1880). — V. almost symmetrical, linear, with rostrate-capitate ends. L. 0,015 to 0,023; B. 0,003 to 0,004 mm. Median line almost central, straight; its central pores approximate. Axial and central areas indistinct. Striæ 24 to 30 in 0,01 mm. almost parallel. — Grun. in V. H. Syn. p. 63 Pl. VIII f. 36 to 39. *C. minuscula* A. S. Atl. IX f. 58 to 61?

Fresh water: Greenland! Scotland! Sweden (Vernamo, fossil)! Belgium (V. H.), Ecuador, Banos!

2. **C. (Encyonema) Cesatii** Rabh. (1853). — V. nearly symmetrical, narrow lanceolate, gradually tapering from the middle to the acute ends. L. 0,045 to 0,05; B. 0,006 to 0,007 mm. Median line almost central, with approximate central pores and slightly curved terminal fissures at some distance from the ends. Axial area narrow; central area small. Striæ radiate throughout, about 19 in 0,01 mm., very finely punctate. — *Nav. appendiculata* Grun. Verh. 1860 p. 552 Pl. IV f. 29. *Nav. Cesatii* Rabh. Süssw. D. p. 39 Pl. VI f. 89. V. H. Syn. p. 88 Pl. VIII f. 35. *Cymbella Cesatii* Grun. A. S. Atl. LXXI f. 48, 49.

Fresh water: Greenland! Iceland! Swedish and Russian Lappland! Scotland! Sweden (Wenern)! Belgium (V. H.), Piedmont (Rabh.), Canada!

This form, easily recognized by the distance of its terminal nodules from the ends of the valve, is so slightly asymmetrical, that one might regard it as a Navicula. It seems to be an inhabitant principally of northern or alpine regions. In Verh. 1860 (p. 571 Pl. VII f. 16) Grunow mentions a *Colletonema dubium* as occurring together with *C. Cesatii* (his *Nav. appendiculata*) and

with frustules of the same appearance. It seems then probable that the frustules of *C. Cesatii* occur enclosed in gelatinous tubes.

3. **C. angustata** W. Sm. (1853). — V. almost symmetrical, with, usually, slightly triundulate margins and capitate ends. L. 0,03 to 0,05; B. 0,008 mm. Median line almost central, straight; its central pores approximate and its terminal fissures in the ends of the valve. Axial area very narrow or indistinct, not dilated in the middle. Striæ about 16 in 0,01 mm., slightly radiate throughout. — *N. angustata* W. Sm. B. D. I Pl. XVII f. 156. *C. æqualis* A. S. Atl. IX f. 69. *C. æqu. var. hybrida* Grun. A. S. Atl. LXXI f. 50. *Navic. inæquilatera* Lagst. Spitsb. D. p. 33 Pl. II f. 10.

Fresh water (alpine and arctic regions): Greenland! Spitsbergen! Scotland, England (W. Sm.), Norway (Dovre)! Sweden (Gellivara, Degernäs, Loka, Förarm in Åsnen, fossil)! Finland (Imandra to Karelen and Åland)!

4. **C. Schmidtii** Grun. (1875). — V. almost symmetrical, broadly linear, with triundulate margins and cuneate ends. L. 0,026; B. 0,009 mm. Median line almost central, slightly flexuose. Axial and central areas indistinct. Striæ about 14 in 0,01 mm., slightly radiate. — Grun. in A. S. Atl. IX f. 48.

Brackish water: Neusiedler See, Hungary (Atl.).

5. **C. obtusiuscula** (Kütz. 1844?) Grun. 1875. — V. slightly asymmetrical, broad, almost elliptical, with subrostrate ends. L. 0,027; B. 0,012 mm. Median line almost central, straight. Axial area very narrow; central area small and orbicular. Striæ 12 in 0,01 mm., slightly radiate. — Kütz. Bac. p. 79 Pl. III f. 68. A. S. Atl. IX f. 49.

Fresh water: Steinitz See (Atl.).

6. **C. alpina** Grun. (1863). — V. slightly asymmetrical, lanceolate, with convex dorsal and ventral margins and slightly obtuse ends. L. 0,023 to 0,04; B. 0,008 to 0,01 mm. Median line straight, slightly excentric. Axial area very narrow, not dilated in the middle. Striæ 5 in 0,01 mm., very slightly radiate, finely transversely lineate. — Grun. Verh. 1863 p. 148 Pl. IV f. 19. A. S. Atl. LXXI f. 44, 45. Brun. Diat. des Alpes p. 62 Pl. III f. 7.

Fresh water (alpine regions): Tyrol (Grun.), Switzerland (Brun), Savoy!

This little species is very characteristic, not nearly akin to any other *Cymbella*, and distinguished by its unusually coarse and lineate striæ. It is an habitant of alpine regions only. The fine lineation of the striæ appears to indicate a relationship to the group *Naviculæ lineolatæ*, but there is no closely allied from in that group.

7. **C. borealis** Cl. (1891). — V. slightly asymmetrical, linear-lanceolate, gradually tapering from the middle to the obtuse or slightly capitate ends. L. 0,06 to 0,07; B. 0,007 to 0,09 mm. Median line almost central, straight. Axial area very narrow, slightly or indistinctly dilated in the middle. Striæ 10 (middle) to 13 or 14 (ends) in 0,01 mm., very slightly radiate throughout, very finely lineate. — Cl. D. of Finl. p. 46 Pl. II f. 19.

Fresh water: Russian Lapland!

8. **C. delicatula** Kütz. (1849). — V. narrow, lanceolate, slightly asymmetrical, obtuse. L. 0,022 to 0,03; B. 0,005 to 0,006 mm. Striæ 18 or 20 (dorsal) to 21 (ventral) in 0,01 mm., delicate. — Kütz. Sp. Alg. p. 59. A. S. Atl. LXXI f. 54, 55. V. H. Syn. p. 62 Pl. III f. 6.

Fresh water (moist rocks etc.): Norway (Dovre, Brevig)! Sweden (Lapland to Skåne)! France! Savoy! Genève!

This species is recognized by its narrow, almost linear, lanceolate valves and by its close and delicate striæ. It is nearly connected with *C. lævis*, which has broader valves and somewhat coarser striæ. Intermediate forms exist between both.

As *Cymbella elegans* CRAMER has issued in Rabh. Alg. Eur. N:o 1441 (1863) a sample containing several Cymbellæ, as *C. Cistula*, *C. helvetica*, *C. delicatula*, *C. lævis*, *C. affinis*, *C. leptoceras*, *C. amphicephala* and *C. aspera*. As no description or figure of *C. elegans* is given, it is impossible to determine what form the name denotes.

9. **C. lævis** NAEGELI (1849). — V. strongly asymmetrical, semilanceolate, gradually tapering from the middle to the ends. Dorsal margin arcuate; ventral margin straight or slightly convex in the middle. L. 0,025 to 0,035; B. 0,007 to 0,008 mm. Median line somewhat excentric and slightly arcuate. Axial area indistinct. Striæ of the dorsal side 13 (middle) to 15 (ends) in 0,01 mm., slightly radiate. Striæ of the ventral side 16 (middle) to 17 (ends) in 0,01 mm. almost parallel and finely punctate. — NAEG. in Kütz. Sp. Alg. p. 59. V. H. Syn. p. 62 Pl. III f. 7. A. S. Atl. IX f. 35.

Fresh water: Norway (Dovre)! Sweden (Gellivaara to Örtofta in Skåne)! Finland (Lapland to Karelen)! Scotland! Zürich (Grun.), Tours du Rhône!

10. **C. pusilla** GRUN. (1875). — V. asymmetrical, narrow, semilanceolate, with subacute ends and arcuate dorsal, straight or slightly convex ventral, margin. L. 0,23 to 0,04; B. 0,005 to 0,0075 mm. Median line straight, strongly excentric. Axial area very narrow, not, or slightly, dilated around the central nodule. Striæ 15 to 18 (middle) or 16 to 20 (ends) in 0,01 mm., radiate in the middle, transverse at the ends. — GRUN. in A. S. Atl. IX f. 36, 37. V. H. Syn. Pl. III f. 5.

Brackish water: Sweden (Baltic: Gothland, Malmö)! Halle! Neusiedler See (Grun.), Caspian Sea (Grun.), Normandy! Belgium (V. H.), Bayonne (Atl.), Sardinia (Grun.), Mouth of Jenissey! South Africa! Ecuador!

11. **C. yarrensis** A. S. (1881). — V. narrow, semilanceolate, acute. L. 0,075 to 0,11; B. 0,012 to 0,015 mm. Median line nearly central; its terminal fissures in the ends. Axial area narrow, linear, dilated in the middle to an elongated central area. Striæ 11 in 0,01 mm., somewhat more distant in the middle, where they are radiate, parallel in the ends. — *Encyon? yarrense* A. S. Atl. LXXI f. 16.

Slightly brackish water: Yarra-Yarra (Australia)! Tasmania!

12. **C. rupicola** GRUN. (1881). — V. slightly asymmetrical, lanceolate, gradually tapering from the middle to the subacute ends. L. 0,027 to 0,034; B. 0,0045 to 0,0055 mm. Median line almost central, straight. Axial area narrow, not dilated in the middle. Dorsal striæ 12 (middle) to 15 (ends) in 0,01 mm. slightly radiate. Ventral striæ 16 in 0,01 mm. slightly radiate — GRUN. in A. S. Atl. LXXI f. 70, 71.

Fresh water (moist rocks): Arctic America! Scotland (V. H. Types), Salzburg (Atl.).

This species is very nearly akin to *C. lævis* and differs scarcely in anything except the less asymmetrical valves.

13. **C. Reinhardtii** GRUN. (1875). — V. slightly asymmetrical, elliptic-lanceolate, with convex dorsal and ventral margins. Ends obtuse. L. 0,03 to 0,06; B. 0,008 to 0,014 mm. Median line nearly central, straight. Axial area narrow, gradually dilated to the middle, where it expands to a moderately large central area. Striæ 10 (middle) to 13 or 14 (ends) in 0,01 mm. The median striæ are more distant than the rest and slightly radiate. Towards the ends the striæ become almost parallel. — A. S. Atl. IX f. 27. CL. M. D. N:o 132.

Fresh water: Norway (Romsdalen)! Steinitz Sea (Atl.).

The above description is from specimens in Cl. M. D. 132, determined by GRUNOW as *C. Reinhardtii*.

14. **C. leptoceros** (EHB. 1843?) GRUN. — V. asymmetrical, lanceolate, with slightly gibbous ventral margin and obtuse, sometimes slightly attenuated ends. L. 0,02 to 0,04; B. 0,008 to 0,01 mm. Median line slightly arcuate. Axial area linear, not dilated around the central nodule.

Striæ 9 or 11 (middle) to 12 (ends) in 0,01 mm. slightly radiate, especially near the ends, punctate; puncta about 22 in 0,01 mm. — *Cocc. lept.* Ehb. Am. Pl. I: 2 f. 30. *Cy. leptoc.* V. H. Syn. p. 62 Pl. II f. 18, III f. 24 (f. curta) Suppl. A. f. 2 (f. elongata). *Cy. hungarica* Pant. II p. 40 Pl. I f. 14 (1889)?

Fresh water: Rostock (foss.), Belgium! Hungary foss. (Pant.)? Mexico, foss.!

Var. *minor* Grun. (1882). — L. 0,026; B. 0,007 mm. — Grun. Foss. D. Österr. Ung. p. 142 Pl. XXIX f. 32.

Fresh water: Hungary, fossil (Grun.).

Var. *angusta* Grun. (1882). — L. 0,024 to 0,04; B. 0,005 to 0,01 mm. Striæ 12 to 15 in 0,01 mm. — Grun. Foss. D. Österr. Ung. p. 142 Pl. XXIX f. 33, 34.

Fresh water: Greenland! Hungary, fossil (Grun.), Geneva! Savoy!

Var. *excisa* Pet. (1877). — Ventral margin indented in the middle. — *C. turgida var. excisa* Pet. Bull. Soc. Bot. de France 1877 Pl. I f. 2. A. S. Atl. LXXI f. 35. Grun. Foss. D. Österr. Ung. p. 142.

Fresh water: Marly, near Paris (according to Grunow).

The most marked characteristic of *C. leptocceros* is the distinct axial area, which seems to become much reduced in some of the varieties, named by Grunow, especially in the var. *excisa* which I have placed here on the authority of Grunow. Specimens of that var. from Marly (Cl. M. D. N:o 195) agree in my opinion with *C. tumidula* Grun.

The following forms, found in a fossil state in Hungary and described by Pantocsek seem to be nearly akin to *C. leptoceros.*

C. kacnensis Pant. (II p. 40 Pl. XI f. 186). — L. 0,025; B. 0,0075 mm. Striæ 15 in 0,01 mm.

C. Neupaueri Pant. (II p. 40 Pl. XI f. 187). — L. 0,027; B. 0,0095 mm. Striæ 15 in 0,01 mm.

Specimens from Gyöngiös-Pata, which I have examined, are scarcely distinguishable from *C. leptoceros* in Van Heurck's Types.

15. **C. austriaca** Grun. (1875). — V. asymmetrical; with arcuate dorsal margin and slightly convex ventral margin. Ends obtuse and rounded. L. 0,045 to 0,068; B. 0,012 to 0,017 mm. Median line somewhat excentric, nearly straight, broad (oblique). Axial area distinct, linear, not widened in the middle. Striæ 11 or 13 (dorsal) to 13 or 14 (ventral) in 0,01 mm., radiate throughout, punctate; puncta about 21 in 0,01 mm. — Grun. in A. S. Atl. IX f. 10, LXXI f. 67 to 69.

Fresh water: Tyrol (Atl.), Switzerland (St. Gingolf, Engadine)!

Var. *prisca* Grun. (1882). — L. 0,05 to 0,078; B. 0,013 to 0,019 mm. Median line slightly arcuate. Area slightly dilated on the dorsal side of the central nodule. Striæ 9 (middle) to 11 (ends) in 0,01 mm., punctate. Puncta 23 in 0,01 mm. — Grun. Foss. D. Österr. Ung. p. 143 Pl. XXIX f. 29.

Fresh water: Hungary, fossil (Grun.).

Var. *excisa* Grun. (1882). — Smaller. Ventral margin indented. — Grun. Foss. D. Österr. Ung. Pl. XXIX f. 27. Pant. III Pl. I f. 11.

Fresh water: Hungary, fossil (Grun.).

C. austriaca, which seems to inhabit the alps only, is characterized by its median line, being oblique and therefore broad in the middle between the central and terminal nodules, by its distinctly punctate striæ and non-rostrate ends. It is evidently akin to *C. leptoceros. Cymb. Erdöbenyana* Pant. (II p. 40 Pl. XI f. 198; 1889) agrees completely with *C. austriaca*, as I have convinced myself by examining specimens from Erdöbenye.

16. **C. Stodderi** Cl. (1881). — V. slightly asymmetrical, narrow, lanceolate, with subrostrate ends. L. 0,075 to 0,09; B. 0,015 mm. Median line almost central, straight; its terminal fissures approximate to the ends. Axial area moderately broad, linear-lanceolate, not abruptly dilated around the central nodule. Striæ strongly radiate in the middle, 10 or 11 (middle) to 12 (ends) in 0,01 mm., not distinctly punctate. — Cl. N. R. D. p. 5 Pl. I f. 5. Cl. M. D. N:o 212, 274.

Fresh water: Monmouth (Maine), Bemis Lake (White Mountains)! Caldas (Brazil)!

This species is probably akin to *Nav. Monmouthiana* GRUN., and its place here is somewhat doubtful.

17. **C. amphioxys** KÜTZ. (1844) GRUN. — V. almost symmetrical, narrow linear-lanceolate, with subrostrate ends. L. 0,07; B. 0,007 mm. Median line almost central, straight. Axial area narrow; central area indistinct. Striæ 17 in 0,01 mm. slightly radiate in the middle and slightly convergent in the ends, not distinctly punctate. — *Navic. amphioxys* KÜTZ. Bac. p. 91 Pl. XXVIII f. 37? *Cymb. navic. var. amphioyx* GRUN. in Cl. M. D. N:o 273 (1879).

Fresh water: Degernäs, Westerbotten, Sweden, fossil!

This form, frequent in Cl. M. D. N:o 273, seems not to be akin to *C. naviculacea*, but rather to the group of *Navicula radiosa*, having, like those, the terminal striæ convergent.

18. **C. acuta** A. S. (1881). — V. almost symmetrical, lanceolate, with acute ends. L. 0,05 to 0,085; B. 0,016 to 0,02 mm. Median line almost central, straight. Axial area narrow, linear, in the middle dilated to a rhomboid-orbicular central area. Striæ 9 to 11 in 0,01 mm., very finely punctate. — *C. americana var. acuta* A. S. Atl. LXXI f. 75 to 78.

Fresh water: Sweden (Lake Rosslängen in Calmar Län)! Mouth of Jenissey! Demerara River!

19. **C. acutiuscula** CL. N. Sp. — V. slightly asymmetrical, lanceolate, gradually tapering from the middle to the acute ends. L. 0,07 to 0,095; B. 0,02 to 0,022 mm. Axial area narrow, lanceolate, not (or on the ventral side slightly) dilated around the central nodule. Striæ 9 to 10 (middle) or 11 (ends) in 0,01 mm., slightly radiate in the middle, parallel at the ends, coarsely punctate; puncta 17 to 20 in 0,01 mm. — Pl. IV f. 26.

Fresh water: Crane Pond! Waltham, Mass.!

This species is nearly akin to *C. acuta*, but has broader area and more coarsely punctate striæ.

20. **C. Hauckii** V. H. (1888). — V. asymmetrical-lanceolate, with arcuate dorsal margin, slightly convex ventral margin and obtuse, not rostrate ends. L. 0,07 to 0,08; B. 0,018 to 0,02 mm. Median line slightly asymmetrical, almost straight. Axial area narrow, lanceolate, scarcely dilated on the dorsal, but distinctly on the ventral side of the central nodule. Striæ 10 (middle) to 18 (ends) in 0,01 mm., radiate throughout, coarsely punctate; puncta about 18 in 0,01 mm. — V. H. in Hauck and Richter Phycoth. univ. N:o 147. Notarisia 1888 p. 622. Icon. n. Pl. IV f. 24.

Fresh water: Triest!

The above description is from original specimens in Van Heurck's collection. *C. Hauckii* is similar to *C. acutiuscula*, but the striæ are radiate in the ends, where they are much closer than in the middle. *C. Lindsayana* GREV. (Trans. Bot. Soc. Edinb. Vol. VIII p. 234 Pl. III f. 5 to 8) has the same size and outline as *C. Hauckii*, but, according to GREVILLE, somewhat coarser striæ. The description and figures given by GREVILLE are not sufficient for identification.

21. **C. amphicephala** NAEGELI (1849). — V. slightly asymmetrical, with arcuate dorsal and almost straight ventral margin. Ends rostrate to rostrate-capitate. L. 0,025 to 0,04; B. 0,009 to 0,01 mm. Median line slightly excentric, almost straight. Axial and central areas indistinct. Striæ 12 or 14 (dorsal) to 16 (ventral) in 0,01 mm., more distant in the middle than elsewhere, slightly radiate. — NAEG. in Kütz. Sp. Alg. p. 890. A. S. Atl. IX f. 62, 64 to 66; LXXI f. 52. V. H. Syn. p. 61 Pl. II f. 6. *C. naviculiformis* HEIB. Consp. Crit. p. 108 Pl. I f. 2.

Fresh water: Spitsbergen! Iceland! Sweden (Åreskutan, Upsala, Billingen, Gulf of Bothnia)! Denmark! Holstein! England! Saxony! Belgium (V. H.), Switzerland! Ispahan (Atl.), Tasmania! New Zealand! Brazil!

Var. *subundulata* CL. — V. linear, with slightly triundulate margins and capitate ends. L. 0,04; B. 0,007 mm. Striæ in the middle 16, at the ends 18 in 0,01 mm.

Fresh water: Norway, Dovre!

Var. *hercynica* A. S. (1875). — V. rostrate. L. 0,029; B. 0,01 mm. Striæ about 13 in 0,01 mm. — *C. herc.* A. S. Atl. IX f. 30, 31. *C. abyssinica* Grun. in Martelli Florula bogosensis p. 151 Pl. I f. 3 (1886).

Fresh water: Juliushall, Harzburg (Atl.), Ringsjön (Sweden)! Abyssinia (Grun.).

22. **C. lata** Grun. Ms. — V. slightly asymmetrical, broadly lanceolate, with subrostrate to rostrate ends. L. 0,042 to 0,056; B. 0,016 to 0,018 mm. Median line almost straight and central. Axial area narrow, linear, slightly dilated around the central nodule. Striæ 9 (middle) to 12 (ends) in 0,01 mm. slightly radiate in the middle, almost parallel at the ends, finely punctate. — Pl. IV f. 27.

Fresh or slightly brackish water: Sweden (Gulf of Bothnia at Piteå; Öre sjö, near Borås)! Ladoga! Domblitten, Rostock and Lüneburg, fossil!

This species resembles in outline *C. Ehrenbergii*, but is much smaller and has less distinctly punctate striæ.

23. **C. Cucumis** A. S. (1875). — V. broad, with convex dorsal and almost straight or slightly convex ventral margin. Ends rostrate-truncate. L. 0,07 to 0,09; B. 0,024 mm. Median line almost central, slightly arcuate. Axial area narrow, slightly dilated around the central nodule. Striæ 8 to 9 (dorsal) to 10 (ventral) in 0,01 mm. punctate; puncta 12 in 0,01 mm., more distant on the median ventral striæ. — A. S. Atl. IX f. 21, 22.

Fresh water: Bengal (Atl.), Cameroon!

24. **C. Ehrenbergii** Kütz. (1844). — V. asymmetrical, elliptic-lanceolate, with slightly rostrate, obtuse ends. L. 0,09 to 0,14; B. 0,028 to 0,038 mm. Median line slightly excentric, straight. Axial area narrow, but distinct, slightly dilated around the central nodule. Striæ 7 to 9 in 0,01 mm. slightly radiate throughout, coarsely punctate; puncta 13 to 16 in 0,01 mm. — *Navic. inæqualis* Ehb. Inf. Pl. XIII f. 18 (1838). *Cymb. Ehrenb.* Kütz. Bac. p. 79 Pl. VI f. 11. W. Sm. B. D. I Pl. II f. 21. A. S. Atl. IX f. 6 to 9; LXXI f. 74. V. H. Syn. p. 61 Pl. II f. 1.

Fresh water: Iceland! Sweden (from Lapland to Skåne)! Norway! Finland! England! Belgium (V. H.), Paris! Germany! Switzerland! North America (Crane Pond, Lost Spring Ranch, Washington territory, St. Rosa Cal.)!

Var. *delecta* A. S. (1875). — V. asymmetrical-lanceolate, with slightly rostrate ends. L. 0,063 to 0,085; B. 0,019 to 0,024 mm. Axial area narrow, not, or slightly, dilated around the central nodule. Striæ 8 to 9 (middle) to 11 (ends) in 0,01 mm. — *Cymb. delecta* A. S. Atl. IX f. 17. *C. Ehrenbergii var.* Atl. LXXI f. 80. *C. Ehrenb. var. minor* V. H. Syn. II f. 2.

Fresh water: Greenland! Königsaue (Atl.), Puerto Monte, Chili (Atl.), Victoria, Splitters Creek (Austr.)!

25. **C. lapponica** Grun. (1879). — V. almost symmetrical, sublanceolate, gradually tapering from the middle to the acute ends. L. 0,033 to 0,037; B. 0,008 to 0,0085 mm. Median line almost central, straight. Axial area narrow; central area rather large, rounded. Median striæ 16 in 0,01 mm., terminal striæ about 21 in 0,01 mm., finely punctate. — Grun. in Cl. M. D. N:o 271. Pl. IV f. 28.

Fresh water: North Iceland! Repats in Gellivare, Luleå Lapmark, fossil, Sweden!

This species has never been described or figured, but I suppose that Grunow denotes this form, which occurs sparingly in Cl. M. D. N:o 271. This species seems to connect *C. Cesatii* with *C. stauroneiformis*.

26. **C. stauroneiformis** Lagst. (1873). — V. lanceolate, almost symmetrical, with nearly obtuse, attenuated ends. L. 0,038 to 0,04; B. 0,009 to 0,011 mm. Median line almost central, straight. Axial area very narrow; central area large, quadrate, somewhat broader outwards, not reaching to the margins. Striæ 16 to 17 in 0,01 mm., slightly radiate, finely punctate. — Lagst. Spitsb. D. p. 45 Pl. I f. 15. A. S. Atl. LXXI f. 62, 63.

Fresh water: Beeren Eiland (Lagst.), Spitsbergen!

27. **C. naviculiformis** Auersw. (1861). — V. elliptic-lanceolate, slightly asymmetrical, with rostrate-capitate ends. L. 0,03 to 0,047; B. 0,01 to 0,016 mm. Median line almost central, nearly straight. Axial area narrow, linear, suddenly dilated in the middle to an orbicular space. Striæ in the dorsal side 14 (middle) to 18 (ends) in 0,01 mm., on the ventral side 14 in 0,01 mm. — Auersw. Rabh. Alg. E. N:o 1065. V. H. Syn. Pl. II f. 5. *C. cuspidata* W. Sm. B. D. I Pl. II f. 22 *a'*. *C. anglica* Lagst. Spitsb. D. p. 42 Pl. II f. 18 (1873). A. S. Atl. IX f. 63. V. H. Syn. Pl. II f. 5.

Fresh water: Greenland! Spitsbergen! Beeren Eiland (Lagst.), Norway (Romsdalen, Dovre)! Sweden! Finland! Holstein! Harz (Atl.), Jenissey! New-Zealand! Australia!

Heiberg (Consp. Crit. p. 108) remarks that *Cymb. cuspidata* W. Sm. is not the species of Kützing, but possibly *C. naviculiformis*, of which he gives several figures (Pl. I f. 3), which however are much more similar to *C. amphicephala* than to this species. Lagerstedt proposed the name *C. anglica*, believing it to be identical with the species of W. Smith, which is too indistinctly figured for identification. *C. naviculiformis* closely resembles *C. amphicephala*, from which it is distinguished by the larger central area.

28. **C. hybrida** Grun. (1878). — V. linear, almost symmetrical, with rostrate ends. L. 0,045; B. 0,009 mm. Median line almost central and straight. Axial area narrow; central area large, subquadrate. Striæ 11 in 0,01 mm. almost parallel, finely punctate. — Grun. in Cl. M. D. N:o 161. Icon. nostr. Pl. IV f. 23.

Fresh or very slightly brackish water: Sweden (Gothland, Lefrasjön in Skåne)!

29. **C. spuria** Cl. N. Sp. — V. asymmetrical, lanceolate, with subrostrate ends. L. 0,05 to 0,06; B. 0,013 mm. Median line very slightly arcuate, almost central. Axial area narrow, gradually dilated towards the middle. Striæ 12 (dorsal, median) to 13 (ventral and dorsal, terminal) in 0,01 mm., slightly radiate in the middle, almost parallel in the ends, finely but distinctly punctate.

Fresh water: Talbot (Victoria, Australia)! Pichinicha (alpine region of Ecuador)!

30. **C. cuspidata** Kütz. (1844). — V. broadly linear-lanceolate, slightly asymmetrical, with rostrate-capitate ends. L. 0,04 to 0,095; B. 0,014 to 0,024 mm. Median line slightly excentric, straight. Axial area narrow, linear; central area rather large, orbicular. Striæ 9 or 10 (middle) to 12 or 14 (ends) in 0,01 mm. radiate, finely lineate. — Kütz. Bac. Pl. III f. 40. Heib. Consp. p. 109 Pl. I f. 4. A. S. Atl. IX f. 50 (typical) 53 to 55. V. H. Syn. p. 61 Pl. II f. 3.

Fresh water: Sweden (Lappland to Upsala and Westergötland)! Norway (Finmark, Dovre)! Finland! Paris! Belgium (V. H.), England! Germany! Italy! Greenland! Canada! Massachusetts! Jenissey! Kamtschatka! Japan! New Zealand!

Var. *obtusiuscula* Grun. (in V. H. Types N:o 19). — L. 0,06 to 0,08; B. 0,019 to 0,02 mm. Ends more rounded.

Fresh water: England (V. H. T.).

31. **C. heteropleura** Ehb. (1843). — V. slightly asymmetrical, lanceolate, with rostrate and truncate to subrostrate, obtuse ends. L. 0,12 to 0,15; B. 0,033 to 0,04 mm. Median line almost central, straight. Axial area distinct, linear. Central area large, slightly transversely dilated. Striæ 9 to 10 in 0,01 mm. slightly radiate throughout, punctate; puncta 9 to 13 in 0,01 mm. — *Pinnularia heteropleura* Ehb. Am. p. 133. M. G. V: 2 f. 11. *Cymb. het.* Kütz. Bac. p. 79. A. S. Atl. IX f. 4, 5.

Fresh water (arctic and northern regions): Greenland! Norway (Dovre)! Sweden (Lappland)! Russian Lappland!

Var. *subrostrata* Cl. — V. with scarcely rostrate, obtuse ends. L. 0,19 to 0,20; B. 0,045 mm. Striæ 9 in 0,01 mm. coarsely punctate; puncta 9 to 13 in 0,01 mm. — *Cymb. heteropleura* A. S. Atl. IX f. 3.

Fresh water: Canada! Danas Pond! Cherryfield!

Var. *minor* Cl. — V. with rostrate and truncate ends. L. 0,06 to 0,08; B. 0,015 to 0,022 mm. Striæ 9 in 0,01 mm., coarsely punctate; puncta 18 to 21 in 0,01 mm. — *Cymb. Ehrenb.* var. Lagst. Spitsb. D. p. 42 Pl. II f. 17. *Cymb.* A. S. Atl. IX f. 51, 52.

Fresh water: Spitsbergen! Beeren Eiland (Lagst.), Norway (Dovre)! Scotland (Lough Mourne, foss.)! Jenissey! St. Fiora, Italy (foss.)!

The typical *C. heteropleura* is a large and characteristic boreal form. The var. minor occurs at Hjerkin in Dovre and cannot be distinguished from specimens in St. Fiora deposit. The latter variety differs from *C. cuspidata* in nothing except the somewhat different shape of the ends and the more coarsely punctate striæ. *C. americana* A. S. (Atl. IX f. 15, 20) seems to be intermediate between *C. cuspidata* and *C. heteropleura var. minor.* A similar form occurs in New Zealand at Horawarra.

32. **C. oregonica** Cl. N. Sp. — V. slightly asymmetrical, lanceolate, gradually tapering from the middle to the acute ends. L. 0,1; B. 0,02 mm. Median line almost central. Axial area narrow, slowly dilated to the middle, where it suddenly expands to a large, subrectangular, central area. Striæ 17 (middle) to 20 (ends) in 0,01 mm. radiate throughout, punctate; puncta about 18 in 0,01 mm. forming longitudinal rows. — Pl. IV f. 25.

Fresh water: Oregon, fossil!

33. **C. Mölleriana** Grun. (1875). — V. nearly symmetrical, somewhat irregularly lanceolate, obtuse. L. 0,05 to 0,06; B. 0,01 to 0,012 mm. Terminal nodules of the median line at some distance from the ends. Axial area narrow; central area large, orbicular. Striæ 12 to 13 in 0,01 mm., radiate throughout. — Grun. in A. S. Atl. IX f. 71 to 75.

Fresh water(?): Wedel in Holstein (Atl.).

It seems doubtful whether this form, which I know only from the figures in A. S. Atlas, really be a Cymbella. It has more of the appearance of some form belonging to the group of *Navicula viridula*, but the striæ are radiate at the ends.

34. **C. (Encyonema) lacustris** Ag. (1824). — V. lanceolate, scarcely asymmetrical, with obtuse or truncate ends. L. 0,03 to 0,06; B. 0,01 mm. Median line nearly central; its terminal nodules very distant from the ends. Axial area narrow; central area small, irregular. Striæ about 9 in 0,01 mm., divergent in the middle, convergent at the ends, in the middle alternately longer and shorter, transversely lineate; lineolæ about 28 in 0,01 mm. — *Schizonema lacustre* Ag. Syst. p. 10. A. S. Atl. LXXI f. 1 to 5. V. H. Syn. Pl. XV f. 40. *Colletonema subcoherens* Thwaites in W. Sm. B. D. II p. 70 Pl. LVI f. 353. *Encyonema Ungeri* Grun. in A. S. Atl. X f. 63. *Colletonema lacustre* V. H. Syn. p. 111.

Fresh or slightly brackish water: Hungary (Plattensee Cl. M. D. N:o 108), England (W. Sm.), Gulf of Bothnia!

The frustules of this species live enclosed in mucous tubes. The structure of the valve shews that it is nearly akin to the Naviculæ lineolatæ.

35. **C. (Encyonema) prostrata** Berk. (1832). — V. strongly asymmetrical, semielliptical, with obtuse ends, frequently inclined downwards. L. 0,04 to 0,1; B. 0,025 to 0,03 mm. Median line straight; its terminal nodules considerably distant from the ends. Axial area narrow; central area small, orbicular. Striæ about 7 in 0,01 mm., in the middle of inequal length, and radiate at the ends convergent, transversely lineate. — *Monema prostratum* Berk. Brit. Alg. Pl. IV f. 3. *Gloeonema Leibleinii* Ag. Consp. p. 31? *Encyonema paradoxum* Kütz. Bac. p. 82 Pl. XXII f. 1 (1844). *Encyon. prostratum* Ralfs Ann. N. Hist. (I) XVI Pl. XVIII f. 3 (1845). W. Sm. B. D. II

p. 68 Pl. LIV f. 345. A. S. Atl. X f. 64 to 69; LXXI f. 6 to 9. V. H. Syn. p. 65 Pl. III f. 9 to 11. *Cymbella Encyonema* Heib. Consp. p. 110 (1863). *Encyonema maximum* Wartm. Rabh. Alg. Eur. N:o 1248 (1862).

Fresh or slightly brackish water: Sweden (Gulf of Bothnia, from Westerbotten to Roslagen; Lake Mälaren)! Finland (Åbo, Ladoga)! England! Belgium (V. H.), France! Switzerland (Brun), Germany! Hungary (Plattensee, Grun.), Italy (St. Fiora, foss.).

36. **C. (Encyonema?) inelegans** Cl. N. Sp. — V. boat-shaped, with arcuate dorsal margin, straight or slightly concave ventral margin, and broad, rounded, somewhat reflexed ends. L. 0,055 to 0,065; B. 0,02 mm. Median line parallel to the ventral margin, very excentric. Terminal fissures comma-like; terminal pores near the ends. Axial area linear, rather broad. Striæ on the dorsal side 10 (middle) to 12 (ends) slightly radiate; striæ on the ventral side 8 in 0,01 mm., radiate in the middle, parallel in the ends, coarsely punctate; puncta 17 to 18 in 0,01 mm. — Pl. V f. 1.

Fresh water: Fall River, Oregon, foss. (Grove Coll.)!

37. **C. (Encyonema) Triangulum** Ehb. (1845). — V. broad, asymmetrical, lanceolate with acute ends. L. 0,04 to 0,05; B. 0,02 mm. Median line straight, dividing the valve into a ventral part half as broad as the dorsal. Terminal fissures in the ends of the valve. Axial area very narrow; central area small or indistinct. Striæ 9 to 11 in 0,01 mm. almost parallel or slightly radiate in the ends, coarsely punctate; puncta about 10 in 0,01 mm. — *Gloeonema Triangulum* Ehb. Abh. 1845 p. 77. M. G. XXXV A. 7 f. 10. *Encyon. Triang.* Kütz. Sp. Alg. p. 62. A. S. Atl. X f. 54; LXXI f. 10.

Fresh water: North America, New York and Pensacola (Atl.), Michigan, Dakota and Lost Spring Ranch Calif.! Tasmania, Campbell Town, fossil!

38. **C. (Encyonema) turgida** Greg. (1856). — V. lunate, with strongly arcuate dorsal, centrally gibbous ventral margin, and acute ends. L. 0,05 to 0,10; B. 0,012 to 0,023 mm. Median line straight, dividing the valve into a ventral part of about half the width of the dorsal. Terminal fissures in the ends, comma-like, turned downwards. Axial area distinct, linear, scarcely dilated in the middle. Striæ 7 to 9 in 0,01 mm., radiate in the middle and, on the dorsal side, at the ends, parallel or convergent at the ends on the ventral side, punctate; puncta 13 to 18 in 0,01 mm. — Greg. M. J. IV p. 5 Pl. I f. 18. *Encyon. turg.* A. S. Atl. X f. 49 to 53. V. H. Syn. p. 65 Pl. III f. 12.

Fresh water: Sweden! Finland! Mouth of Jenissey! Scotland (Greg.), East Indies! Java! Australia (Murray River)! Tasmania! New Zealand! North America (California, Mexico)! Guatemala! Ecuador! Argentina!

This species is very variable and graduates into the following. The largest and most typical specimens occur in California, Mexico and Ecuador. European specimens are smaller and can only with difficulty be distinguished from the following species.

39. **C. (Encyonema) ventricosa** Kütz. (1834). — V. lunate, with straight or centrally gibbous ventral margin and subacute ends, usually turned downwards. L. 0,015 to 0,036; B. 0,007 to 0,011 mm. Median line approximate to the ventral margin. Terminal nodules and fissures at the ends of the valve. Axial area very narrow or indistinct. Striæ 10 to 16 in 0,01 mm. slightly radiate, finely punctate. Frustules enclosed in branched mucous tubes. — *Frustulia ventricosa* Kütz. Syn. p. 11 f. 7. *Cymb. ven.* Bac. p. 80 Pl. VI f. 16. *Encyon. ventric.* V. H. Syn. p. 66 Pl. III fig. 15 to 17, 19. *Encyon. prostratum* Kütz. Bac. p. 82 Pl. XXV f. 7 (1844). *Encyon. cæspitosum* Kütz. Sp. Alg. p. 61 (1849). W. Sm. B. D. II p. 68 Pl. LV f. 346. V. H. Syn. p. 65 Pl. III f. 14; Suppl. A f. 3. A. S. Atl. X f. 57, 58; LXXI f. 11, 12. *Encyon. Auerswaldii* Rabh. Süssw. D. p. 24 Pl. VII f. 2 (1853). *Cymbella maculata* W. Sm. B. D. I Pl. II f. 23. *Cymb. affinis var. semicircularis* Lagst. Spitsb. D. p. 43 Pl. II f. 20. *Cocconema Lunula* Ehb. Am. Pl. I: 1, f. 15 (1843). *Encyon.*

Lunula A. S. Atl. X f. 42, 43; LXXI f. 14, 15, 32 to 34. *Cymb. Lunula* Rabh. Alg. Eur. N:o 1166 (1861). *Cymb. silesiaca* Bleisch Rabh. Alg. Eur. N:o 1802 (1865). A. S. Atl. X f. 59. *Cymb. minuta* Hilse Rabh. Alg. Eur. N:o 1261 (1862). A. S. Atl. LXXI f. 30, 31. *Cymb. variabilis* Wartm. Rabh. Alg. Eur. N:o 803 (1859).

Fresh water: Spitsbergen! Norway (Dovre, Christiania)! Sweden (Lapland to Skåne)! Finland! Gulf of Bothnia (from Haparanda to Roslagen)! England! Belgium! France! Germany! Switzerland! East Indies! Japan! Australia! Tasmania! New Zealand! Greenland! Mexico! California! Ecuador!

Var. *ovata* Grun. (1875). — V. with convex ventral margin. Median line almost in the middle of the valve. — *Encyon. cæspit. var. ovata* A. S. Atl. X f. 45, 46. V. H. Syn. Pl. III f. 13.

Fresh water: Sweden (Gulf of Bothnia)! Germany, Atter See (Atl.), Belgium (V. H.).

Var. *obtusa* Grun. (1875). — V. elongated, obtuse. — *E. cæspit. var. obtusa* Grun. in A. S. Atl. X f. 47, 48.

Fresh water: Rome (Atl.), Rammer Moor (Atl.).

Most authors regard the forms of *C. ventricosa* as belonging to two different species, *Encyonema ventricosum* and *E. cæspitosum*, the former being smaller and with the median line closer to the straight ventral margin, the latter a little larger, with the median line somewhat more distant from the ventral margin, which is slightly gibbous in the middle. I am unable to find any definite limit between these species, and as their distinctive characteristics are very trifling and subject to great variation, I have united them.

40. **C. (Encyonema) Jordani** Grun. Ms. — V. with very elevated dorsal margin, more or less gibbous ventral margin and truncate to capitate ends. L. 0,02 to 0,032; B. 0,008 to 0,009 mm. Areas indistinct. Median line straight; its terminal fissures turned downwards. Striæ about 16 in 0,01 mm., radiate in the middle, very finely punctate. — Pl. V f. 3, 4.

Fresh water: Otago, New Zealand (Weissflog Coll.)!

41. **C. (Encyonema) hebridica** Grun. (1877). — V. elongated, lunate, with arcuate dorsal and slightly convex ventral margin and subacute ends. L. 0,03 to 0,04; B. 0,007 to 0,008 mm. Median line straight, dividing the valve so that the ventral part is half as broad as the dorsal. Terminal fissures in the ends. Axial area very narrow; central area small or indistinct. Striæ about 10 in 0,01 mm. distinctly punctate. — *Encyon. hebridicum* (Greg.) Grun. Cl. M. D. N:o 37. Cl. D. of Finl. p. 48 Pl. II f. 16, 17.

Fresh water: Sweden (Luleå Lapmark, foss.)! Finland (Russian Lapland; Nyland and Viborg foss.)!

This form, which appears to be pretty constant, occurs in northern regions. It connects *E. ventricosum* with *E. gracile*. In A. Schmidts Atl. IX f. 11 is figured a large form from »Ohlajärri» (Orrjärvi, Finland?), which seems either to be a forma maxima of *C. hebridica* or a new species.

42. **C. (Encyonema) gracilis** Rabh. (1853). — V. narrow, slender, with gently arcuate dorsal and straight ventral margin. Ends acute. L. 0,03 to 0,056; B. 0,007 to 0,01 mm. Median line more approximate to the ventral than to the dorsal margin; its terminal nodules distant from the ends. Areas indistinct. Striæ 10 to 13 in 0,01 mm. — *Encyon. gracile* Rabh. Süssw. D. Pl. X f. 1. A. S. Atl. X f. 36, 37, 39, 40. V. H. Syn. Pl. III f. 20 to 21. *Cymbella scotica* W. Sm. B. D. I p. 18 Pl. II f. 25 (1853). *Cymb. lunata* W. Sm. Ann. Mag. Nat. Hist. [2] XV Pl. IX f. 15 (1855). V. H. Syn. Pl. III f. 23.

Fresh water, especially alpine regions: Norway (Finmark, Dovre)! Sweden (Lapland, Småland)! Finland! Scotland! Savoy! Tasmania! New Zealand! Greenland! White Mountains!

43. **C. (Encyonema) norvegica** Grun. (1875). — V. asymmetrical, linear, with obtuse, broad ends. L. 0,04 to 0,05; B. 0,007 to 0,008 mm. Median line straight, nearly axial, with the

terminal nodules at some distance from the ends. Axial area narrow, central area small, orbicular. Striæ 14 to 15 in 0,01 mm. slightly radiate in the middle, where they are more distant, parallel at the ends. — GRUN. in A. S. Atl. X f. 41. CL. M. D. N:o 268.

Fresh water (alpine regions): Greenland! Iceland! Norway (Dovre, Romsdalen)! Sweden (Pauträsk, Wilhelmina socken)!

C. norvegica is nearly akin to *C. gracilis* and differs principally by its more linear form and broad, rounded ends.

44. **C. incerta** GRUN. (1878). — V. linear, slightly asymmetrical, with broad, obtuse ends, slightly arcuate dorsal margin and almost straight ventral. L. 0,04 to 0,07; B. 0,009 mm. Median line almost central. Axial area narrow, not dilated in the middle. Striæ 14 to 16 in 0,01 mm., equidistant in the middle, where they are parallel, and slightly radiate at the ends. — *C. Pisciculus var. incerta* GRUN. Cl. M. D. N:o 96. CL. D. fr. Grönl. och Argent. p. 13 Pl. XVI f. 12. *C. subæqualis var. incerta* GRUN. in V. H. T. N:o 30.

Fresh water, northern or alpine regions: Norway (Dovre, Hammerfest)! Sweden (Lapland)! Finland (Russian Lapland)! Scotland (V. H. T.).

Var. *naviculacea* GRUN. (1879). — With somewhat wider axial area and finer striæ, about 18 in 0,01 mm. — *C.* (*Pisciculus var.*) *naviculacea* GRUN. in Cl. M. D. N:o 272. CL. D. fr. Grönl. och Argentina p. 13 Pl. XVI f. 11.

Fresh water: Greenland! Norway (Dovre)! Sweden (Lapland to Jämtland)! Finland (Russian Lapland)!

45. **C. æqualis** W. SM. (1856). — V. linear-lanceolate, with arcuate dorsal, straight or slightly convex ventral margin, and broad, obtuse, or almost truncate ends. L. 0,03 to 0,045; B. 0,006 to 0,011 mm. Median line straight, near to the ventral margin, broad (oblique). Axial area narrow, not, or slightly, dilated in the middle. Striæ 11 or 14 (middle) to 14 or 16 (ends) in 0,01 mm., slightly radiate, obscurely punctate; puncta about 16 in 0,01 mm. — W. SM. B. D. II p. 84. *Cymb. obtusa* GREG. M. J. IV Pl. I f. 19 (1856). V. H. Syn. p. 61 Pl. III f. 1 *a*. A. S. Atl. IX f. 41 to 45; LXXI f. 72? *Cymb. subæqualis* GRUN. V. H. Syn. Pl. III f. 2, 4 Suppl. A f. 1 (1880).

Fresh water: Greenland! Iceland! Scotland and England! Sweden (Lapland to Skåne, Gothland)! Norway (Dovre, Stavanger, foss.)! Belgium (V. H.), Saxony! Switzerland! Michigan!

Var. *florentina* GRUN. (1880). — V. less asymmetrical, almost lanceolate. Striæ finer, 15 in 0,01 mm. — *Cymb. subæqualis var. florentina* GRUN. in V. H. Syn. Pl. III f. 3.

Fresh water: S:ta Fiora, foss. (Grun.).

Var. *diminuta* GRUN. — L. 0,015; B. 0,004 mm. Striæ 12 to 15 in 0,01 mm. — *Cymb. obtusa var. diminuta* GRUN. in V. H. T. N:o 129.

Fresh water: England (V. H. T.).

C. æqualis W. SM. is usually believed to denote the same species as *C. angustata*, but as the ends are described as obtuse and the striæ are coarse, 12 in 0,01 mm., it is evident that this is a mistake, and that SMITH meant the form described above as *C. æqualis*. GREGORY's figure of *Cymb. obtusa* is small and not very characteristic, but agrees pretty well with this species. Between *Cymb. subæqualis* GRUN. and *Cymb. obtusa* GREG. as represented in VAN HEURCK's Synopsis I am unable to discover any specific distinction. As limited here *Cymb. æqualis* is a common form, distinguished by its linear form and almost truncate ends. The median striæ are more distant than the others and radiate.

46. **C. sinuata** GREG. (1856). — V. linear, slightly asymmetrical, frequently gibbous in the middle on the ventral side, with broad, obtuse ends. L. 0,012 to 0,026; B. 0,004 to 0,005 mm. Axial area narrow; central area large, on the ventral side reaching to the margin. Striæ 9 to 11 0,01 mm., almost parallel. — GREG. M. J. IV Pl. I f. 17. *C. abnormis* GRUN. in V. H. Syn. Pl. III f. 8 (1880). *Gomphonema asymmetricum* GUTW. p. 28 Pl. I f. 24?

Fresh water: Sweden (Mälaren, Westergötland, Småland)! Finland (Åbo)! Scotland (Greg.), Ireland! New Zealand!

Var. *antiqua* GRUN. — V. with subcapitate ends. L. 0,032 to 0,033; B. 0,008 mm. Striæ 7 to 8 in 0,01 mm., finely punctate. — *C. abn. var. ant.* GRUN. Foss. D. Öster. Ung. p. 141 Pl. XXIX f. 31.

Fresh water: Hungary, fossil (Grun.).

Var.? *fossilis* PANT. (1893). — Linear with slightly rostrate ends. L. 0,05; B. 0,01 mm. Central area a transverse fascia. Striæ 8 to 9 in 0,01 mm. — *Cymb. abnormis var. fossilis* PANT. III Pl. XVII f. 255.

Fresh water: Hungary, fossil (Pant.).

This little form is of interest as it has some resemblance to a Gomphonema, in its unilaterally dilated central area. The fig. given by GREGORY is not as good as desirable, but there can hardly exist any doubt that GREGORY really meant this species.

47. **C. tumidula** GRUN. (1875). — V. asymmetrical, linear-lanceolate, with rostrate ends. L. 0,033 to 0,035; B. 0,007 to 0,009 mm. Dorsal margin arcuate, ventral straight, or somewhat gibbous in the middle. Median line somewhat excentric, straight, with approximate central pores. Axial areas indistinct; central area indistinct or on the dorsal side only. Striæ on the dorsal side 13 (middle) to 15 (ends) in 0,01 mm., on the ventral side 14 in 0,01 mm., slightly radiate throughout, finely punctate. On the ventral side of the central nodule are two puncta at the ends of the two median striæ. — GRUN. in A. S. Atl. IX f. 33. V. H. T. N:o 27.

Fresh water: Rostock, fossil! Oxford! Triest (Atl.), Paris, Marly (Cl. M. D. 195)!

Var. *salinarum* GRUN. (1875). — V. asymmetrical, lanceolate, with subacute, not rostrate ends. L. 0,027 to 0,04; B. 0,008 to 0,01 mm. Axial area narrow, slightly dilated on the dorsal side around the central nodule. Striæ 11 or 12 (middle and dorsal) to 15 (ventral) in 0,01 mm. — *C. salinarum* GRUN. A. S. Atl. IX f. 28. V. H. T. N:o 26.

Brackish water: Bay of Finland (Dannf.), Saule (Atl.), Italy!

C. tumidula seems to connect *C. amphicephala* with *C. turgidula*, *C. affinis* etc. As far I can see, there is no other difference between *C. tumidula* and *C. salinarum* than the somewhat different shape of the ends. The above descriptions are from original specimens in VAN HEURCK's Types.

48. **C. turgidula** GRUN. (1875). — V. asymmetrical with more or less rostrate, obtuse, or truncate ends. L. 0,032 to 0,05; B. 0,01 to 0,015mm. Axial area very narrow. Striæ in the middle on the dorsal side 9 to 10 in 0,01 mm. at the ends about 11 in 0,01 mm. finely punctate, puncta about 24 in 0,01 mm. At the ventral side of the central nodule are two small puncta, ending the median striæ. — GRUN. A. S. Atl. IX f. 23 to 26.

Fresh water: Bengal (Atl.), New Zealand! Niagara falls! Porto Rico! Ecuador, Chimborazo! Argentina!

C. turgidula is nearly related to *C. affinis*, but is larger and has 2 puncta below the central nodule.

49. **C. affinis** KÜTZ. (1844). — V. more or less broad, semielliptical to semilanceolate with almost straight ventral margin and slightly rostrate, obtuse or subtruncate ends. L. 0,025 to 0,04; B. 0,007 to 0,01 mm. Median line slightly arcuate, excentric. Axial area very narrow, not dilated around the central nodule. Striæ 10 or 11 (dorsal side) to 12 (ventral side) in 0,01 mm. a little closer at the ends, slightly radiate, finely punctate. On the ventral side of the central nodule is a small isolated punctum ending the median stria. — KÜTZ Bac. p. 80 Pl. VI f. 15? W. SM. B. D. I Pl. XXX f. 250? A. S. Atl. IX f. 29, 38*; LXXI f. 28, 29. V. H. Syn. p. 62 Pl. II f. 19. V. H. Types N:o 26. *Cymb. truncata* GREG. M. J. III p. 39 Pl. IV f. 3 (1855)? *Cocconema nanum* HANTZSCH Rab. A. E. N:o 1321 (1862). A. S. Atl. LXXI f. 27. *Coccon. gibbum* A. S. Atl. X f. 27. *Cymb. affinis var. tumida* LAGST. Spitsb. D. p. 43 Pl. II f. 19?

Fresh water: Sweden (Uppland to Skåne, Gothland, Gulf of Bothnia)! Finland! Holstein! England! Belgium (V. H.), Germany! Switzerland! Italy! Mouth of Jenissey! Japan! Australia (Lake Muir)! New Zealand! New York! Argentina!

Cymb. affinis is a variable species, connecting *Cymb. turgidula* with *Cymb. parva*. The ventral margin is sometimes indented in the middle. Such a form has been figured by GRUNOW in Foss. Diat. Österr. Ung. Pl. XXIX f. 26 and is probably identical with *Cymb. exisa var. major* GUTWINSKY Materialy p. 25 Pl. I f. 21.

50. **C. parva** W. SM. (1852). — V. semilanceolate, with slightly rostrate, obtuse to subtruncate ends. L. 0,03 to 0,05; B. 0,01 to 0,012 mm. Median line somewhat arcuate and broad (oblique). Axial area narrow, very slightly dilated in the middle. Striæ 9 or 10 (median, dorsal) to 13 (ventral and terminal) in 0,01 mm., very slightly radiate, obscurely punctate. There is no punctum on the ventral side of the central nodule. — *Cocco. parvum* W. SM. B. D. I p. 77. Pl. XXIII f. 222. A. S. Atl. X f. 14, 15. GRUN. Franz Josephs Land D. p. 97 (45) Pl. I f. 9. *Cymb. cymbyformis var. parva* V. H. Syn. p. 64 Pl. II f. 14. *Cocconema pachycephalum* RABH. Alg. Eur. N:o 1107 (1861).

Fresh water: Greenland! Franz Josephs Land (Grun.), Sweden (Lapland to Skåne)! Norway (Finmark to Christiania)! Finland! England! Germany! Belgium! France! Switzerland! Savoy! Italy! Mouth of Jenissey! North America, Winnepeg!

Var. *hungarica* GRUN. (1875). — L. 0,024 to 0,04; B. 0,009 to 0,01 mm. Area dilated on the dorsal side of the central nodule. Striæ 10 in 0,01 mm. — *Coccon. hungaric.* GRUN. in A. S. Atl. IX f. 38, X f. 16, 17; LXXI f. 37, 38.

Fresh water: Norway (Brevig)! Platten See, Hungary (Grun.).

Cymb. parva is in the living state stipitate. It is closely akin to *Cymb. affinis* and *Cymb. cymbiformis*, differing from both by the want of a punctum at the end of the median central stria.

51. **C. Botellus** LAGST. (1873). — V. arcuate, with parallel margins and rounded ends. L. 0,024 to 0,034; B. 0,006 to 0,007 mm. Median line slightly excentric, arcuate. Axial area narrow, not dilated around the central nodule. Striæ 10 to 11 in 0,01 mm., very slightly radiate, not distinctly punctate. — *Cymb. variabilis var. Botellus* LAGST. Spitsb. D. p. 44 Pl. II f. 22. *Cymb. bot.* A. S. Atl. LXXI f. 39.

Fresh water: Arctic America! Beeren Eiland (Lagst.), Spitzbergen!

52. **C. cymbiformis** (AG. 1830?) KÜTZ. (1833). — V. boat-shaped, with straight, sometimes slightly gibbous, ventral margin and obtuse or truncate ends. L. 0,05 to 0,1; B. 0,01 to 0,012 mm. Median line slightly arcuate, broad (oblique); its terminal fissures reflexed. Axial area narrow; central area small. Striæ 8 to 9 in 0,01 mm. somewhat closer at the ends, finely lineate (lineolæ 20 in 0,01 mm.). On the ventral side of the central nodule is an isolated punctum at the end of the median stria. — Ag. Consp. p. 10 (1830)? *Frustulia coffeæformis* KÜTZ. Dec. N:o 11 (1833) according to Lagst. *Frust. cymb.* KÜTZ. Linn. VIII p. 539 Pl. XIII f. 10. *Coccon. cymbiforme* W. SM. B. D. I p. 76 Pl. XXIII f. 220? A. S. Atl. IX f. 76 to 79; X f. 13. *Cymb. cymbif.* V. H. Syn. p. 63 Pl. II f. 11 a, b, c.

Fresh water: Iceland! Norway (Finmark to Brevig)! Sweden! Finland! England! Belgium (V. H.), France! Germany! Switzerland! Hungary (Dubravica, foss. Grun.), Socotra (Kitton), Japan! Tasmania! Argentina!

C. cymbiformis is very similar to *C. helvetica*, but differs by the reflexed terminal fissures and from *C. helvetica*, as well as from *C. parva*, by the isolated punctum below the central nodule.

53. **C. Beccarii** GRUN. (1886). — V. clavate, and at the same time boat-shaped, with one half longer than the other. L. 0,054 to 0,06; B. 0,014 mm. Median line arcuate, almost in the middle of the valve. Axial area narrow, not dilated around the central nodule. Striæ 11 to 16

in 0,01 mm., slightly radiate throughout, distinctly punctate. No isolated punctum below the central nodule. — GRUN. in Martelli Florula Bogosensis p. 152 Pl. I f. 1, 2.

Fresh water: Abyssinia (Grun.).

54. **C. Cistula** HEMPR. (1828). — V. boat-shaped, with concave, centrally slightly gibbous, ventral margin, and truncate or rounded, obtuse ends. L. 0,07 to 0,16; B. 0,018 to 0,025 mm. Median line arcuate, broad, bent downwards near the central nodule. The central pores distant, and the terminal fissures reflexed. Axial area narrow, linear, slightly dilated on the dorsal side of the central nodule. Striæ 7 to 9 in 0,01 mm. coarsely lineate; lineolæ 18 to 21 in 0,01 mm. On the ventral side, near the central nodule, the striæ are interrupted by a narrow depression, so that below the central nodule is a segmental row of 2 to 5 puncta. — *Bacillaria Cistula* HEMPR. a. EHB. Symb. Phys. phyto. Pl. II, IV f. 10. *Coccon. Cistula* W. SM. B. D. XXIII f. 221. A. S. Probet. f. 16 Pl. X f. 1—5, 24—26. *Cymb. Cistula* V. H. Syn. p. 64 Pl. II f. 12—13. *C. Cistula var. maculata* A. S. Atl. LXXI f. 21. GRUN. Franz Josephs Land D. p. 97 (45) Pl. I f. 8. *C. Cistula var. fusidium* HÉRIB. a. PERAG. D. d'Auvergne p. 71 Pl. III f. 12. *Coccon. arcticum* A. S. Atl. LXXI f. 25. *Coccon. cornutum* GREG. M. J. IV Pl. I f. 11 (1856)?

Fresh and slightly brackish water: Spitsbergen! Norway (Dovre, Stavanger, foss.)! Sweden (Lapland to Skåne), Bay of Bothnia (from Piteå to Uppland and Helsingfors)! Finland! England! Holstein! Belgium! France! Germany! Switzerland! Italy! Mouth of Jenissey! Kamtschatka! Japan! Yarkand! America (Winnepeg, Vancouver, Massachusets, Illinois, California, Mexico)!

Var. *maculata* KÜTZ. (1834). — V. broader and shorter than in the type. L. 0,045 to 0,082; B. 0,013 to 0,015 mm. Striæ 9 to 12 in 0,01 mm. Lineolæ 24 in 0,01 mm. No row of puncta below the central nodule. — *Frustulia maculata* KÜTZ. Dec. N:o 85 (1834) according to Lagst. *Cymb. maculata* A. S. Atl. X f. 6; LXXI f. 20, 22. *Cymb. Cistula var. mac.* V. H. Syn. p. 64 Pl. II f. 16, 17. *Cymb. Bouleana* BR. a. HÉRIB. D. d'Auvergne p. 220 Pl. VI f. 14 1893 (ad spec. auth.). *Cymb. Pauli* HÉRIB. a. PERAG. D. d'Auvergne p. 70 Pl. III f. 11 (1893).

Fresh water: Franz Josephs Land (Grun.), Spitsbergen! Sweden (Vestergötland, Småland)! Finland! England! France! Germany! Greenland! Argentina!

Var. *sibirica* GRUN. (1880). — V. with rounded, not rostrate ends. L. 0,08; B. 0,024 mm. Median line strongly arcuate. Striæ 10 (middle) to 12 (ends) in 0,01 mm. lineate (lineolæ about 20 in 0,01 mm.) interrupted in the ventral side of the central nodule by a narrow depression. — *Coccon. Cistula var. sib.* GRUN. A. D. p. 25 Pl. I f. 11.

Fresh water: Mouth of Jenissey!

Var. *arctica* LAGST. (1873). — V. boat-shaped, with strongly arcuate dorsal, and slightly concave ventral, margin. Ends truncate. L. 0,032 to 0,07; B. 0,007 to 0,015 mm. Median line strongly arcuate, broad; its terminal fissures reflexed. Axial area narrow. Striæ 9 to 13 in 0,01 mm. finely lineate. No row of puncta on the ventral side of the central nodule. — *Cymb. variabilis var. arctica* LAGST. Spitsb. D. p. 44 Pl. II f. 21. *Cymb. arctica* A. S. Atl. X f. 12; LXXI f. 23, 24.

Fresh water: Beeren Eiland (Lagst.), Spitsbergen! Russian Lapland! Mouth of Jenissey!

Var.? *truncata* BRUN (1880). — V. with slightly arcuate dorsal margin, straight ventral margin and very broad, truncate ends. L. 0,045 to 0,075 mm. Striæ 8 to 10 in 0,01 mm. No row of puncta below the central nodule. — BRUN D. des Alpes p. 58 Pl. III f. 2.

Fresh water: Switzerland (Brun.).

C. Cistula is a very variable species, graduating, as it appears, to *C. cymbiformis*. Its most distinctive characteristic, the row of puncta below the central nodule, is not present in some of its varieties. The *var.? truncata* is remarkable for its outline and resembles very much the smaller *C. curta* A. SCHM. (Atl. IX f. 47. L. 0,02; B. 0,01 mm.) unknown to me.

55. **C. Stuxbergii** CL. (1880). — V. with strongly arcuate dorsal margin, almost straight ventral margin, and rostrate, truncate ends. L. 0,055 to 0,075; B. 0,02 mm. Median line strongly arcuate, with reflexed terminal fissures. Axial area indistinct, slightly dilated on the dorsal side

around the central nodule. Striæ 14 to 15 in 0,01 mm. radiate in the middle, almost parallel at ends, very finely punctate, crossed on the ventral side below the central nodule by a narrow depression. — *Coccon. Stuxb.* Cl. A. D. p. 13 Pl. I f. 10. *Cymb. St.* Icon. n. Pl. V f. 2.

Fresh water: Mouth of Jenissey!

56. **C. Sturii** Grun. (1882). — V. boat-shaped, with truncate ends. Dorsal margin arcuate, ventral margin straight, somewhat gibbous in the middle. L. 0,19 to 0,25; B. 0,032 mm. Median line slightly arcuate, dilated towards the ends; its terminal fissures reflexed. Axial area narrow linear, gradually dilated towards the middle and the ends. Striæ 7 or 8 (middle) to 10 or 12 (ends) in 0,01 mm. punctate (puncta about 14 in 0,01 mm.), crossed near the central nodule on the ventral side, and sometimes on the dorsal side, by a narrow depression. — Grun. Foss. D. Österr. Ung. p. 140 Pl. XXX f. 35. Pant. III Pl. XIX f. 287.

Fresh water: Hungary, fossil!

This species is very characteristic, distinguished from all others by its median line becoming wider towards the ends. It has the outline of *C. lanceolata*, and the row of puncta of *C. Cistula*.

57. **C. lanceolata** Ehb. (1838). — V. boat-shaped, with arcuate dorsal margin, slightly concave, centrally gibbous, ventral margin, and obtuse ends. L. 0,08 to 0,16; B. 0,024 to 0,03 mm. Median line slightly arcuate with reflexed terminal fissures. Axial area very narrow; central area small, elongated. Striæ 9 to 10 in 0,01 mm. slightly radiate, punctate, puncta 15 to 18 in 0,01 mm. — *Coccon. lanceolatum* Ehb. Inf. p. 224 Pl. XIX f. 6. W. Sm. B. D. I Pl. XXIII f. 219. A. S. Atl. X f. 8—10. *Cymb. lanc.* V. H. Syn. p. 63 Pl. II f. 7. *Coccon. Boeckii* Grun. in A. S. Atl. X f. 11 (1875). *Coccon. variabile* Cramer, Rab. A. E. 1246 (p. p. C. cymbifera).

Fresh water, especially larger lakes, often slightly brackish water: Sweden (Lapland to Skåne)! Gulf of Bothnia! Norway (Finmark to Laurgård)! Finland (Ladoga, Onega)! Siberia! Holstein! Britain! France! Belgium (V. H.), Switzerland! Vienna! Socotra (Kitton).

Var *cornuta* Ehb. (1843). — L. 0,15 to 0,20; B. 0,027 to 0,029 mm. Striæ 7 or 8 (middle) to 10 or 11 (ends) in 0,01 mm. punctate; puncta 10 to 12 in 0,01 mm. — *Coccon. cornutum* Ehb. Am. p. 124. M. G. XV, *A* f. 94. *Cymb. lanc. var. cornuta* Grun. Foss. D. Österr. Ung. p. 141.

Fresh water: Ireland, Toome Bridge, Mourne Mountains (Grun.), Lüneburg (Grun.).

Var. *fossilis* Pant. (1889). — L. 0,127; B. 0,024 mm. Striæ 11 (middle) to 8 (ends) in 0,01 mm. — Pant. II p. 40.

Brackish water: Hungary, fossil (Pant.).

58. **C. helvetica** Kütz. (1844). — V. boat-shaped, with gently arcuate dorsal margin and straight, frequently slightly gibbous ventral. Ends rounded obtuse. L. 0,036 to 0,085; B. 0,01 to 0,015 mm. Median line slightly asymmetrical and almost straight. Terminal fissures in nearly the same direction as the median line. Axial area narrow, very slightly dilated around the central nodule. Striæ 9 to 11 in 0,01 mm. closer towards the ends; puncta about 16 in 0,01 mm. There are no isolated puncta below the central nodule. — Kütz. Bac. p. 79 Pl. VI f. 13. V. H. Syn. p. 64 Pl. II f. 15. A. S. Atl. X f. 20 to 21, 22 (*Cymb. scotica*) f. 23 (*Coccon. lævc*); LXXI f. 19.

Fresh water: Greenland! Norway (Finmark, Stavanger, foss.)! Sweden (Lapland to Skåne)! Gulf of Bothnia (Haparanda, Piteå), Finland! Scotland! Belgium (V. H.), Germany! France! Switzerland!

Var. *curta* Cl. — L. 0,045; B. 0,012 mm. Central area smaller than in the type, or indistinct. Striæ 12 in 0,01 mm. less distinctly punctate than in the type. — *C. turgidula* Grun. in Cl. M. D. N:o 95.

Fresh water: Holstein!

Var.? *Balatonis* Grun. (1875). — Dorsal margin strongly arcuate, ventral slightly gibbous. L. 0,09; B. 0,026 mm. Striæ about 8 in 0,01 mm. — *Cymb. Bal.* Grun. A. S. Atl. X f. 19.

Fresh water: Platten See, Hungary (Grun.).

Cymbella helvetica is a very common species, easily recognized by its straight terminal fissures. Under the name *Encyonema Gerstenbergeri* GRUNOW has described (Banka D. p. 9 Pl. I f. 11; 1865) a form, remarkable for the terminations of the median line, which are unusually distant from the ends of the valve. I have seen from various localities several specimens closely agreeing with the figure published by GRUNOW, and I have convinced myself that these are abnormal forms of *C. helvetica*.

* **C. hevesensis** PANT. (1889). — V. boat-shaped, with obtuse ends. L. 0,062; B. 0,013 mm. Median line bent; its central pores very distant. Axial area narrow, slightly dilated around the central nodule. Striæ 11,5 to 13,5 in 0,01 mm. slightly radiate, punctate. — PANT. II p. 40 Pl. III f. 53.

Brackish water: Hungary, fossil (Pant.).

This species is unknown to me. The fig. and description given by PANTOCSEK are insufficient for deciding as to its relations to other boat-shaped Cymbellæ.

* **C. Chyzerii** PANT. (1889). — V. boat-shaped, with the ventral margin slightly gibbous in the middle. Ends subrostrate, obtuse. L. 0,0825; B. 0,0145 mm. Median line arcuate, its central pores approximate. Axial area narrow, not dilated in the middle. Striæ 10 to 12,5 in 0,01 mm. Ventral striæ crossed by »a black line»(?) — PANT. II p. 40 Pl. XI f. 194.

Brackish water: Hungary, fossil (Pant.).

This species is unknown to me. The description and the figure given by PANTOCSEK are insufficient for ascertaining its relations to other boat-shaped Cymbellæ. It may come near to *C helvetica*, *C. lanceolata*, *C. cymbiformis*.

59. **C. aspera** EHB. (1840). — V. boat-shaped, with strongly arcuate dorsal margin and straight, centrally gibbous ventral margin. Ends obtuse, rounded. L. 0,15 to 0,18; B. 0,033 mm. Median line arcuate. Axial area linear, slightly dilated in the middle. Striæ 7 to 9 in 0,01 mm. slightly radiate, punctate; puncta 12 to 15 in 0,01 mm. No row of isolated puncta on the ventral side. — *Coccon. asperum* EHB. Ber. 1840 M. G. V: 1 f. 1 etc. PETIT Journ. de Microgr. 1878 Mars et Avril f. 3. HÉRIB. D. d'Auvergne Pl. III f. 10. *Cy. lanceol. var. aspera* BRUN D. des Alpes p. 57 Pl. IX f. 16? *Cy. gastroides* KÜTZ. Bac. p. 79 Pl. VI f. 4 *b* (1844). A. S. Atl. IX f. 1, 2; X f. 7. V. H. Syn. p. 63 Pl. II f. 8. GRUN. Franz Josephs Land D. p. 97 (45) Pl. I f. 7. *C. gigantea* PANT. III Pl. XXI f. 321 (1893)?

Fresh water: Franz Josephs Land (Grun.), Iceland! Norway (Dovre, Laurgaard)! Sweden (Lapland to Skåne)! Finland! France! Britain! Belgium! Germany! Switzerland! Savoy! Italy! Japan! New Zealand!

Var. *minor* V. H. (1880). — Smaller, with strongly arcuate median line. L. 0,07 to 0,08 mm. — *Cy. gastr. forma minor* V. H. Syn. p. 63 Pl. II f. 9.

Var. *neogena* GRUN. (1882). — L. 0,175; B. 0,033 mm. Striæ about 8 in 0,01 mm., 12 in 0,01 mm. towards the ends, punctate; puncta about 14 in 0,01 mm. — *Cy. gastroides var. neogena* GRUN. Foss. D. Öster. Ung. p. 141.

Fresh water: Hungary, fossil (Grun.).

Var. *dubravicensis* GRUN. (1882). — L. 0,168; B. 0,027 mm. Terminal nodules very strong, at some distance from the ends, surrounded by short striæ. Striæ 6 to 9 in 0,01 mm.; their puncta 14 to 17 in 0,01 mm. — *Cy. gastr. var. dubr.* GRUN. Foss. D. Öster. Ung. p. 141 Pl. XXIX f. 30. PANT. III Pl. XVII f. 251.

Fresh water: Hungary, fossil (Grun.).

Var.? *crassa* GRUN. (1882). — V. short and broad with rounded obtuse ends. L. 0,073; B. 0,024 mm. Median line strongly arcuate. Axial area narrow. Striæ 6 or 7 (middle) to 9 (ends) in 0,01 mm. punctate; puncta 16 to 17 in 0,01 mm. The striæ are on the ventral side crossed by a short depression. — GRUN. Foss. D. Öster. Ung. Pl. XXIX f. 28.

Fresh water: Hungary, fossil (Grun.).

Var. *bengalensis* GRUN. (1875). — V. less asymmetrical, almost boat-shaped, with straight or slightly centrally gibbous ventral margins. Ends obtuse. L. 0,08 to 0,11; B. 0,024 to 0,027 mm. Median line slightly arcuate. Axial area linear, scarcely dilated around the central nodule. Striæ 7,5 (middle) to 9 (ends) in 0,01 mm., coarsely punctate; puncta 12 to 13 in 0,01 mm. — *C. beng.* GRUN. in A. S. Atl. IX f. 12, 13; LXXI f. 79. KITTON Linn. Soc. Bot. XX Pl. XLVIII f. 6 (1884). CL. M. D. N:o 194.

Fresh water: Bengal! Socotra (Kitton).

C. aspera is a very common species, easily recognized by its boat-shaped outline, its coarsely punctate striæ and always distinct area. It appears to be more closely akin to *C. Ehrenbergii* than to the boat-shaped *C. lanceolata*, *C. Cistula* etc. It seems questionable whether the *var. crassa*, which I have not seen, really belongs to *C. aspera*. It may possibly be more akin to *C. Cistula*.

* **C. salina** PANT. (1889). — V. boat-shaped, with arcuate dorsal margin, straight ventral margin and obtuse ends. L. 0,0585; B. 0,013 mm. Median line arcuate. Axial area distinct linear, slightly dilated around the central nodule. Striæ 12,5 to 13 in 0,01 mm. punctate. — PANT. II p. 40 Pl. I f. 9.

Brackish water: Hungary, fossil (Pant.).

This species is not known to me, but seems, to judge from the fig. in PANTOCSEK's work to be allied to *C. aspera*, from which it differs by smaller size and closer striæ.

60. **C. tumida** BRÉB. (1849). — V. boat-shaped with slightly centrally gibbous ventral margin. Ends rostrate-truncate. L. 0,05 to 0,1; B. 0,018 to 0,022 mm. Median line arcuate. Axial area narrow, linear, suddenly dilated around the central nodule to an orbicular or subquadrate central area. A stigma with a fine fissure below the central nodule. Striæ 8 or 9 (middle) to 10 or 12 (ends) in 0,01 mm., radiate, towards the ends almost parallel, distinctly punctate; puncta about 20 in 0,01 mm. — *Coccon. tumidum* BRÉB. in Kütz Sp. Alg. p. 60. *Cy. tum.* V. H. Syn. p. 64 Pl. II f. 10. *Cocc. gibbum* A. S. Probst. f. 17. *Cy. stomatophora* GRUN. in A. S. Atl. X f. 28 to 30. *Coccon. stomat.* GRUN. A. D. p. 26.

Fresh water: Sweden (Westergötland, Göteborg)! Holstein (V. H. T.), Belgium (V. H.), Germany! France! Mouth of Jenissey! Japan! Bengal! New Zealand! Australia, Victoria! America (Illinois, California)!

Var. *borealis* GRUN. (1880). — Ends obliquely truncate, not rostrate. Striæ 8 in 0,01 mm. — *Cocc. stomat. var. borealis* GRUN. A. D. p. 26.

Fresh water: Sweden (Grun.), Niagara Falls!

Var. *gibba* GRUN. (1880). — Dorsal margin with 3 to 4 undulations. Striæ 8 to 9 in 0,01 mm. — *Coccon. stomat. var. gibba* GRUN. A. D. p. 26.

Var. *fossilis* GRUN. (1880). — V. with less rostrate and more rounded ends. Stigma with shorter fissure than in the type. — *Coccon. stomat. var. fossilis* GRUN. A. D. p. 26.

Fresh water: Habichtswald, fossil (Grun.).

61. **C. australica** A. S. (1875). — V. boat-shaped with centrally gibbous ventral margin and truncate or rounded obtuse ends. L. 0,1 to 0,14; B. 0,026 to 0,03 mm. Median line arcuate. Axial area linear, suddenly dilated around the central nodule to an orbicular space. A stigma with a distinct fissure below the central nodule. Striæ 7 (middle) to 9 (ends) in 0,01 mm. slightly radiate in the middle, parallel at the ends, coarsely punctate; puncta about 13 in 0,01 mm. — *Cocc. austr.* A. S. Atl. X f. 34, 35. CL. M. D. N:o 295.

Fresh water: Australia! New Zealand!

62. **C. punctifera** CL. N. Sp. — V. boat-shaped, with truncate ends. L. 0,13; B. 0,02 mm Median line arcuate; terminal fissures reflexed. Axial area linear, suddenly dilated to an orbicular central area. Stigma in the middle of the central nodule, without distinct fissure. Striæ 8 in 0,01

mm. a little closer towards the ends, where they are strongly radiate, distinctly punctate; puncta 15 in 0,01 mm.

Fresh water: Oregon, fossil!

63. **C. mexicana** EHB. (1844). — V. lunate with rounded truncate ends. L. 0,09 to 0,14; B. 0,026 to 0,036 mm. Median line bent, with reflexed terminal fissures. Axial area narrow linear, central small, orbicular. Stigma in the middle of the central nodule, without distinct fissure. Striæ 7 (middle) to 9 (ends) in 0,01 mm. radiate in the middle and alternately longer and shorter, nearly parallel at the ends, coarsely punctate. Puncta 12 to 13 in 0,01 mm. — *Coccon. mexicanum* EHB. Ber. 1844 p. 342. A. S. Atl. X f. 32, 33; LXXI f. 82. *Cymb. kamtschatica* GRUN. in A. S. Atl. X f. 31.

Fresh water: Washington Territory! Vancouver Island! Mexico, Californa and Guatemala fossil! Kamtschatka!.

There is, so far I can see, no other difference between *C. mexicana* and *C. kamtschatica* than that the latter is somewhat smaller and has rather closer striæ and puncta.

64. **C. Janischii** A. S. (1881). — V. lunate, with rounded ends. L. 0,2; B. 0,05 mm. Median line arcuate, with strong terminal nodules and reflexed terminal fissures. Axial area narrow, linear, slightly dilated around the central nodule. Stigma in the middle of the central nodule, without distinct fissure. Striæ 8 to 9 in 0,01 mm., in the middle radiate and of unequal length, towards the ends almost transverse, distinctly punctate; puncta 10 to 12 in 0,01 mm. — *Cocc. Jan.* A. S. Atl. LXXI f. 81.

Fresh water: Pitt River, Oregon (Grove Coll.)! San Francisco (Atl.).

Additional.

C. conifera BRUN (1893). — V. slightly asymmetrical, with arcuate dorsal and gibbous ventral margin. Ends apiculate. L. 0,04 to 0,05; B. 0,012 to 0,018 mm. Median line slightly arcuate, somewhat excentric. Axial area narrow, linear, not dilated around the central nodule. Striæ 9 to 10 in 0,01 mm., slightly radiate throughout, coarsely punctate; puncta 20 in 0,01 mm. — HÉRIB. D. d'Auvergne p. 220 Pl. VI f. 7.

Fresh water: Cantal, fossil!

Species not described and too imperfectly figured to be admitted in the above monograph.

C. affinis PANT. III Pl. IV f. 52.
C. austriaca var. fossilis PANT. III Pl. VIII f. 133.
— — *var. latestriata* PANT. III Pl. I f. 9.
C. Budayiana PANT. III Pl. XV f. 233 (C. Ehrenbergii var.?).
— — *var. gracilior* PANT. III Pl. XXIV f. 363.
C. capitata PANT. III Pl. X f. 160.
C. Cistula var. hungarica PANT. III Pl. III f. 40 (C. helvetica?).
C. Clementis PANT. III Pl. XX f. 303 (C. Cistula var.?).
C. cymbiformis PANT. III Pl. X f. 174.
— — *var. producta* PANT. III Pl. XXIII f. 346.
C. Grunovii PANT. III Pl. XIX f. 283 (C. Cistula var.?).
C. helvetica var. fossilis PANT. III Pl. IX f. 158.
C. inflata PANT. III Pl. VI f. 95.
C. Jimboi PANT. III Pl. VIII f. 130 (C. Cistula?).
C. Kockii PANT. III Pl. I f. 2 (C. Cistula var. maculata?).

C. lanceolata var. fossilis Pant. III Pl. XXIII f. 344.
— — *var. robusta* Pant. III Pl. XXIII f. 350.
C. marina Pant. III Pl. XIX f. 274 (Amphora angusta var.?).
C. obtusa Pant. III Pl. V f. 79.
C. pachyptera Pant. Pl. XXI f. 304, 316.
C. Peragalli Pant. III Pl. XLII f. 584.
C. perfecta Pant. III Pl. XVII f. 249 (C. cymbiformis var.?).
C. plutonica Pant. III Pl. XX f. 297 (C. aspera var.?).
C. præclara Pant. III Pl. XXXVI f. 512 (resembles C. lanceolata but has closer striæ).
C. Rakoczyana Pant. III Pl. VIII f. 121 (C. Cistula var. maculata?).
C. simplex Pant. III Pl. XXI f. 308 (C. ventricosa?),
C. Staubii Pant. III Pl. VIII f. 131 (C. leptoceras var.?).
C. Szontaghii Pant. III Pl. X f. 161 (Amphora augusta var.?).
C. suavis Pant. III Pl. XV f. 229 (akin to C. leptoceras?).
C. turgida Pant. III Pl. VI f. 103 (C. parva?).
C. valida Pant. III Pl. IX f. 154 (C. aspera var.?).
C. vegeta Pant. III Pl. XXIV f. 359.

Gomphonema Agardh (1824).

Valve more or less elongated, clavate, or asymmetrical to the transverse axis. Structure: transverse slightly radiate striæ or rows of puncta. Connecting zone not complex, broader in the upper than in the lower end. Cell-contents a single chromatophore, leaving only a narrow parietal plasmaband along one side of the zone, deeply sinuose below the median line. On conjugation two auxospores are formed by two mother-cells, parallel to them. The plane of division of the primordial cell is at right angles to the plane of division of the mother-cells (Pfitzer Bau u. Entw. p. 88).

The large *G. geminatum* was observed as early as 1773 by O. F. Müller, who named it *Vorticella pyraria*. The genus Gomphonema was established 1824 by Agardh for two species, and since then a large number of species have been formed by Ehrenberg, Kützing and others, unfortunately founded on trifling characteristics. For forms living, as Diadesmis, in bands of closely connected frustules, Ehrenberg created (1843) the genus *Sphenosira*. Kützing founded (1844) the genus *Sphenella* for free-living forms and Rabenhorst (1853) the genus *Gomphonella* for forms, which live in gelatinous masses. Heiberg (1863) maintained, with justice, that these genera are not admissible, as they are founded on characteristics, which occur in the same species. An attempt to arrange systematically the known species of Gomphonema was made (1878), by Grunow in his description of the algæ of the Caspian Sea, and since then he has given a number of most valuable figures in Van Heurck's Synopsis Plates XXIII, XXIV and XXV. As among them there are several species from America, which, while having the general outline of Gomphonema, differ in their structure, and in the presence of longitudinal lines, similar to those of Scoliotropis and Caloneis, I now exclude these forms, and place them in a separate genus *Gomphoneis*. Recently Brun has described, as *G. cantalicum*, a species, which seems to be allied to Gomphoneis, as it shews across the striæ a longitudinal line, but the striation of this species is in all other respects quite different from that of Gomphoneis.

The valve of Gomphonema is asymmetrical to the transverse axis, and is usually broader in the upper portion, with a wedge-shaped lower end. The central nodule is nearer to the upper end, or *apex*, than the lower, or *basis*. Many species are asymmetrical also to the longitudinal axis, but in a less visible degree, as Pfitzer first pointed out, with a parallel asymmetry, like that of the Cymbellæ. Some varieties are even slightly cymbelliform. In many species there is on one side of the central nodule an isolated punctum, or *stigma*, as in several Cymbellæ, and in others

a unilateral row of stigmas. GRUNOW has formed for the species with stigmas the group *Asymmetrica*, and for those without stigmas the group *Symmetrica*, which names may in view of maintaining the analogy with the Cymbellæ be adventageously changed to *Stigmatica* and *Astigmatica*.

There is a great resemblance between the cell-contents of Gomphonema and Cymbella, the structure is the same in both genera, and they are no doubt nearly connected. We have in *Cym. Beccarii* GRUN. a form, which is asymmetrical to the transverse axis, and, there are several other Cymbelloid varieties of Gomphonema. *Gomph. Cymbella* BRUN may be considered as an intermediate link between the two genera.

The outline of the forms of Gomphonema is very variable, and older authors have paid too much attention to it in forming new species. There exist in the same species all possible transitions, from purely clavate, to strongly biconstricted forms, so that outline only cannot be regarded as a good specific distinction.

Most species of Gomphonema inhabit fresh water, some brackish water, and there are also purely marine forms, the latter being all astigmatical. They are usually attached by dichotomously branched gelatinous stalks to algæ, stones, leaves of water-plants etc. Some forms are inbedded in gelatinous masses, but frustules of attached species occur also occasionally free.

Artificial key.

I. Stigmatica.

1.	Median striæ alternately longer and shorter	2.
	— — not — — —	3.
2.	L. 0,1 to 0,12 mm.	*G. geminatum* LYNGB.
	L. 0,05 mm.	*G. constrictum* EHB.
3.	Axial area distinct or broad	4.
	— — indistinct or narrow	7.
4.	Area linear	5.
	— lanceolate	6.
5.	Ends subacute or apiculate	*G. validum* CL.
	— broadly truncate	*G. Berggrenii* CL.
6.	Striæ about 12 in 0,1 mm.	*G. ventricosum* GREG.
	— — 8 —	*G. oxycephalum* CL.
7.	Central area transverse	8.
	— — small and rounded or indistinct	12.
8.	Central area unilateral	9.
	— — bilateral	10.
9.	Ends apiculate	*G. Augur* EHB.
	— rostrate to truncate	*G. angustatum* KÜTZ.
	— broad, rounded-truncate	*G. subtile* EHB.
10.	Central area narrow	*G. gracile* EHB.
	— — broad	11.
11.	Striæ coarsely punctate	*G. semiapertum* GRUN.
	— obscurely —	*G. intricatum* KÜTZ.
12.	Valve biconstricted	*G. acuminatum* EHB. (*G. subclavatum var. Mustela*).
	— not —	13.
13.	Ends capitate	*G. sphærophorum* EHB.
	— apiculate	*G. apicatum* EHB.
	— rounded	14.
14.	Striæ coarsely punctate	*G. lanceolatum* EHB. [1]
	— finely or obscurely —	15.

[1] *G. cantalicum* BR. a. HÉRIB.

15. Valve cymbiform . . . . . *G. Cymbella* Brun.
— clavate . . . . . *G. subclavatum* Grun.
— lanceolate . . . . . 16.

16. Striæ radiate . . . . . *G. eriense* Grun.
— almost transverse . . . . . *G. parvulum* Kütz.

Astigmatica.

1. Axial area narrow or indistinct . . . . . 2.
— — distinct . . . . . 5.

2. Central area distinct . . . . . 3.
— — indistinct . . . . . *G. exiguum* Kütz.

3. Valve lanceolate . . . . . *G. transsylvanicum* Pant.
— clavate . . . . . *G. olivaceum* Lyngb.
— linear-clavate . . . . . *G. peruvianum* Grun.
— linear, with broad apex and basis . . . . . 4.

4. Central area rounded . . . . . *G. Salinarum* Pant.
— — a transverse fascia . . . . . *G. æstuarii* Cl.

5. Axial area narrow. dilated in the middle . . . . . *G. kamtschaticum* Grun.
— — broad . . . . . 6.

6. Striæ 21 to 22 in 0,01 mm. . . . . *G. abbreviatum* Kütz.
— 16 to 18 — . . . . . *G. brasiliense* Grun.
— 6 in — — . . . . . *G. Puiggarianum* Grun.

1. **G. eriense** Grun. (1878). — V. lanceolate, slightly clavate with rounded, obtuse ends. L. 0,032 to 0,042; B. 0,013 to 0,014 mm. Axial area narrow, linear; central area small, rounded, with a distinct stigma. Striæ radiate, 14 to 16 in 0,01 mm. — Grun. Casp. Sea Alg. p. 12. V. H. Syn. XXIII f. 10.

Fresh water: Lake Erie, N. America (Grun.).

This species in unknown to me, but to judge from the figure, it is not closely allied to any other Gomphonema.

2. **G. parvulum** Kütz. (1844). — V. lanceolate-clavate, with rounded or rostrate to capitate apex, gradually tapering from the middle to the narrow often subcapitate basis. L. 0,02 to 0,03; B. 0,006 to 0,007 mm. Axial area indistinct; central area indistinct or small and unilateral. Stigma frequently indistinct. Striæ 13 to 15 in 0,01 mm., almost transverse, indistinctly punctate. — *Sphenella parvulum* Kütz. Bac. p. 83 Pl. XXX f. 63. *Gomphon. parvulum* V. H. Syn. p. 125 Pl. XXV f. 9. *G. parv. var. subcapitata* V. H. Syn. f. 11. *G. parv. var. lanceolata* V. H. Syn. f. 10. *G. Lagenula* V. H. Syn. Pl. XXV f. 7, 8.

Fresh water: Sweden! England! Belgium (V. T.), France! Athens! Italy! Sandwich Islands! Tahiti! New Zealand! New Jersey! Dakota! Jamaica! Brazil! Ecuador!

Var. *subelliptica* Cl. — V. elliptic-lanceolate almost symmetrical, with scarcely rostrate apex. L. 0,015; B. 0,005 to 0,006 mm. Striæ 13 to 14 in 0,01 mm.

Fresh water: Greenland! Falmouth! Tasmania!

Var. *exilis* Grun. — V. subclavate, narrow, linear-lanceolate, with rounded, not rostrate apex. L. 0,02 to 0,005 mm. Striæ 18 to 19 in 0,01 mm. — Grun. Casp. S. Alg. p. 10.

Fresh water: Rimforsa in Westergötland, Sweden (Grun. ad. icon. in litt).

Var. *exilissima* Grun. V. narrow, lanceolate, subclavate. with slightly rostrate ends. L. 0,02; B. 0,005 mm. — Grun. in V. H. Syn. Pl. XXV f. 12 (V. H. T. 17).

Fresh water: England! Ecuador!

Var. *micropus* Kütz (1844). — V. slightly clavate, lanceolate, with obtuse apex and subacute basis. L. 0,025 to 0,03; B. 0,007 to 0,008 mm. Striæ 8 to 13 in 0,01 mm. Central area unilateral, narrow. — *G. micropus* Kütz Bac. p. 84. V. H. Syn. p. 125 Pl. XXIV f. 46, XXV f. 4, 5, 6.

G. angustatum var. intermedia GRUN. in V. H. Syn. Pl. XXIV f. 47, 48. *G. angustum* BRÉB. (fide Grun.).

Fresh water: Finland! Sweden, Upsala! Gothland, Visby in slightly brackish water (a var. with coarse striæ, 8 in 0,01 mm.), Kansas River! Ecuador!

Var.? *tergestina* GRUN. (1880). — V. lanceolate, with obtuse, truncate ends. L. 0,015; B. 0,004 mm. Central area unilateral, very broad, reaching to the margin. Striæ 14 in 0,01 mm. — *G. semiapertum var. tergestina* GRUN. in V. H. Syn. Pl. XXV f. 40.

Triest (Grun.).

3. **G. angustatum** KÜTZ (1844). — V. slightly clavate, linear, with broad, rostrate to subcapitate apex and basis. L. 0,03 to 0,04; B. 0,007 mm. Axial area not distinct; central area unilateral, stigma indistinct. Striæ transverse 10 to 12 in 0,01 mm. indistinctly punctate. — *Sphenella angustata* KUTZ Bac. p. 83 Pl. VIII f. 6. *G. commune* RABH. Fl. E. Alg. p. 283 (1864). *G. angusta* V. H. Syn. p. 126 Pl. XXIV f. 49, 50.

Fresh water: Sweden! England! Belgium (V. H.), France! Germany!

Var. *producta* GRUN. (1880). — V. L. 0,02 to 0,025. Ends rostrate to capitate. — *Gomph. commune* LAGST. Spitsb. D. p. 40 Pl. I f. 14. *G. ang. var. prod.* V. H. Syn. Pl. XXIV f. 52 to 55.

Fresh water: Spitzbergen! Sweden! Finland! Neuchâtel! Tasmania! Arctic America! Winnipeg River! Brazil!

Var. *obtusata* KÜTZ (1844). — V. distinctly clavate, with broad, subrostrate ends. L. 0,025 to 0,03 mm. Striæ 9 to 10 in 0,01 mm. — *Sphenella obtusata* KÜTZ Bac. p. 83 Pl. IX f. 1. *Gomph. ang. var. obtus.* V. H. Syn. Pl. XXIV f. 43 to 45. *Sph. obt.* and *S. vulgaris* SCHUM. I Nacht. Pl. II f. 14, 15. *Sphenella naviculoides* HANTZSCH in Rab. Dec. N:o 1322 (1862).

Fresh water: Thüringen!

Var. *æqualis* GREG. (1856). — V. with capitate-rostrate apex and basis. L. 0,03 to 0,035; B. 0,006 mm. Striæ 10 to 12 in 0,01 mm. — *G. æquale* GREG. M. J. IV Pl. I f. 41. *G. angust. var.? æqualis* GRUN. V. H. S. Pl. XXV f. 3.

Fresh water: Scotland (Greg.).

Var. *subæqualis* GRUN. (1880). — V. as in var. producta. Striæ 14 in 0,01 mm. — GRUN. V. H. Syn. Pl. XXV f. 1.

Fresh water.

Var. *Sarcophagus* GREG. (1856). — V. linear with rostrate, broad apex and basis. L. 0,024 to 0,04; B. 0,006 to 0,007 mm. Striæ 8 in 0,01 mm. — *G. Sarcophagus* GREG. M. J. IV Pl. I f. 42. *G. ang. var. Sarcoph.* V. H. Syn. Pl. XXV f. 2. *G. Lagenula* SCHUM. III Nacht. Pl. II f. 8?

Fresh water: Sweden (Rimforsa in Westergötland, Alnarp)! Scotland (Greg.).

Var. *undulata* GRUN. Ms. — V. triundulate. L. 0,02 to 0,028; B. 0,006 mm. Striæ 10 in 0,01 mm.

Fresh water: Laurgaard in Norway (Grun.).

Gomph. angustatum is a very variable species, passing over by its varieties to *Gomph parvulum var. micropus.* By the var. undulata it seems to be connected with *Cymbella abnormis.*

4. **G. intricatum** KÜTZ (1844). — V. sublinear, slender, slightly gibbous in the middle, with obtuse apex and basis. L. 0,03 to 0,07; B. 0,005 to 0,008 mm. Axial area distinct, but narrow; central area transverse, broad. Striæ 10 in 0,01 mm., subparallel, obscurely punctate. — KÜTZ Bac. p. 87 Pl. IX f. 4. V. H. Syn. p. 126 Pl. XXIV f. 28, 29. *G. gracile* SCHUM. II Nacht. Pl. I f. 18 *a.*

Fresh water: Sweden! Russian Lapland! Finland! Hungary, Dubravica, fossil (Grun.), Ecuador (reg. trop.)!

Var. *pumila* GRUN. (1880). — L. 0,03; B. 0,005 mm. Striæ 10 in 0,01 mm. — GRUN. in V. H. Syn. Pl. XXIV f. 35, 36. *G. gracillimum* SCHUM. II Nacht. Pl. I f. 18 *b*?

Fresh water: Belgium (V. H.), England, Cirencester! Hungary, Dubravica, foss. (Grun.).

Var. *dichotoma* Kütz (1833). — L. 0,04 to 0,06; B. 0,008 mm. Striæ 11 to 13 in 0,01 mm. — *G. dichot.* Kütz. Syn. D. p. 569 f. 48. Bacil. p. 85 Pl. VIII f. 14. W. Sm. B. D. Pl. XXIX f. 241? *G. intr. var. dich.* V. H. Syn. p. 125 Pl. XXIV f. 30—31. *G. pulvinatum* Al. Br. in Rab. Süssw. D. p. 58 (1853). V. H. Syn. f. 32 to 34.

Fresh water: Finland! Zürich! Australia (Victoria, Lake Muir, Tasmania)!

Var. *fossilis* Pant. (1889). — L. 0,045; B. 0,0075 mm. Striæ 10 to 12,5 in 0,01 mm., the median more distant, 7,5 in 0,01 mm. — Pant. II p. 56 Pl. XI f. 201.

Brackish water: Hungary, foss. (Pant.).

Var. *Vibrio* Ehb. (1843). — V. very slender and narrow, linear, slightly gibbous in the middle, with rounded-truncate often gibbous ends. L. 0,08 to 0,011; B. 0,01 to 0,012 mm. Striæ 10 in 0,01 mm. distinctly punctate. — *G. Vibrio* Ehb. Verb. p. 128 Pl. II: 1 f. 40. Microg. W. Sm. B. D. Pl. XXVIII f. 242. V. H. Syn. Pl. XXIV f. 26—27. *G. Cygnus* Schum. P. D. p. 187 Pl. IX f. 26?

Fresh water: Finland! Germany, Erlaf See (Grun.), Hungary, Dubravica, fossil (Grun.), Seychelles!

To this species probably belongs *G. hungaricum* Pant. III Pl. II f. 28 (1893).

5. **G. subtile** Ehb. (1843). — V. narrow, elongate,d biconstricted, with broad, rounded-truncate apex. L. 0,045; B. 0,007 mm. Axial area indistinct; central area narrow, unilateral, transverse. Striæ 12 in 0,01 mm., almost transverse, distinctly punctate. — Ehr. Am. p. 128. Greg. M. J. IV Pl. I f. 12. Schum. P. D. I Nacht. Pl. II f. 19. V. H. Syn. Pl. XXIII f. 13, 14.

Fresh water: Scotland! Finland! Holstein! Bengal!

Var. *Sagitta* Schum. (1863). — As the type, but with cuneate apex. — *G. Sagitta* Schum. P. D. p. 187 Pl. IX f. 29. V. H. Syn. Pl. XXIII f. 27.

Fresh water: Prussia (Schum.).

6. **G. semiapertum** Grun. (1880). — V. elongated, clavate, with broad apex and basis. L. 0,06 to 0,07; B. 0,011 to 0,013 mm. Axial area distinct, linear; central area a large, transverse fascia, with a distinct stigma on one side and frequently marginal striæ on the other. Striæ 10 to 11 in 0,01 mm., slightly radiate, punctate; puncta about 21 in 0,01 mm. — Grun. in V. H. Syn. Pl. XXIV f. 42. Cl. M. D. N:o 264.

Fresh water: California, Shasta Co (Grun.), Oregon, Pitt River (Grove Coll.)!

7. **G. gracile** Ehb. (1838). — V. elongated, linear to lanceolate, with acute to subacute apex and basis. L. 0,025 to 0,07; B. 0,04 to 0,0111 mm. Axial area very narrow; central area narrow, transverse. Striæ transverse, 9 to 15 in 0,01 mm.

Var. *cymbelloides* Grun. Ms. — V. slightly asymmetrical to the longitudinal axis, with gently curved dorsal margin and nearly straight ventral margin. L. 0,03; B. 0,005 mm. Striæ about 16 in 0,01 mm.

Fresh water: Norway, Dovre! Sweden, Helsingland, Arbrå!

Var. *aurita* Al. Br. (1853). — V. narrow, linear-lanceolate. L. 0,024 to 0,04; B. 0,005 to 0,006 mm. Striæ 15 to 16 in 0,01 mm. Living cells with two horn-like processes at the end. — *G. aur.* Al. Br. in Rabh. Süssw. D. p. 59 Pl. VIII f. 3. V. H. Syn. XXIV f. 15 to 18. *G. angustum* Schum. I Nachtr. Pl. II f. 17?

Fresh water: Baden, Titisee (A. Br.), Finland! Norway, Dovre! Iceland! U. St. Bemis Lake, White Mountains!

Var. *dichotomum* W. Sm. (1853). — Linear-lanceolate, slightly clavate, with obtuse ends. L. 0,04 to 0,05; B. 0,007 mm. Striæ 12 to 14 in 0,01 mm. finely punctate. — *G. dichotomum* W. Sm. Br. D. I p. 79 Pl. XXVIII f. 240. *G.* (*gracile var.?*) *dichotomum* V. H. Syn. Pl. XXXV f. 19 to 21. *G. tenellum* W. Sm. B. D. Pl. XXIX f. 243? *G. Vibrio* Schum. Tatra Pl. III f. 38? *G. hebridense* Hérib. D. d'Auvergne p. 61 Pl. III f. 9?

Fresh water: Sweden! Finland! England! Dubravica, Hungary, foss. (Grun.). Celebes! Hawaji! New Zealand! Australia (Daintree River! Mitchell River! Australian Alps! Tasmania!) Nova Scotia! Illinois! Mexico! Jamaica! Ecuador!

Var. *major* GRUN. (1880). — V. slender, lanceolate. L. 0,07 to 0,10; B. 0,011 mm. Striæ 9 to 10 in 0,01 mm. distinctly punctate. — GRUN. in V. H. Syn. Pl. XXIV f. 12. *G. hebridense* GREG. M. J. II Pl. IV f. 19?

Fresh water: New Zealand! Rhode Island! Demerara River!

Var.? *lanceolata* KÜTZ. (1844). — V. lanceolate-clavate, with apiculate apex. L. 0,055; B. 0,01 mm. Axial area narrow; central area narrow, transverse. Striæ 16 in 0,01 mm. — KÜTZ. Bac. p. 87 Pl. XXX f. 59. V. H. Syn. XXIV f. 11. *G. Turris var. apiculata* GRUN. D. of Banka p. 10 Pl. I f. 12.

Fresh water: Trinidad (Kütz, Grun.), Banka (Grun.).

Var. *naviculacea* W. SM. (1856). — V. almost symmetrical to the transverse axis, lanceolate. L. 0,035 to 0,047; B. 0,007 to 0,01 mm. Striæ 11 to 14 in 0,01 mm., indistinctly punctate. — W. SM. B. D. II p. 98. V. H. Syn. XXIV f. 13, 14.

Fresh water: Edinburgh Bot. Garden (W. SM.)! New Zealand!

G. gracile comprises a large number of closely connected forms, some of which are nearly akin to *G. intricatum*, some to *G. lanceolatum* EHB.

8. **G. Cymbella** BRUN (1891). — V. linear, slightly clavate with obtuse apex and basis, slightly lunate. L. 0,05 to 0,065; B. 0,011 mm. Axial area narrow. Central area transverse not reaching the margin, with a conspicuous stigma. Striæ almost parallel 6 to 7 in 0,01 mm. — BRUN D. esp. n. p. 28 Pl. XIX f. 2.

Fresh water: South Africa, Rio de la Plata, Cape Horn (Brun).

9. **G. lanceolatum** EHB. (1843). — V. lanceolate, clavate, gradually tapering from the middle to the obtuse apex and basis. L. 0,027 to 0,07; B. 0,01 mm. Axial area narrow linear. Central area small, rounded, with one unilateral stigma. Striæ 12 to 13 in 0,01 mm., slightly radiate, coarsely punctate; puncta 22 to 24 in 0,01 mm.; the median stria opposite to the stigma shortened. — EHB. Am. Pl. II: 1 f. 37. *G. affine* KÜTZ. Bac. p. 86 Pl. XXX f. 54 (1844). V. H. Syn. Pl. XXIV f. 8 to 10. *G. Szaboi* PANT. III Pl. II f. 34 (1893)?

Fresh water: Mexico! Jamaica! Ecuador! Lake Tacarigua, Trinidad (V. H. Syn.), Marquesas Islands! New Zealand!

Var. *insignis* GREG. (1856). — At the type, but with coarser striæ, 9 to 10 in 0,01 mm.; puncta 18 to 22 in 0,01 mm. — *G. insignis* GREG. M. J. IV Pl. I f. 39. V. H. S. Pl. XXIV f. 39 to 41.

Fresh water: Scotland (Greg.), Bengal! Victoria, Australia! Ecuador, San Nicolas!

Var. *bengalensis* GRUN. (1880). — More clavate. L. 0,03 to 0,057; B. 0,009 mm. Striæ 8 to 9 in 0,01 mm. indistinctly punctate. — *G. bengalense* GRUN. in V. H. Syn. Pl. XXIV f. 37, 38.

Fresh water: Bengal (V. H. Syn.).

G. lanceolatum is nearly akin to *G. gracile*, some of its forms being exceedingly difficult to distinguish from several varieties of that species. Some forms are, on the other hand, very similar to forms of *G. subclavatum*.

10. **G. subclavatum** GRUN. (1878). — V. clavate, with broad rounded apex and somewhat narrower basis, gibbous in the middle. L. 0,035 to 0,07; B. 0,008 to 0.01 mm. Axial area narrow; central area rounded, with distinct stigma. Striæ strong, 9 to 13 in 0,01 mm. obscurely punctate, almost transverse, the median ones often shortened. — *G. longiceps* EHB. *var. subclavata* GRUN. Casp. S. Algæ p. 10. *G. montanum v. subclav.* GRUN. in V. H. Syn. p. 125 Pl. XXIII f. 39—43., XXIV f. 1. *G. commutatum* GRUN. V. H. Syn. Pl. XXIV f. 2. Fr. Jos. Land D. p. 98 (46) Pl. I f. 12. *G. longiceps* EHB. M. G. Pl. VII: 3, B f. 9 (1854)? SCHUM. P. D. p. 187 Pl. IX f. 27? *G. Cygnus* Ströse Kliecken f. 17. *G. calcareum* CL. a. M. D. N:o 137. *G. dichoto-*

mum β sessile KÜTZ. (fide Grun.). *G. Brébissonii* KÜTZ. (fide Grun.). *G. mexicanum* GRUN. in V. H. Syn. Pl. XXIV f. 3. *G. Kinkerianum* PANT. III Pl. X f. 162, 165.

Fresh water: Sweden! Finland! Holstein! Belgium (V. H.), France! England! Neusidler See (Grun.), Iceland! Argentina! Chimborazo, Ecuador! Sandwich Islands! Tasmania! Auckland! California!

Var. *obliqua* GRUN. (1884). — Cymbelloid bent, asymmetrical to the longitudinal axis. — GRUN. Fr. Josephs L. D. p. (98) 46.

Var. *acuminata* HÉRIB. a. PERAG. (1893). — Lanceolate, tapering towards the narrow ends. — *G. subclav. var. acum.* HÉRIB. a. PERAG. D. d'Auvergne p. 55 Pl. III f. 8.

Fresh water: Auvergne, fossil.

Var. *Mustela* EHB. (1854). — Biconstricted, with gibbous, obtuse apex. — *G. Must.* EHB. M. G. Pl. VII: 3, B. f. 9. SCHUM. P. D. p. 187 Pl. IX f. 30. V. H. Syn. Pl. XXIV f. 4 to 7. *G. Sagitta* SCHUM. P. D. III Nachtr. Pl. II f. 16?

Fresh water: Beeren Eiland (Lagst.), Finmark! Norway, Dovre! Finland! Gulf of Bothnia!

Forma curvata BR. a. PERAG. (1893). — Frustules in front-view curved. — HÉRIB. D. d'Auvergne p. 59 Pl. III f. 6, 7.

Fresh water: Auvergne, fossil.

Var. *montana* SCHUM. (1867). — Biconstricted, with protracted subtruncate or obtuse apex. — SCHUM. Tatra p. 67 Pl. III f. 35. V. H. Syn. p. 124 Pl. XXIII f. 33 to 36. *G. acuminatum var. submontana* GUTWINSKY Fl. Galiz. p. 28 Pl. I f. 23.

Fresh water: Galiz. (Schum.), Belgium (V. H.), Hungary, fossil (Grun.), Demerara River!

G. subclavatum by its variety *montana* makes complete transition to *G. acuminatum*, the latter comprising forms with acute, the former with obtuse ends.

11. **G. acuminatum** EHB. (1838). — V. clavate, more or less biconstricted, with apiculate apex, and narrow basis. L. 0,03 to 0,07; B. 0,009 to 0,01 mm. Axial area narrow or indistinct; central area short and narrow, unilateral. Striæ 10 to 11 in 0,01 mm., slightly radiate, the median stria opposite to the stigma being shortened. — EHB. Inf. p. 217 Pl. XVIII f. 4. W. SM. B. D. I Pl. XXVIII f. 238 *a*, *a'*.

Forma trigonocephala EHB. (1854). — V. not distinctly biconstricted. Apex cuneate. — *G. trig.* EHB. M. G. Pl. VI: 1 f. 36. V. H. Syn. Pl. XXIII f. 18.

Forma Brébissonii KÜTZ. (1859). — V. slightly biconstricted, with cuneate apex. — *G. Bréb.* KÜTZ. Sp. Alg. p. 66. V. H. Syn. XXIII f. 23—26. *C. ac. var. Clavus* V. H. Syn. Pl. XXIII f. 20. *G. acum.* W. SM. B. D. Pl. XXVIII f. 238 *a'''*.

Forma coronata EHB. (1840). — V. strongly biconstricted, with broad, apiculate apex. — *G. coron.* EHB. Abh. 1840 p. 211. *G. acum.* W. SM. B. D. Pl. XXVIII f. 238 *β*. V. H. Syn. p. 124 Pl. XXIII f. 15. Petit Lac des Vosges f. 2. Ströse Kliecken f. 16. *G. acum.* V. H. Syn. Pl. XXIII f. 16. *G. acum. var. laticeps* V. H. Syn. l. c. f. 17.

Forma pusilla GRUN. (1880). — As the f. coron. but smaller. L. 0,03; B. 0,008 mm. — *G. acum. var. pus.* GRUN. V. H. Syn. Pl. XXIII f. 19.

Fresh water: Spitzbergen (Lagst.), Sweden! Finland! Belgium (V. H.), England, (Sm.), Germany! Switzerland! France! Spain! Canada! Massachusetts! Illinois!

Var. *elongata* W. SM. (1855). — V. slender, elongated, strongly gibbous in the middle and at the apex. L. 0,07 to 0,11; B. 0,012 to 0,017 mm. Striæ 12 in 0,01 mm. coarsely punctate; puncta about 20 in 0.01 mm. — G. *elongat.* W. SM. Ann. N. Hist. 1855 p. 6 Pl. I f. 4. B. D. II p. 99. *G. acum. var. elong.* V. H. Syn. Pl. XXIII f. 22. *G. Brébissonii* GREG. M. J. II Pl. IV f. 13 (1854)? *G. acum. var. intermedia* GRUN. in V. H. Syn. Pl. XXIII f. 21.

Fresh water: Scotland! Finland! Vosges!

Var. *Turris* EHB. (1843). — V. very slightly biconstricted with cuneate or apiculate apex. L. 0,04 to 0,06; B. 0,013 mm. Striæ 10 to 11 in 0,01 mm. — *G. Turris* EHB. Am. p. 128. M. G. Pl. XIV f. 70, 71. V. H. Syn. Pl. XXIII f. 31.

Fresh water: Finland (Padasjoki)! Bengal! Australia, North Australia! Murray River! Australian Alps! New Zealand! Houghton, Michig.! Illinois! California! Demerara! Rio Janeiro! Ecuador!

G. acuminatum comprises a number of forms, exceedingly variable in size and outline, passing over to *G. subclavatum var. montana* by the forma Brébissonii, and to *G. Augur* by smaller forms of the var. Turris.

12. **G. Augur** Ehb. (1840). — V. clavate, with broad, truncate-apiculate apex and narrow basis. L. 0,03 to 0,05; B. 0,009 to 0,01 mm. Axial area narrow; central area narrow, unilateral Striæ 10 in 0,01 mm. slightly radiate. — Ehb. Ber. 1840 p. 211. M. G. XVII: 1, f. 35. V. H. Syn. p. 124 Pl. XXIII f. 29. *G. Augur var. Gautieri* V. H. Syn. p. 124 Pl. XXIII f. 28. *G. nasutum* Ehb. Am. p. 128. M. G. VI: 1 f. 37?

Fresh water: Belgium (V. H.), Ceyssat, Puy de Dôme foss.! Maine, Bridgetown! Waltham Mass.! Mexico! Seychelles!

G. Augur is closely connected with *G. accuminatum var. Turris*, of which it may be regarded as a form with non-constricted valves.

G. apicatum Ehb. (1841). — V. clavate, not biconstricted, with acuminate apex. L. 0,022 to 0,025; B. 0,006 to 0,007 mm. Axial and central areas indistinct. Striæ 14 in 0,01 mm. almost transverse, near the end slightly radiate, not distinctly punctate. — Ehb. Abh. 1841 p. 416 (accord. to Chase) M. G. IX: 1 f. 41? Cl. D. of Finl. p. 48 Pl. III f. 20, 21. *G. cristatum* W. Sm. B. D I Pl. XXVIII f. 239? Heib. Consp. D. D. V f. 17?

Fresh water: Finland!

G. apicatum is nearly connected with *G. acuminatum f. trigonocephala*, but has finer striæ.

13. **G. validum** Cl. N. Sp. — V. elongated, gently biconstricted, with rostrate-apiculate apex. L. 0,065; B. 0,01 mm. Axial area linear, moderately broad, not dilated in the middle. Stigma often indistinct. Striæ 6 to 7 in 0,01 mm., distinctly punctate, of equal length, transverse, but radiate at the apex. — Pl. V f. 9.

Fresh water: Japan, fossil in lignite (Brun Coll.)! Demerara River!

Var. *elongata*. — V. very slightly biconstricted, with subcuneate apex. L. 0,14; B. 0,0113 mm. Striæ 5,5 in 0,01 mm. Pl. V f. 8.

Fresh water: Demerara River!

G. validum has the outline of *G. subclavatum var. montana*, from which it differs by its coarser striæ and broader axial area.

14. **G. sphærophorum** Ehb. (1845). — V. clavate, with capitate apex and narrow basis. L. 0,035 to 0,047; B. 0,01 mm. Axial area indistinct. Central area small, rounded. Striæ 11 in 0,01 mm., nearly transverse, punctate. — Ehb. Ber. 1845 p. 78 (fide Chase), V. H. Syn. Pl. XXIII f. 30.

Fresh water: Finland (Åland)! New York (Niagara Falls! Genessee Falls)! Lake Pistaku (Illinois)!

G. sphærophorum is nearly akin to *G. Turris*, from which it differs scarcely by anything but the capitate apex.

15. **G. Berggrenii** Cl. N. Sp. — V, clavate, with broad subtruncate and usually constricted apex. Basis much narrower, obtuse. L. 0,047 to 0,05; B. 0,011 to 0,012 mm. Axial area narrow, linear, somewhat dilated around the central nodule. Stigma distinct. Striæ coarse, 10 to 11 in 0,01 mm. distinctly punctate, slightly radiate. — Pl. V f. 6, 7.

Fresh water: New Zealand (Waitangi! Lake Rotorua! etc.).

G. Berggrenii resembles in outline *G. constrictum* and *G. subclavatum*, but differs from the former by the median striæ not being alternately longer and shorter, and from the latter by its much broader ends and more distinct axial area.

16. **G. constrictum** Ehb. (1830). — V. clavate, gibbous in the middle, with broad, rounded-truncate apex and narrower basis. L. 0,04 to 0,06; B. 0,01 mm. Axial area narrow linear; central area narrow, star-like. Stigma distinct, unilateral. Striæ 10 to 12 in 0,01 mm., slightly radiate, in the middle alternately longer and shorter, coarsely punctate. — Ehb. Abh. 1830 W. Sm. B. D. Pl. XXVIII f. 236. V. H. Syn. p. 123 Pl. XXIII f. 6. *G. pohliæforme* Kütz. Dec. N:o 25 (1833). *G. subramosum* Kütz. Dec. N:o 152 (1836) fide Lagst. *G. constr. var. subcapitata* Grun. V. H Syn. f. 5.

Fresh water: Sweden! England! Belgium (V. H.), Switzerland! Jenissey! Australian Alps! North Australia! Tasmania! Illinois!

Var. *capitata* Ehb. (1838). — V. very slightly or not constricted, clavate with broad apex. — *G. capitatum* Ehb. Inf. Pl. XVIII f. 2. W. Sm. B. D. Pl. XXVIII f. 237. V. H. Syn. p. 123 Pl. XXIII f. 7. Petit Lac des Vosges f. 3. *G. turgidum* Ehb. M. G. Pl. II: 2 f. 40. V. H. Syn. Pl. XXIII f. 11. *G. italicum* Kütz. Bac. p. 85 Pl. XXX f. 75. V. H. Syn. Pl. XXIII f. 8. *G. clavatum* Ehb. Inf. p. 218 Pl. XVIII f. 6. V. H. Syn. Pl. XXIII f. 9.

Fresh water: Sweden! Gulf of Bothnia! Finland! England! Belgium (V. H.), France! New Zealand! Canada, foss.! New York, foss.! Argentina! Ecuador!

G. constrictum is a very common species with very variable outline. Typical specimens are strongly biconstricted, but all possible intermediate forms exist to the quite unconstricted var. capitata. The characteristic present in all these forms is the stellate central area arising from the median striæ being alternately longer and shorter.

17. **G. geminatum** Lyngb. (1819). — V. strongly biconstricted, with broad, subtruncate apex and less broad, obtusely truncate basis. L. 0,1 to 0,12; B. 0,03 to 0,04 mm. Axial area narrow, linear; central area rounded, stellate at its margin, with one or, usually, several, stigmas, disposed in a longitudinal row on one side of the central nodule. Striæ 10 in 0,01 mm. radiate at the ends, in the middle alternately longer and shorter, coarsely punctate; puncta 12 in 0,01 mm. — *Vorticella pyraria* Müll. 1773 (fide Kütz.). *Echinella geminata* Lyngb. Tent. Hydroph. p. 210. *Gomph. gem.* Ag. Syst. p. 12 (1824). W. Sm. B. D. Pl. XXVII f. 235.

Fresh water on stones in rivulets and lakes: Spitsbergen, Beeren Eiland (Lagst.), Färöar (Lyngb.), Scotland! Ireland (Kütz.), Sweden! Finland! France, Cantal (Hérib.), Spain, Aragonia (Mouzón), Switzerland (Brun), Vancouver Island!

Var. *sibirica* Grun. (1878). — V. slightly or indistinctly biconstricted, with broad end. L. 0,08 to 0,09; B. 0,035 mm. Stigma single. Striæ 9 to 10 in 0,01 mm. — Grun. Casp. See Alg. p. 11. *G. gem. var. hybrida* Grun. V. H. Syn. Pl. XXIII f. 4. Franz Josephs Land D. p. 97| (45) Pl. I f. 11.

Fresh water: Ochotsk (Grun.), Franz Josephs Land (Grun.), Jenissey!

Var. *curvirostra* Temp. and Brun (1889). — V. deeply biconstricted, arcuate. L. 0,012 to 0,145 mm. Central area with a single stigma. Striæ 6 to 8 in 0,01 mm. — *G. curvirostrum* Temp. and Brun D. f. du Japon p. 38 Pl. IX f. 4.

Fresh water: Yedo foss. (Temp. and Brun).

G. geminatum, the largest of all species of this genus, is a northern and alpine form, being very common in Scotland, Sweden and Finland, where it occurs attached to stones by strong stalks. Between the strongly biconstricted type and the broadly clavate var. sibirica all kinds of intermediate forms exist. The var. curvirostra is a cymbelloid form, such as occurs also among the forms of other species.

18. **G. ventricosum** Greg. (1856). — V. lanceolate-clavate, with broad, obtuse apex and narrower basis. L. 0,035 to 0,055; B. 0.01 mm. Axial area linear lanceolate. Central area rounded, with one distinct stigma. Striæ 11 to 13 in 0,01 mm., radiate, finely punctate; puncta about 24 in 0,01 mm. — Greg. M. J. IV Pl. I f. 40. V. H. Syn. Pl. XXV f. 13. Cl. M. D. N:o 93.

Fresh water: Scotland (Greg.). Norway! Sweden! Finland! Jenissey! Kamtschatka! Waltham, Massachusetts!

Var. *maxima* Cl. — V. more lanceolate. L. 0,08; B. 0,017 mm. Striæ 12 in 0,01 mm. coarsely punctate; puncta 15 in 0,01 mm. — Pl. V f. 13.

Fresh water: Pitt River, Oregon (Grove Coll.)!

Var. *tasmanica* Cl. — V. nearly lanceolate. L. 0,07; B. 0,015 mm. Striæ about 9 in 0,01 mm., coarsely punctate; the median, on one side of the valve, alternatelty longer and shorter.

Fresh water: Campbell Town, Tasmania, fossil!

Var. *ornata* Grun. (1880). — Lanceolate, gradually tapering from the middle to the obtuse apex and basis. L. 0,06 to 0,1 mm. B. 0,011 to 0,013 mm. Axial and central areas combined in a narrow, lanceolate space. On one side of the central nodule is a row of 3 to 5 stigmas, on the other none, or one to two, stigmas. Striæ 10 in 0,01 mm. coarsely punctate; puncta 18 in 0,01 mm. — Grun. in V. H. Syn. Pl. XXV f. 15. *G. dubravicense* Pant. III Pl. XX f. 294, 296 (1893)?

Fresh water: Guatemala, foss.!

The typical forms of *G. ventricosum* belong to northern countries and for that reason it is doubtful whether the varieties should not be considered as distinct species, although the differences are only trifling.

19. **G. oxycephalum** Cl. N. Sp. — V. large, gradually tapering from the middle to the acute apex. Basis obtuse to truncate. L. 0,09 to 0,13; B. 0,018 to 0,026 mm. Axial and central areas uniting in a lanceolate space, with one (or two) stigma on one side of the central nodule. Striæ 8 in 0,01 mm., slightly radiate at the ends, distinctly punctate; puncta 21 in 0,01 mm. — Pl. V f. 10.

Fresh water: Demerara River!

20. **G. Salinarum** Pant. (1889). — V. linear, more or less gibbous in the middle, with almost equally broad, rounded obtuse apex and basis. L. 0,038 to 0,051; B. 0,0075 to 0,008 mm. Terminal fissures of the median line distant from the ends. Axial area narrow linear, suddenly dilated around the central nodule to an orbicular space. Striæ 10 to 12 in 0.01 mm., obscurely punctate, slightly radiate in the middle and at the ends. — *G. olivaceum var. salinarum* Pant. II p. 56 Pl. IX f. 160; XI f. 199; XVIII f. 287. *G. olivaceum var. fossilis* Pant. II p. 56 Pl. XII f. 204. *G. salsa* Pant. II p. 56 Pl. XVII f. 285. *G. Salin.* Icon. n. Pl. V f. 11, 12.

Brackish water: Baltic at Rügen! Hungary fossil (Gyöngyös Pata! etc.).

Var. *staurophora* Pant. (1889). — Central area a transverse fascia. — *G. oliv. var. staur.* Pant. II p. 56 Pl. XII f. 206.

Brackish water: Hungary fossil (Pant.).

G. Salinarum seems me to be perfectly distinct from *G. olivaceum* by the distant terminal fissures, the broader axial area, the central orbicular area and the more distant striæ. The outline of the valve is, as in most species of Gomphonema, variable. Between *G. salsa* Pant. and *G. oliv. var. fossilis* Pant. I am unable to find any difference from the descriptions and the figures.

21. **G. transsylvanicum** Pant. (1893). — V. lanceolate, scarcely clavate, tapering from the middle towards the obtuse ends. L. 0,084; B. 0,0168 mm. Axial area narrow; central area large, irregular. Striæ about 10 in 0,01 mm., radiate in the middle, where they are of unequal length, parallel towards the ends, not distinctly punctate. — Pant. III Pl. XIV, 219, 220.

Fresh water?: Köpecz (Pant.).

Unknown to the author.

22. **G. olivaceum** Lyngb. (1819). — V. clavate, rarely sublanceolate, with broad, rounded, obtuse apex and narrower basis. L. 0,015 to 0,025; B. 0,005 to 0,007 mm. Axial area indistinct; central area rectangular. Striæ 13 to 14 in 0,01 mm., curved or radiate in the middle of the valve, elsewhere almost transverse, not distinctly punctate. — *Echinella oliv.* Lyngb. Tent. Hydr. D. p. 209 Pl. LXX f. *c* 1 to 3. *G. oliv.* Kütz. Alg. Dec. N:o 13 (fide Lagst.). W. Sm. B. D.

P. XXIX f. 244. V. H. Syn. p. 126 Pl. XXV f. 20 to 27. *G. sphænelloides* Schum. Pr. D. I Nachtr. p. 19 f. 16. *G. subramosum* Kütz. (fide Grun.). *Sphenella vulgaris* Kütz. (fide Grun.).

Fresh and brackish water: Sweden! Germany! Switzerland! England!

Var. *baltica* Cl. (1868). — V. clavate. L. 0,04; B. 0,0075 mm. Central area small. Striæ 16 to 17 in 0,01 mm. — *G. balticum* Cl. Sv. och Norsk D. p. 231 Pl. IV f. 10 to 16.

Brackish water: Baltic (from Westerbotten to Gothland)!

Var. *calcarea* Cl. (1868). — V. clavate; L. 0,022 to 0,047; B. 0,005 to 0,008 mm. Central area small. Striæ 12 to 13 in 0,01 mm. — *G. calcareum* Cl. Sv. och Norsk D. p. 231 Pl. IV f. 7.

Fresh water (on moist limestone-rocks): Gothland!

Var. *stauroneiformis* Grun. (1878). — V. lanceolate. L. 0,033 to 0,07; B. 0,01 to 0,012 mm. Striæ 10 to 13 in 0,01 mm. — Grun. Casp. See Alg. p. 9 Pl. III f. 2.

Brackish water: Caspian Sea (Grun.).

Var. *tenellum* Kütz. (1844). — V. small, clavate. L. 0,012 to 0,025; B. 0,003 to 0,0035 mm. Striæ 14 in 0,01 mm. — *G. ten.* Kütz. Bac. p. 84 Pl. VIII f. 8. V. H. Syn. Pl. XXIV f. 22 to 25.

Fresh water: Finland, Åbo! Australian Alps!

G. olivaceum lives usually in rivulets by slender stalks attached to stones and forming brownish masses about 1 centim. in diameter. The var. calcarea was found on limestone-rocks on Gothland, fixed by long stalks and forming thick gelatinous masses. The var. baltica is common in the Baltic and the Gulf of Bothnia, where it occurs attached by elongated gelatinous stalks to Zostera and Potamogeton. The *G. tenellum* is not quite clear to me. What I suppose to be Kützings species is doubtless a very small *G. olivaceum*, but in the Syn. of Van Heurck Grunow places *G. tenellum* among the asymmetrical Gomphonemas, so it is possible that *G. tenellum* Kütz. is a small *G. intricatum*.

23. **G. Aestuarii** Cl. (1893). — V. linear, narrow, slightly clavate, with obtuse end and basis. L. 0,02 to 0,028; B. 0,002 to 0,0035 mm. Axial area indistinct; central area a broad transverse fascia. Striæ parallel (the median radiate) 20 in 0,01 mm. Ends of the valve with rudimentary diaphragms. — Cl. Diatomiste Vol. II p. 55 Pl. III f. 4.

Marine: Hastings (Comber Coll.)!

24. **G. exiguum** Kütz. (1844). — V. narrow, clavate with obtuse, sometimes slightly rostrate apex. L. 0,009 to 0,03; B. 0,002 to 0,003 mm. Axial area narrow, not dilated in the middle. Striæ 18 in 0,01 mm. transverse. — Kütz. Bac. p. 84 Pl. XXX f. 58. V. H. Syn. p. 126 Pl. XXV f. 34. *G. hyalinum* Heib. Consp. D. D. p. 96 Pl. V f. 18 (1863). *G. exiguum var. digitatum* V. H. Syn. f. 35, 36; *var. telographicum* (Kütz.) V. H. l. c. f. 37; *var minutissimum* (Kütz.) V. H. l. c. f. 38; *var. perpusilla* Grun. V. H. l. f. 39.

Marine: Coasts of Denmark (Heib.), England! Belgium (V. H.).

This minute species is probably widely distributed, but from its smallness rarely met with in cleaned materials. Between the many varieties in V. H. Syn. I am unable to find any difference except in the number of the striæ, and the size.

Var. *pachyclada* Bréb. (1838). — V. linear-clavate. L. 0,015 to 0,034; B. 0,005 mm. Striæ 16 in 0,01 mm. — *G. pach.* Bréb. Considér. p. 21 (fide Chase). V. H. Syn. XXV f. 31, 32.

Marine: Coasts of Normandy (Bréb., Grun.), Cape Wankarema! Behrings Island!

Var. *arctica* Grun. (1880). — V. broad, clavate. L. 0,02 to 0,035; B. 0,006 to 0,008 mm. Striæ 16 to 20 in 0,01 mm. almost transverse. — *G. arct.* Grun. V. H. Syn. Pl. XXV f. 30. Franz Josephs Land D. p. 102 (50) Pl. I f. 13.

Marine, arctic regions: Franz Josephs Land (Grun.), Nova Zembla! Cape Wankarema!

25. **G. kamtschaticum** Grun. (1878). — V. elongated, clavate, with rounded apex and narrower basis. L. 0,03 to 0,07; B. 0,005 to 0,011 mm. Axial area distinct, linear, dilated around the central nodule. Striæ 12 to 16 in 0,01 mm. radiate in the middle, very finely punctate. —

GRUN. Casp. Sea Alg. p. 12. V. H. Syn. XXV f. 29. *G. antarcticum* O'MEARA L. Soc. XV p. 56 Pl. I f. 3 (1877)?

Marine: Arctic America, Bessels Bay! Esquimaux Harbour (Grun.), Iceland! East Cape! Behrings Island!

Var. *sibirica* GRUN. (1878). — V. less clavate, striæ less radiate. — GRUN. in Cl. M. D. 315 to 318.

Marine: Cape Wankarema!

Var. *californica* GRUN. (1880). — Almost linear, with obtuse and rounded ends. L. 0,03; B. 0,006 mm. Striæ 15 in 0,01 mm. — GRUN. in V. H. Syn. Pl. XXV f. 28.

Marine: San Francisco (Grun.).

G. Kamtschaticum is by the *var. calif.* nearly connected with *G. exig. var. pachyclada*, the two latter varieties being distinguished only by the somewhat more visible axial and central area of the former. In the Cape Wankarema material occur forms of *G. kamtschaticum* with unilateral axial area.

26. **G. peruvianum** GRUN. (1880). — V. linear, clavate. L. 0,03; B. 0,005 mm. Axial area narrow; central subquadrate. Striæ 9 in 0,01 mm. — GRUN. in V. H. Syn. Pl. XXV f. 33.

Marine: Peru (Grun.).

27. **G. abbreviatum** (AG. 1831?) KÜTZ. (1844). — V. clavate, with broad, rounded end and narrow, obtuse basis. L. 0,016 to 0,028; B. 0,005 mm. Axial and central areas uniting in a broad, linear-lanceolate space. Striæ 21 to 22 in 0,01 mm. transverse, radiate in the end. — *Licmophora minuta* KÜTZ. Dec. N:o 23 (1833) fide Lagst. *G. abbreviatum* AG. Consp. p. 34? KÜTZ. Bac. p. 84. GRUN. Casp. See Alg. p. 13. V. H. Syn. Pl. XXV f. 16.

Fresh or slightly brackish water: Weissenfels (Kütz.), Dubravica, Hungary, fossil (Grun.), Gulf of Bothnia at Torneå!

28. **G. brasiliense** GRUN. (1878). — V. lanceolate, obtuse. L. 0,025 to 0,034; B. 0,005 to 0,0055 mm. Axial and central areas uniting in a broad, lanceolate space. Striæ 16 to 18 in 0,01 mm. short. — GRUN. Casp. See Alg. p. 13. *G. abbr. var. bras.* V. H. Syn. Pl. XXV f. 17.

Fresh water: Brazil, Cuba, Bengal (Grun.).

Var. *Demeraræ* GRUN. Ms. — V. sublanceolate with subrostrate apex. L. 0,038 to 0,058; B. 0,008 to 0,012 mm.

Fresh water: Demerara River (Grun.).

29. **G. Puiggarianum** GRUN. (1880). — V. linear-lanceolate, with truncate apex and basis. L. 0,05; B. 0,008 mm. Axial area broad, lanceolate. Striæ 6 in 0,01 mm. marginal. — GRUN. in V. H. Syn. Pl. XXV f. 18.

Fresh water: Brazil (Grun.).

Var. *æquatorialis* CL. — V. small. L. 0,025; B. 0,005 mm. Area less broad. Striæ 8 to 9 in 0,01 mm.

Fresh water: Ecuador, San Nicolas!

Additional.

G. cantalicum BRUN a. HÉRIB. (1893). — V. lanceolate, slightly clavate, gradually tapering from the middle to the rounded obtuse ends. L. 0,16 to 0,225; B. 0,025 to 0,032 mm. Axial area narrow, linear, not dilated in the middle where there is, unilaterally, a stigma. Striæ 12 in 0,01 mm. almost parallel, slightly radiate at the ends, coarsely punctate; puncta about 14 in 0,01 mm., arranged in slightly undulating longitudinal rows. Across the striæ and in the middle between the median line and the margin there is a shadowy longitudinal line. — BRUN a. HÉRIB. D. d'Auvergne p. 219 Pl. VI f. 11.

Fresh water: Cantal, fossil!

Var. *costalonga* Brun a. Hérib. (1893). — Valve very slightly curved. Longitudinal lines more distinct. — l. c. f. 13.

Var. *major* Brun a. Hérib. (1893). — L. 0,23 mm. — l. c. f. 12.

A very remarkable species. It does not belong to Gomphoneis as the striæ are composed of simple rows of puncta.

Trachyneis Cl. N. Gen.

Valve naviculoid, more or less elongated, frequently asymmetrical on both sides of the longitudinal axis. Valve (often) with an interior coarsely dotted stratum, a median stratum of more or less transverse flexuose strong costæ, anastomosing, where they bend towards each other and thus forming a network of diamond-shaped or rectangular alveoli, and an exterior stratum with very fine puncta forming longitudinal, sometimes slightly oblique, fine striæ. — *Cell-contents:* T. aspera v. genuina has two chromatophore-plates along the connecting zone. The margins of the plates are strongly indented.

The type of this genus, *Nav. aspera* Ehb. is very variable and widely distributed. The peculiar structure of this species makes it necessary to form for it and the allied species a separate genus. Under a low power the valve seems to be covered with elongated or rhomboid puncta, more or less distinctly disposed in quincunx, these puncta being the diamond-shaped alveoli formed by the anastomoses of the costæ. The fine puncta of the exterior stratum are visible only with difficulty, and, under certain illumination, give to the elongated puncta the appearance of being transversely lineate (See Van Heurck Suppl. Pl. B f. 26). The interior stratum of the valve may sometimes be separated, as is shewn by the fig. 23 Pl. XLVIII of A. S. Atl.

I suppose that the division Lineolatæ of Navicula may be regarded as having the nearest relations to Trachyneis, especially the forms of that group, which have divided striæ. A structure somewhat similar to that of Trachyneis is to be found in Mastoneis and Dictyoneis. All the species of this genus are marine. They occur in all seas, arctic as well as tropical.

Most forms of Trachyneis aro so closely connected and subject to transitions as to make the distinction of well founded species very difficult. The variability of some species is considerable. In certain species there is a remarkable tendency to asymmetry, some varieties having a very excentric median line, or asymmetrical axial area; but such forms, for which the genus *Alloioneis* was created, are so closely connected with other, nearly, or perfectly, symmetrical forms, that no specific distinction can be founded on this character. The arrangement of the alveoli in oblique, or straight longitudinal rows, seems to afford some distinction; but this characteristic is also subject to great variation, and in some forms we find that the rows are oblique near the central area, and longitudinal elsewhere.

Artificial key.

1. Central area small . . . . . *T. relata* A. S
   — — large . . . . . 2.
2. Central area a transverse, outwards dilated fascia . . . . . 3.
   — — rounded . . . . . 4.
3. Stauros not reaching to the margin . . . . . *T. aspera* Ehb.
   — reaching — — . . . . . *T. tumidula* Grun.
4. Alveoli in decussating rows . . . . . 5.
   — — longitudinal — . . . . . *T. Johnsoniana* Grev.
5. All alveoli in decussating rows . . . . . 6.
   Alveoli at the margin in decussating, in the middle in straight rows . . . . *T. Brunii* Cl.

6. { Axial area indistinct . . . . . *T. Clepsydra* Donk.
   { — — linear, frequently unilateral . . . . . 7.
7. { Alveoli in regularly decussating rows . . . . . *T. Debyi* Leud. Fortm.
   { — — irregularly — — . . . . . *T. Antillarum* Cl.

1. **T. aspera** Ehb. (1843). — V. elliptic- to linear-lanceolate or elongated rhomboid. L. 0,06 to 0,3; B. 0,024 to 0,05 mm. Ends obtuse or rounded. Axial area very narrow or linear and unilateral. Central area a broad stauros, widened and truncate outwards. Alveoli forming transverse striæ, radiate throughout, 6 to 18 in 0,01 mm. in more or less oblique rows.

Symmetrical forms.

Var. *genuina* Cl. — V. linear-lanceolate, obtuse. L. 0,15 to 0,2; B. 0,028 to 0,033 mm. Alveoli close. Rows of alveoli 7 to 10 in 0,01 mm. Longitudinal fine striæ distinct, 26 in 0,01 mm. — *Stauroptera aspera* Ehb. Am. Pl. I f. 1, 2. *Nav. aspera* V. H. Syn. Pl. X f. 13. Suppl. B. f. 26. A. S. Atl. XLVIII f. 15, 21, 22. Donk. B. D. Pl. X f. 1. *Nav. pseudo-aspera* Pant. III Pl. XVIII f. 258 (1893).

Marine: North Sea! Singapore (Atl.), Amboina (Kinker Coll.)! Sydney! Japan, fossil (Brun Coll.)! Mexillones guano (Deby Coll.)!

Var. *vulgaris* Cl. — V. elliptic- or linear-lanceolate. L. 0,11 to 0,2; B. 0,02 to 0,035 mm. Axial area indistinct or very narrow. Alveoli close. Rows of alveoli about 10 in 0,01 mm. Longitudinal fine striæ about 25 in 0,01 mm. — *Nav. aspera* A. S. XLVIII f. 2 to 6.

Marine: Arctic America! North Sea! Cape of Good Hope! New Zealand! Samoa! New Caledonia! Java! Galapagos Islands!

Var. *Neumeyeri* Janicsh (1876). — V. large, lanceolate. L. 0,3; B. 0,05 mm. Axial area narrow. Rows of alveoli about 9 in 0,01 mm. — *Nav. Neum.* A. S. Atl. XLVIII f. 1.

Marine: Cape Horn (Petit).

Var. *robusta* Petit (1877). — V. narrow, elliptical, with acute or subcuneate ends. L. 0,09 to 0,14; B. 0,028 to 0,035 mm. convex, with a longitudinal depression on each side of the median line. Axial area indistinct. Alveoli forming three longitudinal bands and somewhat radiate striæ, 6 (middle) to 8 (ends) in 0,01 mm. — *Stauroneis robusta* Petit D. de Campbell p. 27 Pl. V f. 16.

Marine: Campbell Island (Petit Coll.)!

Var. *angusta* Cl. — V. narrow, linear-lanceolate. L. 0,12; B. 0,018 mm. Rows of alveoli 11 in 0,01 mm.

Marine: Sumbava (Kinker Coll.)! Colon (Deby Coll.)!

Var. *contermina* A. S. (1876). — V. narrow elliptical. L. 0,048; B. 0,011 to 0,012 mm. Axial area narrow. Striæ in slightly radiate, transverse, rows, about 10 in 0,01 mm., crossed by a few longitudinal blank bands. — *Nav. contermina* A. S. Atl. XLVIII f. 17, 18.

Marine: Japan (Atl.), Cape Horn (Petit).

Var. *pulchella* W. Sm. (1853). — V. narrow, elliptical, gradually tapering towards the obtuse ends. L. 0,075 to 0,085; B. 0,015 to 0,02 mm. Axial area indistinct. Alveoli close, forming oblique, and slightly radiate, transverse rows, 13 to 16 in 0,01 mm. — *Stauroptera Achnanthes* Ehb. Am. p. 135 Pl. III: 3 f. 7? M. Geol. XVII: 1 f. 10? *Stauroneis pulchella* W. Sm. B. D. I p. 61 Pl. XIX f. 194. *Navicula aspera* Donk. B. D. X f. 1 *b*. *Stauroneis pygmæa* Castr. Voyage Challenger p. 25 Pl. XXIX f. 7. A. S. Atl. XLVIII f. 12, 13 (no name).

Marine: North Sea! Philippines! Samoa! Sandwich Islands!

Var. *residua* A. S. (1876). — V. narrow, linear-lanceolate. L. 0,1; B. 0,012 mm. Axial area indistinct. Rows of alveoli 18 in 0,01 mm. — *Nav. residua* A. S. Atl. XLVIII f. 29.

Marine: Japan (Atl.), Cape Horn (Petit).

Asymmetrical forms.

Var. *californica* Cl. — V. linear-lanceolate, obtuse. L. 0,17 to 0,22; B. 0,03 to 0,035 mm. Axial area linear, unilateral. Alveoli close, disposed in irregular, longitudinal rows, and slightly radiate, transverse rows, 6 to 7 in 0,01 mm.

Marine, fossil: Japan (Brun Coll.)! San Pedro (Kinker Coll.)! S:ta Monica Cal. (Deby Coll.)!

Var. *derasa* Cl. — V. linear, obtuse. L. 0,22; B. 0,023 mm. Axial area broad and irregular, unilateral. Central area a broad fascia, reaching to the margin. Alveoli close, forming oblique rows and slightly radiate, at the ends parallel, rows, 7 in 0,01 mm.

Marine: Madagascar (Kinker Coll.)!

Var. *intermedia* Grun. (1876). — V. narrow lanceolate to elliptic-linear. L. 0,1 to 0,19; B. 0,019 to 0,026 mm. Axial area narrow, unilateral. Alveoli forming longitudinal or oblique rows, and transverse, slightly radiate rows, 7 to 9 in 0,01 mm. — *Nav. aspera var. interm.* Grun. A. S. Atl. XLVIII f. 14. Franz Josephs Land D. Pl. I f. 20. *Nav. aspera var. hungarica* Pant. II p. 42 Pl. X f. 180 (1889).

Marine: Greenland! Spitzbergen! Franz Josephs Land (Grun.), Finmark! Sea of Kara! Cape Deshneff! North Sea! Fossil: St. Peter, Hungary! Brünn! Sendaï, Japan!

Var. *oblonga* Bail (1854). — V. linear, with subcuneate ends, and frequently with a median gibbosity. L. 0,17 to 0,22; B. 0,04 to 0,05 mm. Axial area narrow; linear, unilateral. Alveoli close, in oblique and transverse rows, the latter slightly radiate, 7 to 10 in 0,01 mm. — *Stauroptera oblonga* Bail Smiths. Contr. 1854 p. 10 f. 17. *St. oblonga?* A. S. Atl. Pl. XLVIII f. 16. *Stauroneis oblonga* Castr. Voy. Challenger p. 24 Pl. XX f. 7 to 11.

Marine: Sydney! Kerguelens Land! South America, fossil!

Var. *rhombica* Cl. — V. rhomboid. L. 0,12; B. 0,055 mm. Ends acute. Median line excentric. Axial area linear, unilateral. Central area large. Costæ near the margin transverse, 9 in 0,01 mm. Alveoli arranged in oblique rows, crossing each others in an angle of about 80°, 6 in 0,01 mm.

Marine: Galapagos Island!

Var. *perobliqua* Cl. — V. linear, gradually tapering towards the obtuse ends. L. 0,158; B. 0,02 mm. Median line very excentric. Axial area indistinct. Alveoli arranged in obliqe and transverse rows, the latter 8 to 9 in 0,01 m. m. — Pl. III f. 37.

Marine: Macassar Straits (Grove Coll.)!

Var. *Amphora* Brun (1891). — V. strongly asymmetrical. L. 0,09 to 0,14 mm. Axial area irregular, unilateral. Central area small. Alveoli arranged in oblique and transverse rows, the latter 6 in 0,01 mm. — *Nav. Amphora* Brun De espèces n. p. 32 Pl. XV f. 3.

Marine: Port au Prince and King Georgs Sound (Brun).

Var. *Schmidtiana* Grun. (1876). — Lanceolate, somewhat gibbous in the middle, obtuse. L. 0,08 to 0,11; B. about 0,017 mm. Axial area linear, unilateral. Alveoli distant, disposed in 2 to 3 longitudinal rows and in transverse rows, 9 to 12 in 0,01 mm. — *Nav. Schm.* A. S. Atl. XLVIII f. 19, 20.

Marine: Campeachy Bay! Galapagos Islands!

2. **T.**(?) **tumidula** Grun. (1860). — V. gibbous in the middle and with broad, truncate ends. L. 0,025; B. 0,011 mm. Axial area indistinct; central area a broad fascia, reaching the margin, where it is dilated. Rows of alveoli radiate, 13 in 0,01 mm. — *Stauroneis tumid.* Grun. Verh. 1860 p. 566 Pl. VI f. 10.

Marine: Red Sea (Grun.).

I have not seen this form, which, to judge from Grunow's description, seems to belong to Trachyneis.

3. **T. Clepsydra** Donk. (1861). — Frustule rectangular, constricted in the middle. V. convex, linear lanceolate, with obtuse or subtruncate ends. L. 0,11 to 0,13; B. 0,02 mm. Median line

central; its terminal fissures laterally expanded. Axial area indistinct; central area rounded-quadrate. Alveoli disposed in oblique and transverse rows, the latter curved and slightly radiate, 10 in 0,01 mm. — *Nav. cleps.* Donk. M. J. I n. s. p. 8 Pl. I f. 3. B. D. p. 63 Pl. X f. 2. A. S. Atl. XLVIII f. 7—8 (no name).

Marine, aestuaries: Coasts of Scotland and England! Cape Horn (P. Petit).

Var. *scotica* A. S. (1876). — Smaller, more linear. L. 0,085 to 0,09; B. 0,015 mm. — *Nav. scotica* A. S. Atl. XLVIII f. 9—11. Cl. M. D. N:o 303.

Marine: Scotland!

4. **T. Debyi** Leud. Fortm. (1892). — V. linear-lanceolate, convex, gradually tapering towards the obtuse ends. L. 0,15 to 0,30; B. 0,025 to 0,04 mm. Axial area narrow linear, symmetrical; central area orbicular. Alveoli disposed in oblique and transverse rows, the latter parallel, 8—9 in 0,01 mm. Longitudinal fine striæ about 20 in 0,01 mm. — *Nav. clepsydra* A. S. Atl. XLVIII f. 39.

Marine and brackish: Red Sea! Sumatra (Grove Coll.)! Java (Kinker Coll.)! Singapore! China (Penang Harbour Dr. Rae Coll.)! Australia (St. Vincent, Atl.)!

Var. *osculifera* Cl. — Axial area unilateral; central area with a linear marking on both sides of the central nodule. — *Alloioneis Debyi* Leud. Fortm. D. de la Malaisie p. 18 Pl. II f. 5.

There can be no doubt that *T. Clepsydra* and *T. Debyi* are distinct species. The fig. 38 in A. S. Atl., (*Nav. cleps. var.?*) appears to be a variety of *T. aspera*, or perhaps a new species.

5. **T. Johnsoniana** Grev. (1863). — V. elliptic-lanceolate, with obtuse or subrostrate ends. L. 0,09 to 0,11; B. 0,033 to 0,037 mm. Axial area indistinct; central area, large, widened and rounded outwards. Alveoli disposed in longitudinal and transverse rows; the former about 6 in 0,01 mm.; the latter radiate throughout, 8—10 in 0,01 mm. Longitudinal fine striæ 25 in 0,01 mm. — *Nav. Johns.* Grev. T. M. S. XI p. 17 Pl. I f. 8. *Nav. Sieboldii* Pant. III Pl. XX f. 293 (1893)? *Trach. Johns.* Icon. n. Pl. III f. 38.

Marine: Java (Deby Coll.)! Queensland (Grev.), Port Jackson! New Zealand (Grev.), Japan, Sendaï Dept (Brun Coll.)!

The valve is sometimes slightly asymmetrical, the median line being excentric. The central area, rounded in typical specimens, is in some varieties dilated and truncate outwards, so that *T. Johnsoniana* is closely connected with *T. aspera*.

6. **T. Brunii** Cl. (1891). — V. broadly elliptical. L. 0,068; B. 0,034 mm. Axial area indistinct; central area large, transverse, rounded outwards. Alveoli disposed in two to three longitudinal rows along the median line, in oblique rows towards the margin. Transverse rows of alveoli slightly radiate throughout, 9 (middle) to 12 (ends) in 0,01 mm. Longitudinal fine striæ about 26 in 0,01 mm. — *Nav. Brunii* Cl. in Brun D. espèces n. p. 33 Pl. XVI f. 4.

Marine: Japan (Brun Coll.)! China!

This species has some resemblance to *Nav. Ovum Paschale* (A. S. Atl. Pl. VIII f. 56) also from Japan, but this form, unknown to me, has not the large central area of *T. Brunii*. It seems, nevertheless, probable that *Nav. Ovum Paschale* is a form of *Trachyneis*.

7. **T. Antillarum** Cl. (1878). — V. linear-lanceolate to linear-elliptical, with obtuse ends. L. 0,12 to 0,17; B. 0,026 to 0,032 mm. Median line somewhat excentric. Axial area more or less broad, irregularly linear and unilateral. Central area rounded, unilateral, on the opposite side of the axial area. Alveoli disposed in longitudinal flexuose or irregularly oblique rows. Transverse rows slightly radiate throughout 9 to 10 in 0,01 mm. — *Alloioneis* (*Navicula?*) *Antillarum* Cl. West. Ind. D. p. 8 Pl. II f. 11.

Marine and brackish: Campeachy Bay! West Indies! Florida! Red Sea! Bab el Mandeb! Madagascar! Singapore! Java! Sumatra! China!

Var. *Kurzii* GRUN. (1878). — V. rhombic-lanceolate, with rounded ends. L. 0,09 to 0,105; B. 0,036 mm. Median line strongly excentric. Axial area semilanceolate, unilateral. Alveoli disposed in oblique rows, crossing each other in an angle of about 80°, and about 7 in 0,01 mm. Transverse costæ marginal, 10—11 in 0,01 mm. — *Nav.* (*Alloioneis?*) *Kurzii* GRUN. in Cl. West Ind. D. p. 8 Pl. II f. 12.

Brackish water: Elephant Point, India (Grun.), Singapore! Sumatra (Grove Coll.)!

8. **T. velata** A. S. (1876). — V. lanceolate, gradually tapering to the obtuse ends. L. 0,07 to 0,13; B. 0,02 to 0,022 mm. Axial area very narrow or unilateral; central area small, rounded. Alveoli rectangular, disposed in irregular, oblique rows and in transverse rows; the latter almost parallel or slightly radiate at the ends, 15—16 in 0,01 mm. Fine longitudinal striæ 25 in 0,01 mm. — *Nav. velata* A. S. Atl. Pl. XLVIII f. 33—34; f. 35—37 (no name). *Nav. australis* PETIT Cape Horn p. 125 (1888).

Marine: Cape Good Hope (Atl.), Madagascar! Mauritius! Ceylon! King Georges Sound (Grove Coll.)! Sumatra! Java! China! Japan! Sandwich Islands! New Caledonia! Cape Horn (Petit).

Additional.

Under the name *Navicula Paludinarum* PANTOCSEK has recently figured an apparently very curious form, which ought perhaps to be included in a proper genus. The valve is lanceolate, obtuse. L. 0,115; B. 0,038 mm. Axial area moderately broad, slightly dilated in the middle. Striæ costate, 8 in 0,01 mm., radiate throughout and alternating with single rows of large ocelli(?) — PANT. III Pl. IX f. 144. Var. *gracilior* l. c. Pl. XI f. 186. Fresh water? »Bodos» (Pant.).

Having had no opportunity of examining this remarkable form I am unable to decide as to its place in the system.

Mastoneis CL. N. GEN.

Valve with double structure. The exterior stratum with transverse striæ, composed of puncta; the interior with transverse costæ, directed from the margin, where they are thicker, towards the median line.

The only known species has been placed by GREVILLE and GRUNOW in the genus *Stauroneis*, but it has no close relation to any species of that genus, and the peculiar structure of the valve makes it advisable to form for it a new genus. I am unable to point out any close relation between this form and any other, although its general appearance has some resemblance to some Mastogloiæ.

1. **M. biformis** GRUN. (1863). — V. elliptical with rostrate extremities. L. 0,08 to 0,09; B. 0,032 to 0,035 mm. Median lines with approximate median pores and small terminal fissures, turned in the same direction. Central nodule transversely dilated into a very short stauros. No axial area. Striæ slightly radiate, 15 (middle) to 18 (ends) in 0,01 mm. punctate; puncta about 20 in 0,01 mm. Costæ 8—9 in 0,01 mm. — *Stauroneis biformis* GRUN. Verh. 1863 p. 154 Pl. IV f. 7. *Stauroneis australis* GREV. Ed. N. Ph. J. V. XVIII p. 187 f. 13 1863.

Marine: Queensland (Grev.), Red Sea (Kinker Coll.)! Port Jackson! Labuan!

Corrigenda.

Page 19, line 4 and 5, instead of *A. incerta* read *A. insecta*

Page 23, line 7, instead of Tropidoneis concerta read Tropidoneis conserta

Plate I.

PLATE I.

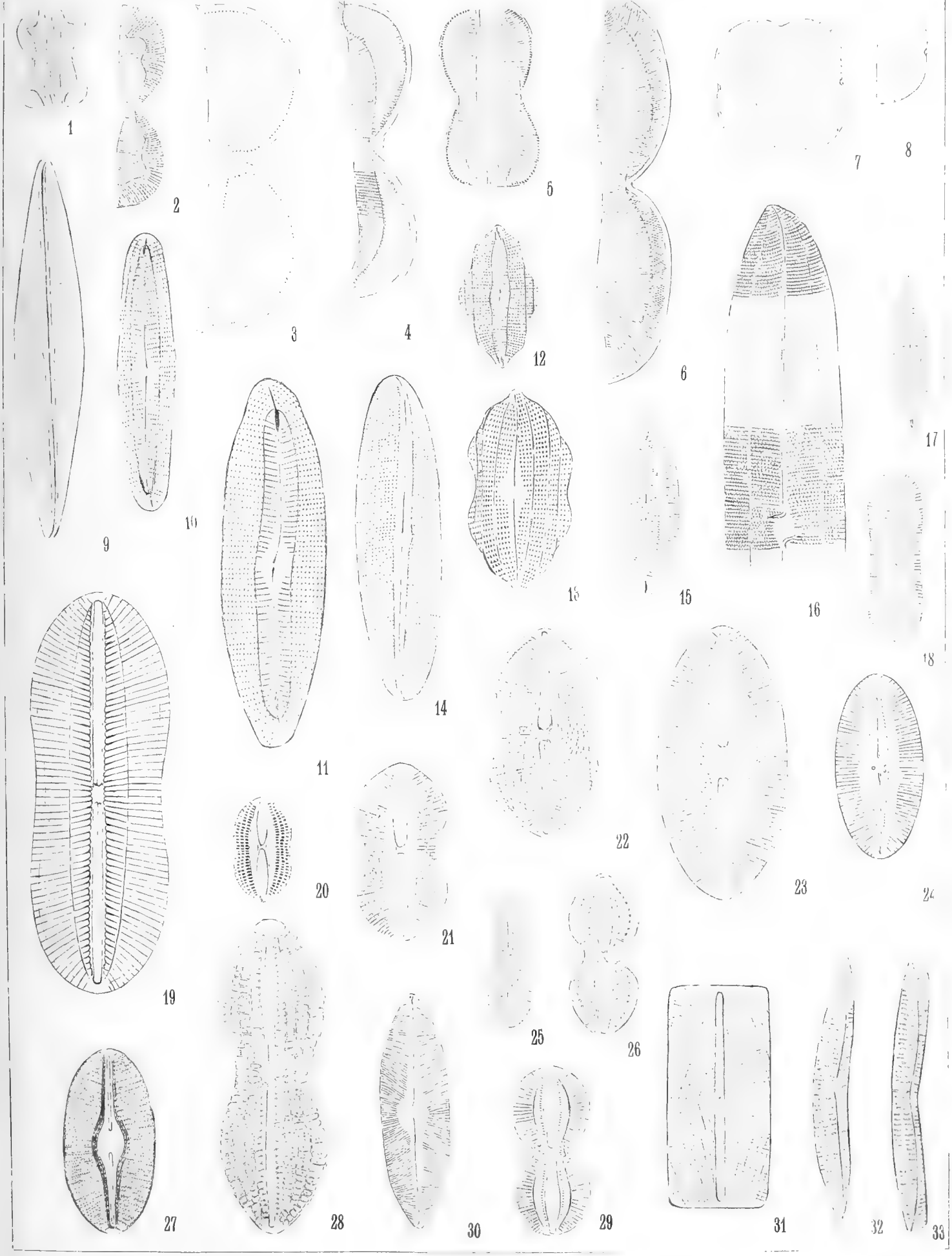

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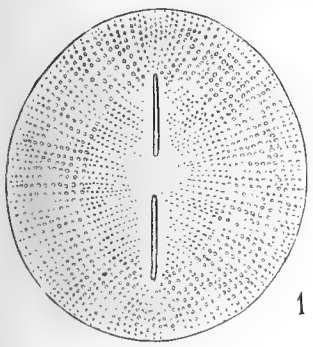
Plate II.

PLATE II.



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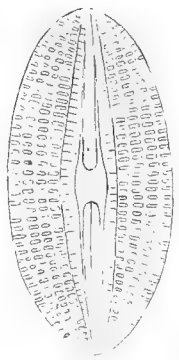

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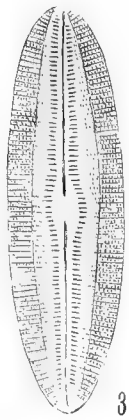

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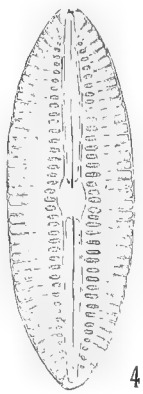

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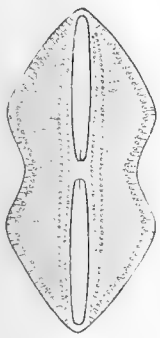

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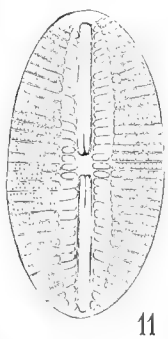

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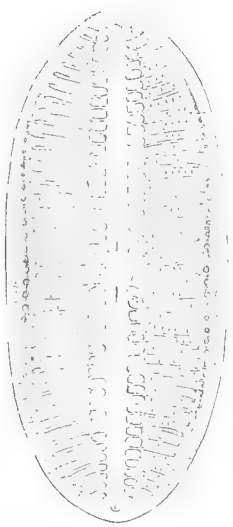

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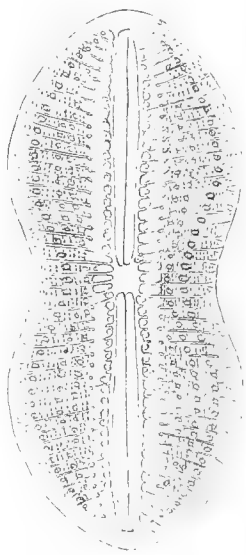

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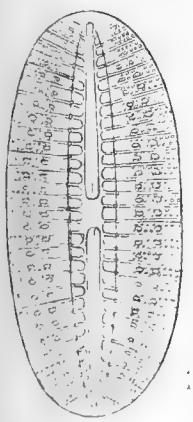

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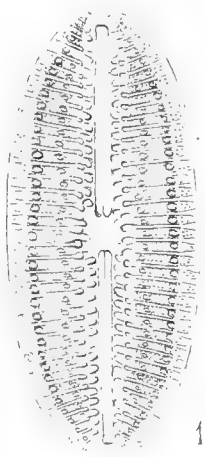

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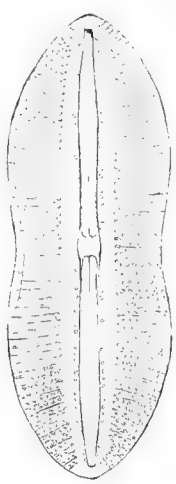

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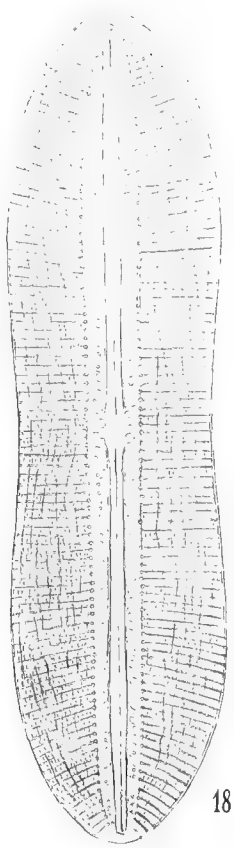

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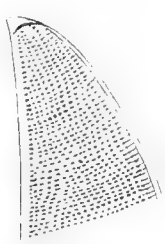

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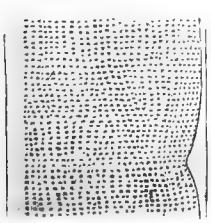

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Plate III.

PLATE III.

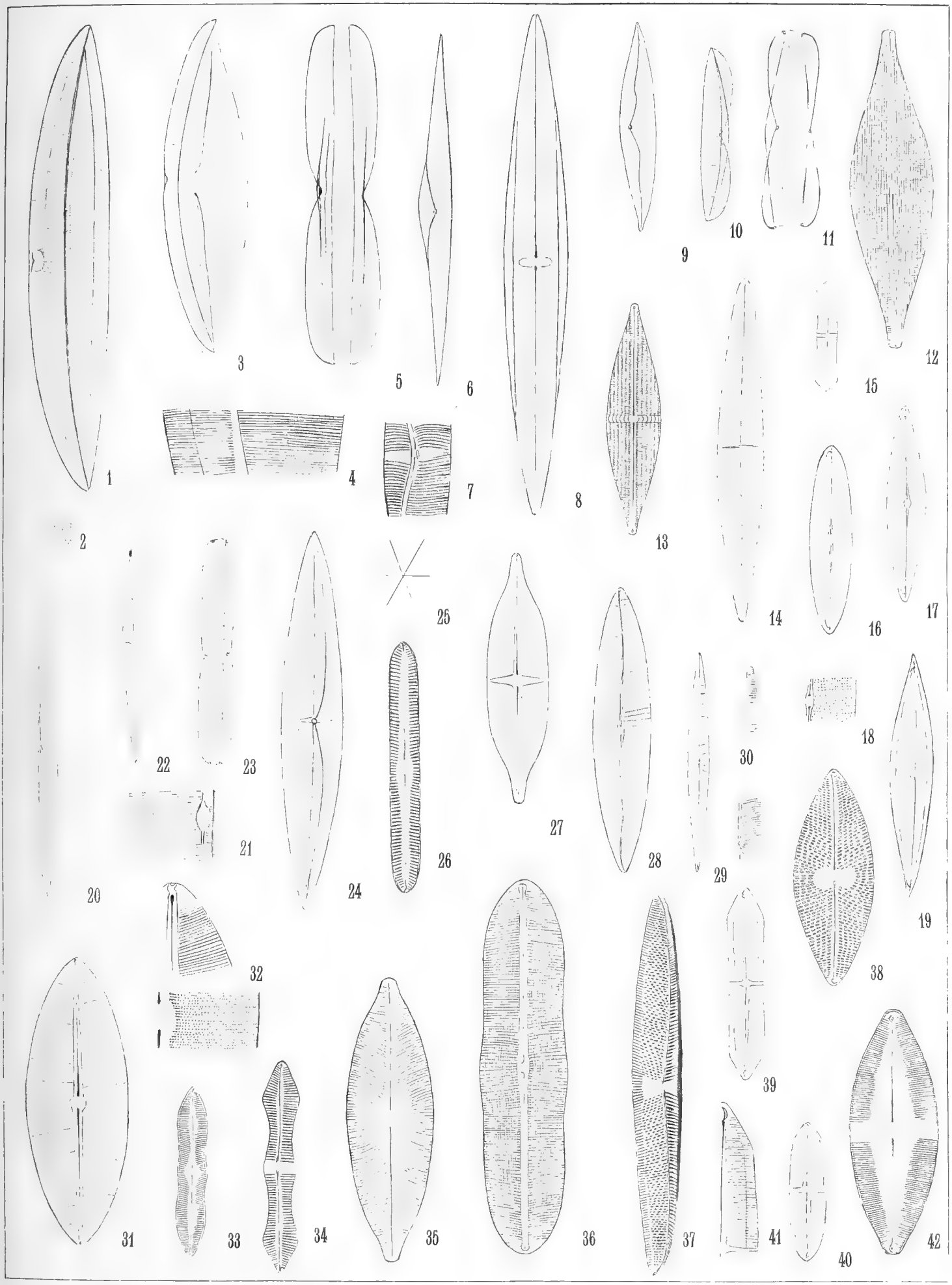
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Plate IV.

PLATE IV.

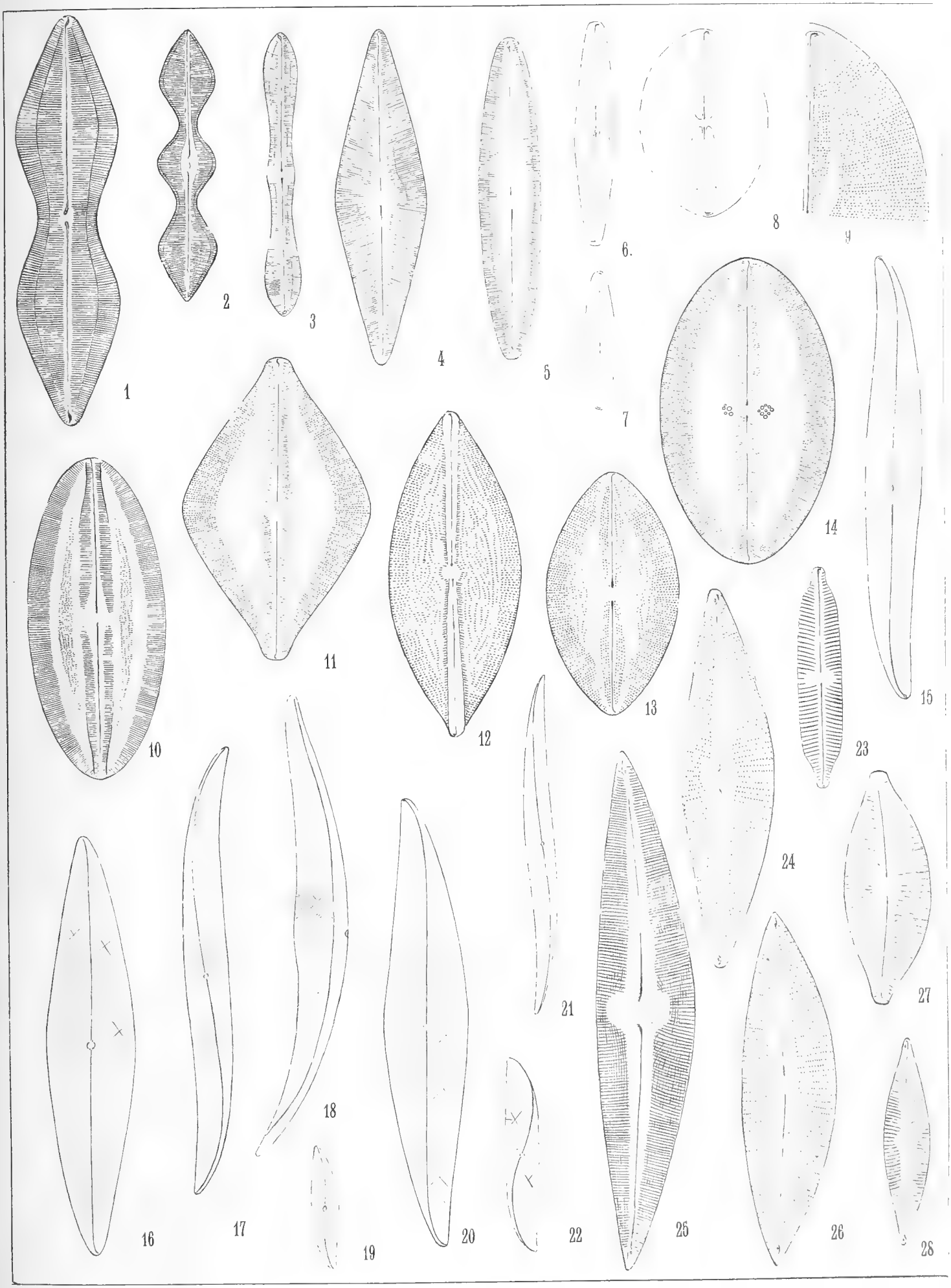
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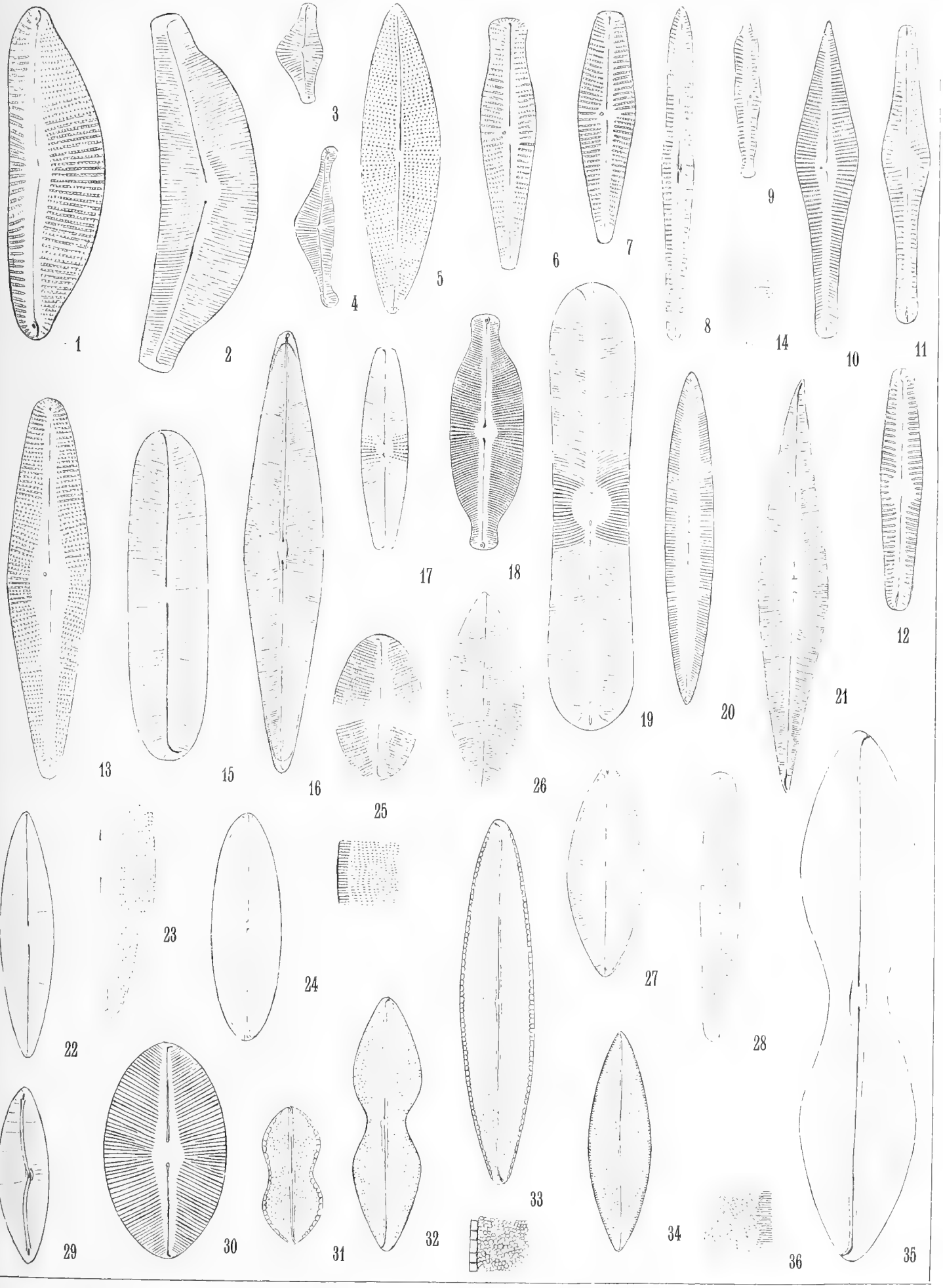
Plate V.

PLATE V.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KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N:o 3.

BIDRAG

TILL

SYDÖSTRA SVERIGES

(SMÅLANDS, ÖSTERGÖTLANDS OCH GOTLANDS)

HIERACIUM-FLORA

AF

HUGO DAHLSTEDT.

III.

ARCHIERACIA.

SECTIO I. VULGATA, SUBSECTIO CÆSIA ET VULGATA GENUINA,
SECTIO II. OREADEA, III. RIGIDA, IV. FOLIOSA.

INLEMNAD TILL K. SVENSKA VETENSKAPS-AKADEMIEN DEN 9 MARS 1892.

STOCKHOLM, 1894.
KUNGL. BOKTRYCKERIET P. A. NORSTEDT & SÖNER

INLEDNING.

Närvarande liksom föregående afdelning af mina bidrag till sydöstra Sveriges Hieracium-flora hade jag hoppats att på en gång få publicerad i Kgl. Sv. Vetenskapsakademiens Handlingar för år 1893. Men som utrymmet var starkt anlitadt till följd af andra förut inlemnade afhandlingar, för hvilka i första hand måste beredas rum, blef härigenom en delning af mitt arbete nödvändig. I Kgl. Sv. Vet. Akad. Handlingar, Band 25, N:o 3, kom sålunda endast de båda undergrupperna, *Subcæsia* och *Subvulgata* af *Vulgata*, att införas. I närvarande afhandling fortsättes *Vulgata* med undergrupperna *Cæsia* och *Vulgata genuina*, hvartill komma de inom det behandlade området anträffade formerna af *Oreadea*, *Rigida* och *Foliosa*.

Redan före och under tryckningen af föregående arbete ha emellertid gjorts flera nya fynd och upptäckter på skilda ställen i Skandinavien, hvilka i många afseenden kastat nytt ljus öfver en del sydostsvenska formers slägtskapsförhållanden och ställning. En del af de ändringar, hvartill dessa fynd gifvit anledning, har jag kunnat införa i denna och föregående afhandling, andra deremot, som skulle ha ledt till alltför vidlyftig omarbetning, har jag måst lemna åsido. Mycket af hvad jag yttrat öfver formernas inbördes ställning stämmer sålunda ej fullt med min nuvarande uppfattning. Hvad deremot de särskilda formernas begränsning beträffar, har jag i allmänhet ej funnit skäl att afvika från min förutvarande åsigt. Der ibland varit fallet, att en annan begränsning af en art visat sig nödvändig, har jag likväl ansett mig böra företaga en omarbetning.

Jag hoppas, att oaktadt antydda och andra ofullkomligheter detta arbete likväl skall lända till något gagn för dem, som vilja syssla med detta artrika och i flera hänseenden så intresseväckande slägte.

Under åren 1892 och 1893 har dels af mig dels af läroverksadjunkten K. Johansson i Visby inom området upptäckts en del nya former. För att på ett ställe ha samladt allt hvad man hittils känner af områdets Hieracium-flora anser jag lämpligt att i slutet af denna afhandling meddela beskrifningar öfver dessa. En litteraturförteckning, gällande för afdelningarne II och III af närvarande arbeten, en förteckning öfver de former från området, hvilka utdelats i mitt exsiccatverk: »Herbarium Hieraciorum Scandinaviæ, Cent. I—V», men hvilka ej kunnat förut upptagas, samt en fullständig namnförteckning till båda afdelningarne bifogas äfven.

I. VULGATA Fr.

(Fortsättning från Kgl. Sv. Vet. Ak. Handlingar. Bandet 25. N:o 3. Jemför anförda ställe, sid. 31 och följande).

C. CÆSIA (Almqu.).

Stjelk nästan glatt eller nedtill föga hårig, upptill oftast rikt, nedtill föga eller ej stjernhårig, typiskt 2—3-, mera sällan ända till 8- eller 10-bladig med det nedersta eller de nedre bladen nästan oskaftade eller m. l. m. och då oftast kort skaftade, de öfre oskaftade, hos mångbladiga former uppåt småningom aftagande i storlek och bredd och hos fåbladiga uppåt hastigt decrescerande och långt skilda från hvarandra samt med långt, oftast tvärt afbrott mot inflorescensens brakteer. Hos fåbladiga former sitter ofta det nedre, väl utvecklade stjelkbladet nära basalbladen eller ingår ibland i den af dem bildade basala rosetten, hvarvid de öfriga vanligen bli smala och föga utbildade samt ofta brakteliknande. Hos alla former förekommer vid stjelkens bas en m. l. m. riklig bladrosett med vanligen starkt och ytterligt förkortade internodier. Hos former med få stjelkblad äro basalbladen talrikast och bredast. De äro äfven ganska breda hos en stor del af de mångbladiga formerna, men äro hos dessa i allmänhet mindre talrika och tendera att tidigt afvissna (isynnerhet de yttre i rosetten). Hos ett fåtal äro äfven basalbladen smala och hos dessa hafva de ännu större benägenhet att tidigt bortvissna. I allmänhet äro bladen hos former med breda basalblad och få stjelkblad åtminstone vid sin bas djupt tandade eller flikade och tendera hos många att få tvär eller hos former, hvilka morfologiskt (och genetiskt) stå närmare *silvaticum*-typen, ej sällan något hjertlik bas. Dessa former tillhöra morfologiskt *cæsium*-typen. Hos en del andra former, hvilka tillhöra *ramosum*-typen, äro bladen ofta äfven djupt flikade och basalbladen ej sällan ganska breda med bred och stundom något intryckt bas, men former af denna typ kunna äfven vara smalbladiga och sammanbindas morfologiskt med ett fåtal former, hvilka genom sina fåtandade blad, färre basalblad och smala till större delen oskaftade, talrika och uppåt långsamt decrescerande stjelkblad mest öfverensstämma med *subrigidum*-typen. Till färgen vexla bladen hos de olika arterna i full analogi med beslägtade former af *Subcæsia* från intensivt glaucescenta till gulaktigt gröna eller skiftande i lökgrönt, men oftast är hos alla formerna tendensen till glaucescens hos bladen mycket framträdande, i det former med normalt mera grön eller lökgrön bladfärg på en del lokaler äga modifikationer med svagare eller starkare i blågrönt stötande färg. Hos flertalet former äro bladen åtminstone på öfversidan m. l. m.

glatta och äfven undertill i allmänhet föga håriga, men äro här deremot ej sällan rikt stjernhåriga, isynnerhet hos glaucescenta former. I motsats till förhållandet hos beslägtade former af *Subcæsia* äro hos denna grupp bladens tänder rakare, glesare och mera framåtrigtade och bladbasen mera nedlöpande samt försedd med mindre tät, ojemn eller djup tandning än hos nyssnämnda grupp. Det nära förhållandet mellan former af de respektive grupperna belyses i påfallande grad deraf, att ju tätare och mera flikig tandning och ju djupare inskuren bas med olikstora och bakåtrigtade tänder en form af *Subcæsia* äger, desto mera tenderar en beslägtad form af *Cæsia* att få djupare och mera oregelbunden tandning och bredare bas med utåtrigtade tänder etc. På detta sätt hafva en stor del af de bredbladigare formerna af *Cæsia* ofta längre tänder och tvärare eller mera intryckt bas än en del smalbladiga former af *Subcæsia*. Detsamma gäller äfven om de ur dessa *cæsium*-former utbildade eller paralellt med dem uppkomna och ytterst närbeslägtade former, hvilka äro utvecklade efter *ramosum*-typen. Men alla dessa former äro dock skarpt begränsade från *silvaticum*-typen genom mångbladig stjelk, rakare, jemnare fördelade och mera framåtrigtade bladtänder samt genom den från örtbladsregionen mindre skarpt afskiljda inflorescensregionen m. m. Likaså äro äfven former af både *cæsium*-, *ramosum*- och *subrigidum*-typen skarpare begränsade från *silvaticum*-typen än sinsemellan, hvarföre former af de förstnämnda båda typerna och äfven några nära beslägtade, tillhörande *subrigidum*-typen, alla här sammanförts i en grupp. Härtill har jag äfven föranledts deraf, att till och med inom samma underart ofta ej en bestämd, konstant typ är förherrskande. Så äger t. ex. den vanligen efter *cæsium*-typen starkt utbildade *H. *cæsium* äfven former och individ med m. l. m. utpräglad *ramosum*-typ. *H. *galbanum* äger en mängd vexlande modifikationer och former från ren *cæsium*-typ till rätt tydligt utpräglad *ramosum*-typ jemte en oändlig mängd kombinationer af dessa båda typer. På samma sätt med *H. *læticolor*, inom hvilken t. o. m. former finnes utvecklade med i hög grad framträdande *subrigidum*-habitus. En annan anledning till denna sammanslagning af så olika morfologiskt utbildade former i samma grupp och på samma gång ett bevis på den svaga differentieringen mellan dessa typer, är att en del former t. ex. *H. *galbanum*, hos hvilken *cæsium*-typen är rådande, utbildat paralellformer t. ex. *H. *variabile*, hos hvilken *ramosum*-typen blifvit förherrskande, men hvilka former, ehuru typiskt lätt och konstant skilda och i hög grad från hvarandra afvikande, dock mången gång genom mellanformer eller analoga variationer och modifikationer äro så nära förbundna, att de visa sig i jemförelsevis sen tid differentierade från hvarandra. Samma differentiering, som hos dessa former är i det närmaste och hos några andra former fullt genomförd, visar sig deremot hos vissa andra former i sitt första stadium. Att räkna till denna sednare kategori äro utom de nyssnämnda *H. *galbanum* och *H. *læticolor* äfven *H. *exaltatum* m. fl., hvarom närmare under hvarje art. Formerna af denna grupp synes sålunda på grund af sitt vacklande mellan olika typer och sin för öfrigt temligen odifferentierade morfologiska utbildning stå på ett lägre och möjligen äldre stadium än *Subcæsia*, hos hvilka en bestämd morfologisk typ är betydligt renare och mera strängt genomförd. Men på samma gång hithörande former synas vara stadda i starkare differentiering och utbildning af typer, analoga med de mera fixerade *vulgatum*- och *rigidum*-typerna, synes äfven en annan omständighet tala för, att denna grupp omfattar äldre former, nämligen den att hvarje form så ofta äger

spridda modifikationer med starkt tycke af *silvaticum*-typen och hvilka modifikationer såsom utan tvifvel kvarstående medelformer torde framställa utseendet af de sannolikt förr talrikare urformerna till såväl *Cæsia* som beslägtade former af *Subcæsia*. Så äga både *H. *cæsium*, *H. *galbanum* och *H. *læticolor* modifikationer, hvilka stå så ytterligt nära sina beslägtade former af *Subcæsia: H. *stenolepis*, *H. *cæsiiflorum* och *H. *prolixum* (jemte *H. *acidotum*), att de ofta förefalla omedelbart förbundna med dessa genom direkta medelformer. En annan omständighet synes mig äfven antyda ifrågavarande grupps lägre ställning, nämligen att ofta en underart af densamma är differentierad i ett par (eller flera) svagt begränsade varieteter eller former, hvilka inom *Subcæsia* äga hvar sina beslägtade och motsvarande men sinsemellan skarpt begränsade underarter. Så motsvaras alldeles *H. *ravusculum* med *β subcanitiosum*, den förra af *H. *sublividum* och den senare af *H. *canitiosum; H. *exaltatum* med sina båda med afseende på holkfjällen något skiljaktiga former motsvaras af *H. *silvaticum* och *H. *sinuosifrons*. — Holkarne vexla inom gruppen betydligt i storlek och form. Hos de mest *cæsium*-artadt utbildade formerna äro de stora och grofva, men ju mera typen närmar sig *ramosum*- eller *subrigidum*-typen, desto smärre bli de i allmänhet. För öfrigt står hårighetens fördelning och holkfjällens form i full öfverensstämmelse med förhållandet hos motsvarande former inom *Subcæsia*. Inflorescensens utbildning hos de olika formerna motsvarar äfven på ett i ögonen fallande sätt förhållandet hos motsvarande former af sistnämda grupp. Man jemföre t. ex. *H. *cæsium* med *H. *stenolepis*, *H. *læticolor* med *H. *prolixum*, *H. *basifolium* med *H. *maculosum* m. fl. Hos *Cæsia* är dock inflorescens-regionen mindre väl begränsad från bladregionen; isynnerhet gäller detta för former af *ramosum*- och *subrigidum*-typen, hos hvilka den ofta är föga eller icke begränsad nedåt. Hos former af *cæsium*-typen äro inflorescensgrenarne långa och m. l. m. aflägsnade från hvarandra, hos former af öfriga typer m. l. m. sammanträngda och utspärrade samt längre (*ramosum*-typen) eller mera upprätta och kortare (*subrigidum*-typen). Mellanformer mellan dessa inflorescens-typer förekomma dock nästan hos hvarje underart. Alltid äro grenarne och skaften rakare och gröfre än hos motsvarande former af *Subcæsia*. För öfrigt hänvisar jag angående slägtskapsförhållandena till den under gruppen *Subcæsia* lemnade tabellen och till hvad för öfrigt derstädes och under de särskilda formerna anföres i texten.

Conspectus specierum.

A. *Involucri* squamæ ± *angustæ lineares* v. e basi latiore ± *lanceolatæ*, interiores præsertim acutæ v. etiam subulatæ sæpe sat protractæ, glandulis raris sparsis v. nullis et pilis paullo fræquentioribus v. interdum numero æquantibus obsitæ, semper floccis uberibus — sparsis vulgo ubique obtectæ v. interdum marginibus floccis paullo uberioribus vestitæ.

H. cæsium Fr.

B. Involucri squamæ ± *latæ lanceolatæ — lanceolato-triangulares* glandulis sparsis — sat densis solum obsitæ v. glandulis densis et pilis sparsioribus vestitæ, in marginibus vulgo conspicue et sat late floccosæ, dorso rarius v. etiam densius stellatæ.

1. *Squamæ* involucri crassi ± lanceolato-triangulares sat dense glandulosæ et *densiuscule — sat crebre pilosæ*, marginibus *late dense et dilute floccosæ*, dorso inferne sparsius apicibus dense canofloccosis et comosis.
H. cæsiomurorum Lbg.

2. *Squamæ* involucri elongati — parvi gracilioris lanceolatæ — lanceolato-lineares *sparsim — sat dense glandulis* mediocribus nigris — parvis lutescentibus *obsitæ*, raro pilis solitariis immixtis, in marginibus *latiuscule — anguste sæpe sat conspicue* floccosæ, dorso sparsim — densiuscule apicibus haud multum conofloccosis leviter — sat multum comosis.
H. porrigens Almqu.

H. CÆSIUM Fr. (coll.)

Caulis fere glaber v. saltim superiore parte haud multum pilosus. *Folia caulina* (1—)2—3 usque ad 5—8, superiora sessilia abrupte v. sensim decrescentia, infimum ± petiolatum, ± dentata — basi incisa dentibus vulgo porrectis, acuta — cuspidata. *Folia basalia* in rosulam vulgo ± multifoliam approximata latiora v. angustiora subæqvaliter et porrecte dentata — subirregulariter et patentim incisa basi angustata decurrente rarius ovata — subcordata, omnia v. pleraque ± acuta. *Involucra* sat magna — mediocria, crassa — crassiuscula, squamis linearibus — lanceolatis, interioribus saltim acutis — longe cuspidatis, exterioribus sæpius ± obtusiusculis — obtusis, nunc pilis tenuibus ± sparsis et glandulis raris v. subnullis parvis — minutis nunc glandulis parvis — mediocribus et pilis brevibus numero fere æquantibus obtectis floccis raris — sparsis v. etiam densis — densissimis plerumque æqualiter adspersis v. rarius floccis ad marginem paullo uberioribus congestis et dorsum versus inconspicue rarescentibus obsitis, numquam in marginibus stria floccosa bene et conspicue limitata notatis. *Anthela* paniculata simplex sæpe subfurcata — sat composita ramis longioribus patentibus sat rectis laxa v. rarius magis contracta ramis leviter curvatis, vulgo deorsum haud bene limitata et indeterminata. *Styli* lutei usque sat obscuri.

De här sammanfattade formerna, af hvilka dock ytterlighetsformerna äro rätt olika, bilda en ganska naturlig och med *H. silvaticum* ytterst nära beslägtad formgrupp. De respektive formerna äga inom nyssnämda art sina fullkomliga motsvarigheter och närmaste slägtingar och äro med dem så nära förbundna, att de på en del punkter stundom nästan kontinuerligt sammanbindas med dem. Hithörande former äro dels utbildade efter *cæsium*-typen dels efter den med *rigidum*-typen nästan analoga *ramosum*- (och *subrigidum*-)typen, men hvarje form är synnerligen vexlande till sin typ, så att ofta inom samma art bestämda gränser mellan dessa typer äro svåra att draga, hvarjemte vissa former, hvilka företrädesvis äro utbildade efter en typ, stå ytterst nära och äro genom öfvergångsformer förbundna med andra

former, hos hvilka hufvudsakligen en annan typ är förherrskande. Dessa former med *ramosum*- eller *subrigidum*- typ och m. l. m. utpräglad *rigidum*-habitus kunna på dessa grunder ej skiljas från gruppen, ehuru de konsekvent (i likhet med föregående grupper) på grund af sin typ bort särskildt afhandlas. De äro nämligen så nära förenade med former, hos hvilka *cæsium*-typen är förherrskande, att de svårligen kunna behandlas för sig. Deremot äro de former, hvilka stå närmast former af *silvaticum*-typen, morfologiskt betydligt mera skilda från dessa än från de nyssnämda formerna af *ramosum*- och *subrigidum*-typen. Redan förut under *H. silvaticum* har jag påpekat slägtförhållandena till hithörande former, och i det följande kommer jag att ytterligare påpeka desamma, hvarför det här är öfverflödigt att närmare ingå härpå. Men jag vill blott nämna att äfven här slägtskapen är tydlig med *Oreadea*, t. ex. inom *H. * cæsium*, af hvilken former t. o. m. af FRIES, såsom i H. N. 13: 7, förts till denna grupp. Deremot framträder slägtskapen med *Andryaloidea* mindre tydligt. Anmärkningsvärdt är det ofta inträdande förhållandet, att en form af *Cæsia* med temligen svag differentiering i en eller flera varieteter motsvarar och synes beslägtad med tvenne skarpt markerade underarter af *Subcæsia*, hvilket synes tyda på att sistnämda grupp eller typ är sednare utvecklad och högre stående. Exempel härpå är, såsom jag förut framhållit, *H. *læticolor* med sina former, hvilka motsvara de väl begränsade *H. *prolixum* och *H. *acidotum; H. *exaltatum* med sina former, hvilka synas motsvara både *H. *silvaticum* och *H. *sinuosifrons*; *H. *ravusculum* med *β subcanitiosum*, som fullkomligt motsvara de skarpt differentierade *H. *sublividum* och *H. *canitiosum*.

På samma sätt synes förhållandet vara med *H. *basifolium* å ena sidan och *H. *maculosum* å den andra. Dock har inom en annan formgrupp, nämligen serien *H. *galbanum —*variabile*, utom *cæsium*-typen äfven andra typer differentierats, så att formbildningen här gått längre än hos den till *silvaticum*-typen hörande *H. *cæsiiflorum*.

Ett liknande förhållande råder mellan *porrigens*-gruppens former och *H. lacerifolium*.

Conspectus subspecierum.

I. *Squamæ* involucri pilis tenuibus sparsis — frequentioribus et glandulis nullis v. paucis raro sparsis vulgo parum conspicuis obsitæ, ubique ± stellatæ — dense floccosæ floccis interdum in marginibus densioribus.

1. *Folia* plerumque lata intense glaucescentia — plumbea v. viridi-glaucescentia rarius prasino-viridia. *Glandulæ* involucri solitariæ v. nullæ. *Squamæ* omnes ± acutæ — cuspidatæ. *Flocci* ± densi.

a. *Styli* vivi plerumque lutei v. fuscohispiduli. *Folia* intense glaucescentia — plumbea, subtus sat dense floccosa, supra sæpius maculata, sparsim et longe ± inæqualiter et acute grandi-dentata. *Flocci* squamarum saltim ad basin ± densi. *Ligulæ* pallide luteæ.

1. *H. *cæsium* FR.
(H. *ravusculum *β* subcanitiosum DAHLST.).

b. *Styli* vivi plerumque ± obscuri v. livescentes.
Folia lata ± viridi-glaucescentia, supra sæpe maculata (in *β subcanitioso* immaculata), subtus sparsim floccosa sparsius et brevius dentata; *caulina* 1—2. *Flocci* squamarum ubique densi diluti. *Ligulæ* obscure luteæ.
2. *H.* **ravusculum* Dahlst.

Folia vulgo angusta prasino-viridia brevius et magis æqualiter dentata, supra non maculata, subtus leviter stellata; *caulina* 2—5. *Flocci* squamarum ubique sparsi — densiusculi. *Ligulæ* obscure luteæ.
3. *H.* **fraudulentum* Dahlst.

2. *Folia* lata — angusta obscure — dilute viridia v. lutescenti-viridia rarius subglaucescentia. *Glandulæ* involucri nullæ, raro solitariæ. *Squamæ* interiores ± acutæ — obtusæ, exteriores sæpe valde obtusæ. *Flocci* densiusculi raro densi — sparsi.

a. *Squamæ* involucri exteriores breves — brevissimæ lineares sæpe latæ apice truncatæ v. rotundatæ, intermediæ obtusæ — obtusiusculæ et intimæ ± acutiusculæ longæ et fere æquilongæ, eglandulosæ (v. parce et inconspicue glandulosæ), ceterum ± pilosæ et ± densiuscule v. dense floccosæ.
Caulis 0—2-(ad summum 3-) folius. *Folia* basalia late ovata — ovato-lanceolata sparsim et late basi profundius dentata, lutescenti-viridia raro subglaucescentia breviter acuta. *Involucra* magna crassa *squamis* latis exterioribus præsertim valde obtusis.
4. *H.* **galbanum* Dahlst.

Caulis 2—7- v. multifolius. *Folia* basalia sat angusta ± lanceolata — ovato-lanceolata longiuscule acuta sat crebre — sparsius serrata — serrato-dentata basi ovata — truncata magis dentata — subincisa læte viridia v. lutescenti-viridia. *Involucra* mediocria v. parva subangusta *squamis* latis v. subangustis exterioribus obtusis v. obtusiusculis.
5. *H.* **variabile* Lönnr.

Caulis 5—6-folius. *Folia* basalia sat lata ± ovata sat crebre et late ± acute et æqualiter serrata — dentata ± saturate et obscure viridia, subtus ± violascentia. *Involucra* ± crassa et lata *squamis* latis omnibus v. plurimis obtusis — obtusiusculis.
6. *H.* **galbanifolium* Dahlst.

Caulis 2—5-folius. *Folia* basalia cordato-ovata — ovato-lanceolata dilute viridia dense late et crebre ad basin subincisa — pinnato-dentata breviter acuta. *Involucra* mediocria *squamis* angustis exterioribus obtusiusculis — obtusis.
7. *H.* **sublustre* K. Johanss.

b. *Squamæ* involucri exteriores obtusiusculæ — acutiusculæ sensim in intermedias obtusiusculas — acutiusculas et intimas acutas — cuspidatas abeuntes, rare v. sparsim et sæpe subinconspicue glandulosæ ± pilosæ et sparsim floccosæ.

Caulis 0—3(—5)-folius. *Folia* basalia læte gramineo-viridia (subtus interdum subglaucescentia) sat crebre et argute ad basin ± ovatam — descendentem inæqualiter et sæpe longe — longissime dentata — incisa ± ovato-lanceolata — lanceolata longe acuta. *Involucra* elongata.

8. *H. *exaltatum* Dahlst.

II. *Squamæ* involucri pilis sparsis — subdensis et glandulis parvis sparsis — densiusculis obsitæ ubique sparsim stellatæ floccis in marginibus raro paullo frequentioribus.

Caulis 1—4-folius. *Folia* basalia ± angusta elongata saturate et sæpe ± prasino-viridia supra ± maculata sat dense ± irregulariter et argute et ± anguste dentata. *Involucra* brevia ± densiuscule pilosa pilis dilutis ± longis glandulis parvis sparsioribus immixtis rare — sparsim stellata.

9. *H. *basifolium* (Fr.) Almqu.

Caulis 1—3-folius. *Folia* plerumque lata brevia breviter acute et sparsim basi haud multum dentata v. rarius inciso-dentata læte viridia supra haud maculata. *Involucra* brevia pilis brevibus obscuris vulgo sparsis et glandulis numero æquantibus v. frequentioribus obsita leviter stellata.

10. *H. *læticolor* Almqu.

1. **H. *cæsium** Fr.

H. vulgatum Fr. *β* H. cæsium Fr. Nov. Ed 1, p. 76 [1] — H. pallidum Fr. H. N: 13 : 17 — H. plumbeum Fr. Symb. pag 111 p. p., Summa Veg. Scand. p. 539 et H. N. 12 : 21 — H. angulare Fr. in Öfvers. af Kgl. Sv. Vet. Ak. Förh. 1856 p. 148 — H. bifidum Fr. Epicr. p. 93 p. p. (quoad spec. suecica). — H. bifidum Lbg. in Blytt Norges Flora p. 657 et *β* plumbeum Lbg. ibid. — H. bifidum Lbg. in Hn. Fl. ed 11 p. 45 et *β* plumbeum ibid. — H. bifidum Lönnr. in Resa i Smål. och på Gotl. p. 57. — H. plumbeum Fr. var. bifidum Norrl., Bidr. p. 102. — C. J. Lindeberg, Hier. Scand. exs. n. 34. — J. P. Norrlin, Hier exs. n. 125. — Dahlst., Hier exs., fasc. II. n. 48 et 49 (forma). — Dahlst., Herb. Hier. Scand., Cent. II, n:is 5, 6, 7, 8; Cent. III, n:o 91; Cent. IV, n:is 10, 11, 12.

[1] I Nov. Ed 1, part. V. s. 76, 1819, lyder diagnosen: ». . . . *β* H. cæsium. Caule unifolio subglabro, foliis petiolatis oblongis rectangulodentatis, subtus stellato-pilosis, pedunculis elongatis simplicibus, pilis calyc. eglandulosis.

In betuletis asperis ad Braås colore glauco eminus dignoscitur. Fol. caul. pinnatifidum.»

Caules 1 v. sæpe plures 35—50 ctm. alti firmi robusti, sæpe a medio v. a basi ramosi v. furcati, apice oligocephali, (0—) 1—3-folii, inferne rare — sparsim pilosi leviter stellati, superne subglabri et ± floccosi — sat tomentelli. *Folia basalia* in rosulam 3—5-foliam sæpius congesta læte — obscure glaucescentia — plumbea, supra obscuriora sæpissime purpureo-maculata glabra — subglabra, subtus dilutiora (cæsia) rare pilifera in nervo dorsali longe et sparsim pilosa sparsim — densiuscule v. sat dense floccosa, omnia firma et coriacea ± obtusa, exteriora ± ovata — ovato-ovalia, interiora ± ovata — lanceolata ± rhomboidea breviter — sat longe acuta basi ± abrupte contracta, cuneata v. ± descendente, ceterum forma et latitudine sat variantia, sparsim et vulgo ad medium acute longe et longissime sæpe grosse vulgo anguste dentata, dentibus 3—5 ± inæquilongis ± patentibus, petiolis sæpe valde (præsertim in superiore parte) alatis leviter et longe pilosis, marginibus rare v. sparsim ciliatis. *Folia caulina* vulgo angustiora longius acuta — cuspidata sessilia v. in petiolum alatum sensim descendentia, infimum sæpe ± petiolatum vulgo ad medium longe — longissime patenter 2—4-dentata, subtus sæpius dense floccosa parum v. vix pilosa. *Anthela* ± indeterminata furcata (— corymboso-furcata) v. subpaniculata simplex — subsimplex ramis et pedicellis ± longis summis ± superantibus rectis ± erecto-patentibus — erectis v. sat divaricatis acladioque (10—)20—50 mm. longo dense floccosis et pilis longis basi ± longa crassa nigra apice albidis solitariis — raris sub involucris sparsis obsitis sæpissime eglandulosis (apice 2—3-squamosis). *Involucra* sat alta ± lata ± atro — fusco-virentia v. sat virentia ± canula basi ± rotundato-truncata. *Squamæ* sat latæ ± imbricatæ, exteriores laxæ breviter acutæ, interiores sensim in apicem ± acutum — subulatum piceum fere nudum et vix comatum attenuatæ et flores virgineos longe — longissime superantes, pilis longis obscuris v. apice canescentibus sat densis glandulis nigris brevissimis crassis raris — sparsis obsitæ deorsum ubique sparsim — densiuscule ima basi squam. exteriorum sat dense floccosæ, ceterum rare — rarissime stellatæ — fere nudæ. *Calathidium* pallide — subobscure luteum. *Ligulæ* glabræ. Stylus luteus — subluteus v. subobscurus.

Inv. $\frac{12-14}{7-8}$, D. 45—50, L. m. 3—3,5 mm.

Denna form, hvilken i Skandinavien har en mycket vidsträckt utbredning, är på samma gång liksom så många andra former, hvilka äga en större spridning, i hög grad varierande. Öfverallt är den splittrad i en mängd svagare eller starkare utpräglade och m. l. m. utbredda varieteter eller raser, hvilka dessutom förete en mängd af ståndorten betingade modifikationer.

Utmärkande för flertalet former äro de oftast intensivt glaucescenta, fasta och läderartade bladen med glesa och få, utstående, ofta oliklånga och utdragna, spetsiga tänder och med lång, helbräddad, hvass spets, ända från basen eller åtminstone från öfversta stjelkbladet grenig stjelk, hvaremot sjelfva vippan är fåblomstrig med raka, oftast grofva grenar, stora och långa, mörka holkar, hvilka vid basen äro blåhvita af tätt, från de rikligt stjernludna skaften uppstigande ludd, men för öfrigt vanligen sparsamt stjernhåriga och i de långt utdragna, ofta sylhvassa och tjärfärgade fjällspetsarne äro nakna eller nästan nakna samt utan eller med mycket glesa hårtofsar och för öfrigt klädda af m. l. m. rikliga och långa,

vid sin bas m. l. m. långt upp mörka, tjocka hår och få eller enstaka, korta och grofva, vanligen föga märkbara glandler, samt slutligen stora och vida korgar. Bladen variera betydligt till bredden, från bredt äggrundt-rhomboidiska till smalt lancettlika, äfvensom till färgen från ljusare och intensivt glaucescenta till mörkare blygrå. Ofvantill äro de oftast, isynnerhet på soliga ställen, rikligt fläckiga. Den blygrå färgen framträder isynnerhet der underlaget är skiffer. Undersidan är ofta ljust till mörkt violettfärgad och vanligen rikligt stjernluden. Till bladens tandning varierar arten äfven ganska betydligt. Vanligen sitta tänderna glest med långa afstånd sinsemellan och äro än rätt utstående (hos bredare blad), än något framåtriktade (hos smalare blad). Än äro tänderna korta, än äro de mycket långa. Vanligen omvexla längre och kortare tänder oregelbundet med hvarandra; längst äro de vanligen vid basen af de inre och stjelkbladen. Stundom äro isynnerhet rosettbladen vinkliga eller nästan hela och ofta med endast en och annan långt utskjutande tand. På stjelkbladen äro tänderna oftast 2—3 på hvardera sidan. Ibland är tandningen dock rikare och tänderna mera krökta, isynnerhet vid bladbasen, hvilken då blir tätt och djupt flikad. Sådana exemplar påminna i habitus, genom mindre bladrik stjelk och ofta tvär eller stundom intryckt bladbas om en del former af *H.* **stenolepis*, med hvilken denna underart utan allt tvifvel är nära beslägtad. Andra former, isynnerhet sådana med mera mångbladig stjelk, hafva stelare och rakare tänder. Vanligen äro holkarne stora och långa med långt utdragna fjäll, men på en del trakter anträffas uteslutande för öfrigt alldeles normala exemplar med korta holkar, hvilka äga föga utdragna, vanligen spetsiga, men ibland mera trubbade fjäll. Dessa variera ganska mycket till basens bredd samt till färgen, svartbruna eller grönsvarta; stundom bli kanterna mycket bredt grönkantade. De mest smalfjälliga formerna påminna till holkarne mycket om *H.* **stenolepis*. Stjernluddet är hos former med mörka holkar föga synligt och framträder mest som ett blåhvitt ludd vid holkens bas. Hos en del nordliga, ljusholkiga former är det oftast rikligare. Ibland bli, isynnerhet på Gotlands kalkhedar, holkarne mörkt blygrå af ganska tätt stjernludd och fjällens mörka färg. Håren variera på holkarne rätt mycket i riklighet äfvensom till färgen, från nästan alldeles svarta till långt ned ljusspetsade, hvarigenom på olika lokaler ett ofta högst skiljaktigt utseende åstadkommes.

Som ett exempel på dess variabilitet inom ett högst inskränkt område må anföras följande. På fyra, närliggande ställen på Omberg i *Östergötland* förekommer arten i lika många olika hufvudmodifikationer, hvilka genom afvikande habitus och en ringa skillnad i ofvan anförda karaktärer i allmänhet lätt skiljas från hvarandra. De förekomma på silurkalk, lerskiffer, glimmerskiffer och granit eller gneis. Formerna från kalken och lerskiffern äro båda smalfjälliga, svagt stjernludna men ganska rikt och mörkt långhåriga. Den sist nämde har derjemte ovanligt små och korta holkar samt skarp, syllik tandning. Formen från glimmerskiffern har deremot stora holkar, hvilka äro glest håriga men deremot rikligare stjernludna. Formen från graniten eller gneisklipporna är öfverallt äfven på holkarne ytterst glatt. Jemför man former från mera från hvarandra aflägsna trakter kunna med lätthet ännu större differenser iakttagas. På *Gotland* hyser nästan hvarje om än i ringa mån afvikande lokal sin särskilda modifikation eller ras. I Östergötland förekommer ibland på gräsbackar en gråholkig form, hvilken i utseende är ganska afvikande från den vanliga på klippor och afsatser växande formen. En egendomlig form med ljusa, nästan gröna

holkar och bleka blad förekommer på strandremsan öster om Ar på *Gotland* och är märkvärdig för sin analogi med *H. *stenolepis* var. *littorale* och motsvarande former af andra arter [1], hvilka växa på samma lokal eller liknande ståndorter. De äro att tyda såsom ståndortsmodifikationer eller möjligen raser, framkallade af den egendomliga lokalen. På en del ställen synas, såsom är nämdt under *H *stenolepis*, direkta mellanformer till den senare förekomma. Det är dock äfven möjligt att de kunna anses såsom analoga modifikationer af båda arterna, frambragta af den gemensamma lokalen, hvilken, på grund af båda formernas nära slägtskap, påverkat dem på ett likartadt sätt. För öfrigt har *H. *cæsium* både habituella likheter och en och annan öfverensstämmelse i karaktärer med *H. *galbanum* och **H. porrigens*, hvilka äfven variera på analogt sätt.

Är i mer eller mindre afvikande lokalformer anträffad i *Östergötland*, öar i Vettern utanför Medevi (CEDERSTRÅLE); Winnerstads s:n. (A. HOLMGREN); Omberg vid Stocklycke, Mullskräerna, Anudden och Borghamn; V. Tollstads s:n, Hästholmen (förf.); Ödeshögs s:n, Orrnäs och Öninge (G. A:N MALME); Wist s:n, Hamra (förf.); Asby s:n, Bätterarp; Torpa s:n, Torpön [2] (A. HOLMGREN); Åtvids s:n, Åtvidaberg (förf.): *Småland*, Grenna (F. HAGSTRÖM); Hakarps s:n, Brunnstorp (J. E. ZETTERSTEDT); Marbäcks s:n, Stalpet (C. J. LINDEBERG); Drefs s:n Braås, m. fl. st. (G. E. HYLTÉN-CAVALLIUS): *Gotland*, Fleringe s:n, Hau i Ar, Angelbos, Fårösund (S. ALMQUIST); Rute s:n, Vidangen och mellan Gerungs och Risungs (K. J. LÖNNROTH); Bunge s:n, vid strandvägen söder om Fårösund, mellan Stux och Utbunge (K. J. LÖNNROTH); Visby flerestädes allmän (V. B. WITTROCK, K. J. LÖNNROTH, K. JOHANSSON m. fl.); Sanda s:n, Westergarn m. fl. st. (K. J. LÖNNROTH); Klinte s:n, Valla, Klintehamn m. fl. st. (K. J. LÖNNROTH); Fröjels s:n mellan Stenstuga och Gamnarfve (K. J. LÖNNROTH): *Blekinge*, Boråkra (H. G. LÜBECK); Vämö (K. FR. THEDENIUS). — Utom området funnen i *Skåne*, Stenshufvud vid Cimbrishamn (G. A:N MALME, M. ENGSTEDT); Gladsax hallar (G. A:N MALME); Kullaberg (R. WALLENGREN): *Westergötland*, Lilleskog (O. HAGSTRÖM): *Bohuslän*, Marstrand, Elgö, Fiskebäckskil (S. ALMQUIST): *Gestrikland*, Gefle på fl. st. (C. O. SCHLYTER och S. ALMQUIST): *Helsingland*, Söderhamn (A. MAGNUSSON): *Medelpad*, Sundsvall (O. JUEL): *Herjedalen*, Funnäsdalsberget (R. F. FRISTEDT): *Jemtland*, Åre, Åreskutan på Tottbacken m. fl. st. (S. ALMQUIST, J. P. NORRLIN, C. BRANDEL, A. MAGNUSSON m. fl.); *Storlien* (S. ALMQUIST): *Vesterbotten*, Umeå, Koddis (N. L. ANDERSSON). — I *Norge* funnen i Kristianiatrakten såsom på Malmön och vid Bygdö (förf.); Ormön (J. E. ZETTERSTEDT); Valders, Helinstranden (FR. AHLBERG); Rise (S. ALMQUIST); Throndhjem (E. ALMQUIST); Hladehammeren (SCHLEGEL och ARNELL); Udö lotsstation (A. BERLIN); Guldalen, Nyhus och Melhus (E. ADLERZ); Dovre (FR. AHLBERG); Finnmarken, Nyborg (TH. M. FRIES). — För öfrigt enligt J. P. NORRLIN (Herb. Mus. Fenn.) anträffad i sydvestra *Finland*. — *Danmark*, Möen (O. GELERT). — H. *plumbeum FR. [3], hvilken endast är en något utpräglad ras eller svagare varietet, är ej i typisk gestalt anträffad inom området. Deremot närma sig många skifferformer t. ex från Omberg densamma i hög grad, hvarför det är troligt att den mest utpräglade karaktären hos densamma, blygrå blad, är att i väsentlig mån härleda från ståndorten.

En annan ytterlighetsform, hvilken måhända ej uppkommit genom ståndorten, är:

b *approximans* n. forma. — H. approximatum Lüb. in sched.

Holkarne hos denna form äro smärre, mycket gröna, stjernhåriga och jemte skaften långt men glest och krusigt hvithåriga. Fjällen äro kortare och bredare med nakna, mörka fjällspetsar. Bladen äro grönare, undertill mindre blåaktiga, för öfrigt till formen och tandningen liknande hufvudformens. Stjelkbladen vanligen 1—2. Stift temligen mörka.

[1] Sådana modifikationer äro anträffade på samma lokal af *H. *exaltatum*, *H. *opacum*, *H. *variabile* och *H. cæsiomurorum*.

[2] H. angulare FR. i Vet. Ak. Förh. 1856.

[3] Kristianiatrakten äger en fullkomligt analog form af *H. *stenolepis*, hvilken nog ingår i *H. *plumbeum* FR. Symb.

Denna form, hvilken anträffats i *Blekinge* vid Borákra, bibehåller vid odling (enl. explr. i Lönnr. herb., meddelade af H. G. Lübeck) alla sina karaktärer. Den är anmärkningsvärd, emedan den i flera afseenden, isynnerhet till holkarnes utseende, delvis äfven i bladform och färg samt habitus, rätt mycket liknar *H. *basifolium*, från hvilken den dock är lätt skild genom sina öfriga, *H. *cæsium* tillkommande karaktärer. — På Gotland äro här och der anträffade modifikationer, hvilka tendera åt nyssnämda form, och i Kristianiatrakten har jag insamlat grönare skuggformer, hvilka påminna om i deras sällskap växande *H. *basifolium*. *H. *cæsium* väljer helst bergsspringor eller öppna, grusiga och steniga, växtfattiga ställen och afsatser på berg vid eller i närheten af sjöstränder; sällan träffas den på torrare gräsbackar eller liknande lokaler. Trifves väl på eller synes föredraga siluriska formationens bergarter, kalken och skiffrarne.

En mera anmärkningsvärd och bättre utpräglad form är:
β chondrodes n. var.

Caulis altus — elatus plerumque e basi divaricato-ramosus, apice paniculato-corymbosus oligocephalus, 4—5-folius, basi rare pilosus v. subglaber, ceterum glaber, sparsim stellatus et superne ± floccosus — subtomentellus. *Folia* intense glaucescentia rare — sparsim pilosa et in utraque pagina sparsim floccosa, basalia exteriora ± ovali-elliptica, interiora ± late — anguste lanceolata, intima in apicem acutum integrum longe protracta ± longe paucidentata basi ± cuneata — longe descendentia; *caulina* in bracteas sat sensim decrescentia, superiora sessilia ± patentia, infimum ± petiolatum v. sessile, e basi latiore ± lanceolata — linearia sursum magis magisque angustata, plerumque longe vel longissime et patenter 3—4-dentata in apicem ± longum acutum — cuspidatum integrum angustata, omnia coriacea v. chondroidea. *Anthela* fere simplex indeterminata ramis mediocribus ± erectis — patentibus acladioque 10—30 mm. longo dense canofloccosis sed epilosis et eglandulosis. *Involucra* parva obscure plumbeo-virescentia sat crassa subcylindrica basi lata truncato-rotundata. *Squamæ* breves latæ e viridi fusconigræ, interiores marginibus ± fuscovirentes sensim in apicem breviter acutum v. obtusiusculum plerumque leviter albocomatum attenuatæ ubique sparsim stellatæ basi sat dense floccis cæsio-albidæ, ceterum rare v. parce pilosæ v. fere epilosæ numquam v. vix glandulosæ. *Calathidium* sat læte luteum. *Ligulæ* glabræ. *Stylus* vivus et siccus luteo-fuscescens.

Inv. $\frac{8-9}{4,5-5,5}$, D. 25—30, Lm. 2—2,5 mm.

En synnerligen märkvärdig form, hvilken, ehuru tydligen beslägtad med föregående och hörande till dess variationskrets, i många afseenden afviker från densamma i en sjelfständig rigtning och nog torde förtjena rang af underart. Utmärkt genom sin flerbladiga, spensligare stjelk med utspärrade, vanligen ända från basen utgående, flerbladiga grenar, som småningom öfvergå i inflorescensens, hvilka åter äro jemförelsevis korta, raka, upprätta till utspärrade, vanligen enblomstriga och ljusgrå af rikt stjernludd men utan glandler och hår, genom korta, breda, cylindriska holkar med rundadt tvär bas och breda, vanligen något trubbiga och oftast ytterst glest hvithåriga, m. l. m. stjernhåriga fjäll (hufvudsakligast vid de yttres bas) samt korta blommor. Basalbladen äro vid blomningen afvissnade eller

fåtaliga (1—3), vanligen med grund och gles men ganska skarp tandning, oftast smala och spetsiga. Stjelkbladen, af hvilka det nedersta vanligen är skaftadt med vigglikt nedlöpande, fåtandad bas, aftaga småningom uppåt i längd och bredd, äga alla långt utdragen, m. l. m. helbräddad spets och äro till eller något öfver midten försedda med 2—4 glest sittande (ända till 10 mm. långa), m. l. m. vinkelrätt utstående, från skifvan skarpt afsatta tänder eller flikar. De öfre äro vanligen utstående och hafva ofta utböjd, veckad spets. För öfrigt äro bladen fasta och läderartade eller broskartade. Den glaucescenta färgen skiftar ofta i m. l. m. grågrönt. Ofvantill äro de oftast, isynnerhet basalbladen, lifligt och rikligt purpurfärgade och hafva på båda sidor sparsamt, eller på stjelkbladen rikligare stjernludd. De mörka holkarne få genom det blåaktiga, vid basen alltid rikliga stjernluddet en svartaktigt blygrå färgton, hvilken förlänar dem ett ganska karaktäristiskt utseende. Genom den tvära basen och holkarnas cylindriska form samt de jemförelsevis tilltryckta eller föga utstående fjällen, af hvilka de yttre ej nedstiga på skaften, får den ett utseende, hvilket högst betydligt afviker från hufvudformens, hvartill bidraga de blåhvita, alldeles hårlösa skaften.

Denna form är alldeles analog med *H. *variabilis* mera förgrenade former. Här må äfven nämnas, att flera andra former tillhörande *Cæsia* på Gotland uppträda med liknande habitus.

Anträffad på *Gotland* vid Gerungs och Risungs i Rute s:n, dels på öppna åkerrenar dels i lundar (K. J. Lönnroth).

5. **H. *ravusculum** *n. subsp.*

Dahlst., Hier. exs., fasc., II, n. 50. — Dahlst., Herb. Hier. scand., Cent II, n. 9.

Caulis mediocris apice oligocephalus 1—2-folius, inferne coloratus sparsim — sat densiuscule pilosus leviter stellatus, superne parce pilosus — subglaber et sparsim floccosus — sat tomentellus. *Folia basalia* viridi-glaucescentia, exteriora ± ovalia obtusa mucronata denticulata — paucidentata, intermedia ± anguste ovata — lanceolata sat acuta sparsim et minute — sat longe ad basin sæpe anguste et subulate dentata, intimum ± lanceolatum longius et subinæqualiter paucidentatum sat longe cuspidatum, interiora supra medium ± integra, omnia basi ± longe descendentia haud raro rotundata — subobtusa, supra subglabra et sæpe maculata, subtus rare — sparsim in costa sat dense floccosa sæpius densiuscule pilosa, marginibus sparse — densiuscule ciliata, petiolis coloratis pilis sat longis subdensis vestitis. *Folia caulina* 1—2 ovate — anguste lanceolata — linearia in apicem ± longum integrum cuspidatum contracta, infimum ± petiolatum basi ± lata — angusta cuneata inæqualiter et sæpe longe et acute dentatum, ceterum vulgo fere edentatum, summum sessile, omnia subtus sat floccosa. *Anthela* sat discreta simplex — subsimplex ramis longis ± rectis erecto-patentibus — sat erectis acladium 20—50 mm. longum ± superantibus, inferne virentibus sat stellatis, superne floccis densis ± cæsio-albidis eglandulosis et pæne epilosis. *Involucra* grisea v. griseo-plumbea sat elongata ± crassa basi ± ovato-rotundata. *Squamæ* e basi sat lata lanceolato-

lineares in apicem ± longum livido-piceum acutum — cuspidatum leviter stellatum — subnudum et levissime comatum æqualiter attenuatæ, flores virgineos longe superantes, undique cano- v. albido-floccosæ et pilis sparsis v. raris mollibus vestitæ. *Calathidium* saturate luteum sat plenum. *Ligulæ* glabræ. *Stylus* ± fuscus, siccus nigricans.

Inv. $\frac{10—12}{5—7}$, D. 35—40, L. m. 3 mm.

En mycket karaktäristisk form, som är lätt igenkänd på sina stora och temligen tjocka, gleshåriga, ljusgrå till blygrå holkar, hvilka öfverallt äro klädda af rikligt, blåaktigt stjernludd, långa öfverskjutande fjäll, hvilka från bredare bas jemt afsmalna i en spetsig eller syllik, föga eller knappt hårtofsad, stundom nästan naken, kolorerad udd, gles- men långtandade (isynnerhet vid basen), grönaktigt glaucescenta, temligen glatta, men undertill rätt stjernludna, ofta purpurfärgade blad, af hvilka de inre och stjelkbladen äga en vanligen långt utdragen, helbräddad spets, samt täta korgar och m. l. m. mörka stift. Bladen äro än ofvantill mörkare gröna än mera glaucescenta, undertill blekare blågröna, men denna färg döljes ofta af en öfver hela undersidan utbredd, djupt violett färg. Ofvantill äro de vanligen m. l. m. rikligt mörkfläckiga. Bladens tandning liknar den hos *H. *cæsium* men är ofta mera framåtriktad utom vid basen, der den är mera utstående eller någongång svagt bakåtriktad. Tänderna sitta här ofta, isynnerhet på de inre rosettbladen och stjelkbladet, tätare och äro mera oregelbundna samt ofta långa, smala och krökta. Basen är vanligen m. l. m. vigglik och nedlöpande, stundom hos de inre rosettbladen och stjelkbladen nästan tvär, i hvilket fall basaltänderna ofta bli olikstora och tätare samt några eller en och annan af dem bakåtriktad. Häri ligger en antydan om slägtskap med *Subcæsia*, bland hvilka den äfven fullkomligt motsvarar *H. *sublividum*, med hvilken den har många likheter i bladfärg, egendomligheter i tandning, öfversidans fläckighet o. s. v., men isynnerhet till holkarnes form och beklädnad, hvari båda formerna ofta i förvillande grad likna hvarandra. Ofta ligger den enda skillnaden med afseende på holkarne i deras större bredd och de talrikare fjällen hos *H. *ravusculum* i motsats till de smala holkarne med färre fjäll hos *H. *sublividum*. Habituelt skiljas de lätt genom den förres anslutning till *cæsium*- den sednares till *silvaticum*-typen i anseende till bladbasens form och tandning samt stjelkbladens utseende och vidfästning m. m.

För öfrigt är denna form otvifvelaktigt nära beslägtad med *H. *cæsium*, om hvars till holkarne mera stjernhåriga former den ganska mycket erinrar. Den påminner ej heller så litet om *H. *violaceum* Lbg. (Hier. Sc. exs. n. 67 och Hn. Fl. ed 11.), med hvilken den tydligen är beslägtad, och hvilken väsentligen endast skiljer sig genom mörkare holkar med bredare fjäll samt gula stift.

Anträffad i *Östergötland* Sunds s:n, Sundsö talrikt (förf.): *Småland*, Wisingsö, Haga (J. E. ZETTERSTEDT); på Grennaplatån (F. HAGSTRÖM); Forserum s:n, Runseryd (K. JOHANSSON) samt Gärdserum s:n, Bossgård (förf.).

I närheten af denna står en annan mycket anmärkningsvärd form, hvilken tills vidare uppställes som varietet:

β **subcanitiosum** *n. var.*

Caulis gracilior et sæpe elatior quam in præcedente, (1—)2 —3-folius, inferne violaceus ± pilosus et sat stellatus, superne sat dense floccosus — sat tomentosus. *Folia rosularia* tenuia læte viridi-glaucescentia latiora plerumque elliptica v. ovata — ovato-lanceolata extimis obtusis exceptis ± acuta — cuspidata minute — mediocriter ± æqualiter et acute sparsi-dentata, summo apice integra, supra breviter et sparsim — densiuscule pilosa, subtus sparsim in nervo dorsali dense floccoso densiuscule et sat longe pilosa, ceterum rare — sparsim stellata, marginibus pilis sparsis — densiusculis ciliata petiolisque molliter et longe sæpe sat dense villosula. *Folia caulina* inferiora v. infimum ± (sæpe sat longe) petiolata ovato-lanceolata basi ± cuneata — abrupte contracta v. subtruncata, summum v. summa sessilia magis lanceolata, omnia ± longe acuta — cuspidata sat æqualiter et sat argute ad basin sæpe densius dentata, subtus ± floccosa, supra præsertim ad margines rare — rarissime stellata. *Anthela* discreta paniculata — furcata vulgo sat simplex ramis sat longis rectis et ± erectis — sat patentibus acladioque 15—40 mm. longo ± dense albidofloccosis eglandulosis et fere epilosis. *Involucra* sat elongata gracilia e viridi læte grisea — albescentia basi ± ovato-conica in petiolo superne incrassato et ± squamifero ± descendentia. *Squamæ* livido-virescentes e basi lata æqualiter in apicem ± coloratum acutum — cuspidatum angustatæ ± longe porrectæ dense — densissime albido-floccosæ et pilis mollibus plerumque raris adspersæ. *Calathidium* læte luteum sat radians. *Stylus* vivus luteus — subluteus, siccus subobscurus. *Ligulæ* glabræ.

Inv. $\frac{10—12}{5—6,}$ D. c. 35., L. m. 2,5—3 mm.

Står ganska nära föregående, från hvilken den utmärker sig genom de ljust perlgrå till gråhvita, jemförelsevis smala holkarne, klädda af betydligt tätare stjernludd, genom hvilket fjällens m. l. m. brunaktigt gröna färg, isynnerhet uppåt, m. l. m. tydligt framskimrar, genom från bredare bas afsmalnande och öfverskjutande, spetsiga till sylspetsade, jemförelsevis längre fjäll, hvilka äfven äro klädda af mjukare och glesare, ljusa hår, genom ljust och lifligt, i blåaktigt stötande, gröna blad af elliptiskt-äggrund form med jemnare, oftast tätare och skarpare, något framåtrigtad, vanligen ej lång tandning samt genom glesare korgar och ljusare, oftast gula stift. Bladen, hvilka aldrig äro fläckiga på öfversidan, hafva vanligen nedlöpande eller vigglik bas, men tendera stundom att erhålla bredare och tvär eller rundad bas med något ojemna, tätare och krökta, utåt eller stundom något bakåt rigtade tänder. För öfrigt är tandningen i allmänhet rak, ej så lång som hos föregående, på de yttre eller alla rosettbladen gles, eljest tätare. Ibland äro stjelkbladen, isynnerhet hos bredbladigare individ, temligen tättsågade. Vanligen är åtminstone öfre tredjedelen af bladet helbräddad. Bladskaften, hvilka äro smala men uppåt mot den vigglika bladbasen allt mera vingade, samt stjelkens nedre del äro såsom hos föregående purpurfärgade, men af ljusare och klarare färg. Med *H.* **canitiosum* har denna form en utomordentlig

likhet till beklädnaden och den häraf framkallade färgen på holkarne samt till formen på holkbasen, hvilken på samma sätt öfvergår i det upptill förtjockade och fjälliga holkskaftet. Dessa båda former förhålla sig nästan fullkomligt på samma sätt till hvarandra som *H.* **ravusculum* förhåller sig till *H.* **sublividum*, men ehuru de till holkarne äro ännu mera lika hvarandra än de sistnämda sinsemellan, är skillnaden mellan dem med afseende på den morfologiska utbildningen större. *H.* **canitiosum* representerar vida fullkomligare *silvaticum*-typen än *H.* **sublividum*, hvaremot förhandenvarande form går något utöfver den egentliga *cæsium*-typen, hvilket *H.* **ravusculum* sällan gör, och närmar sig genom sin flerbladiga stjelk mycket till *vulgatum*-typen.

Med följande form är den mycket nära beslägtad och stundom svår att skilja derifrån samt torde sannolikt på en och annan lokal vara genom mellanformer förenad med den.

Anträffad endast i *Östergötland* i N. Vi s:n Siggemålen och Kärremåla (på sista stället i sällskap med typiska former af följande underart jemte spridda, som det synes, mellanformer); Sunds s:n, Rödkulla och Löfåsa (på sista stället utan medelformer tillsammans med en vida afvikande form af följande) samt i Wist s:n, Wessentorp (förf.).

3. **H. *fraudulentum** *n. subsp.*

DAHLST., Hier. exs., fasc. I, n. 77, n. 78 (forma.)

Caulis elatus gracilis apice paniculatus v. a medio ramosus, 2—5-folius, inferne pilis longis sparsis — frequentioribus obsitus rare — rarissime stellatus, superne leviter floccosus apice subtomentellus. *Folia basalia* pauca — plurima, saturate prasino-viridia, subtus pallidiora sparsim pilosa leviter stellata in nervo dorsali densius pilosa et stellata, marginibus sparsim (— densiuscule) et breviter ciliata, petiolis brevibus — mediocribus ± coloratis molliter et longe sparsim — subdensiuscule pilosis, exteriora ± ovalia — ovali-lingulata v. elliptica subintegra — denticulata, interioria ± late — anguste elliptico-lanceolata — oblonga sat acuta — longe acuta sparsim et acute minute — sat longe et regulariter dentata, interiora ± lanceolata longe acuta ± longe paucidentata — sat dentata. *Folia caulina* vulgo plurima ± ovato-lanceolata — anguste lanceolata superiore parte integra, ceterum subintegra v. ad basin longe dentata v. ad medium sparsim (dentibus 3—4) et longe — longissime dentata, infimum ± petiolatum, reliqua sessilia, subtus magis floccosa. *Anthela* ± composita ramoso-paniculata indeterminata v. subsimplex furcato-paniculata determinata ramis plerumque gracilibus rectis v. levissime curvatis erecto-patentibus — sat divaricatis plerumque valde superantibus, pedicellis mediocribus sæpe gracillimis acladioque 20—40 mm. longo virentibus sat dense floccosis parum — sparsim pilosis eglandulosis. *Involucra* parva gracilia fusco-virentia basi ± rotundata v. in statu juniore in pedicellum apice leviter incrassatum squamatum ± abeuntia. *Squamæ* angustæ — latiusculæ e basi latiore in apicem acutiusculum — subulatum obscuriorem ± denudatum et parum v. vix comatum angustatæ haud multum v. sat protractæ, rare — sparsim ad basin magis stellatæ et pilis longis albis tenellis ± sparsis et glandulis solitariis — paucis

minutis obtectæ. *Calathidium* ± luteum sat radians. *Ligulæ* glabræ. *Stylus* vivus (subluteus —) fuscus, siccus sat obscurus.

Inv. $\frac{8-10}{4-5}$ D. 30—35, L. m. 2,5 mm.

Utmärkt af sin oftast flerbladiga, temligen fina stjelk, mestadels rent gröna, vanligen glestandade blad med kortare (på rosettbladen) eller längre till ganska långa (på stjelkbladen), vanligen smala och skarpa, utåt eller framåt rigtade, temligen jemt fördelade, något ofvan eller vid midten upphörande tänder, temligen sammansatt, obegränsad eller stundom nästan enkel inflorescens med vanligen fina grenar och skaft samt små ljusare eller mörkare, brungröna holkar med glest stjernludd och glesa, fina, mjuka hår jemte få inblandade, små glandler, hvilka ofta med svårighet kunna upptäckas, samt jemförelsevis smala fjäll, hvilka äro utdragna i en smal och mörkare, nästan naken och hårlös spets.

Står mycket nära föregående, i hvilken som det synes den på en del ställen öfvergår. Med denna har den flera likheter till holkarne såsom de spetsiga fjällen, beklädnaden, at hvilken dock stjernluddet är betydligt sparsammare fastän på samma sätt fördeladt, holkbasens form (något nedlöpande hos yngre holkar) o. s. v. Mest lika föregående till holkarna äro de bredbladiga formerna, hvilka derjemte äfven i bladformen och tandningen likna densamma. Det är till dessa mellanformerna till föregående ansluta sig. Från dessa former med bredare blad äro andra former med smala, mera lancettlika, nästan helbräddade eller grundt och glest tandade blad, isynnerhet hvad beträffar rosettbladen, samt få stjelkblad (oftast 1—2) och gles vippa med mörkare och större holkar, hvilka hafva bredare fjäll, rätt betydligt skilda, men de sammanbindas med de förra genom former, intermediära till habitus och karaktärer. Frodigare exemplar af dessa hafva alla bladen eller åtminstone stjelkbladen, hvilka ofta äro många, försedda med glesa, långa och smala tänder. Dessa former äro ofta mycket greniga och rikblomstriga samt hafva smärre holkar med smalare fjäll och hafva mera *vulgatum*- än *cæsium*-habitus ju rikare inflorescesen är. Exemplar med breda blad hafva isynnerhet på stjelkbladen tätare och oregelbundnare tandning. Stjelkbasen, bladskaften och medelnerven äro oftast lifligt purpurfärgade och stundom äro bladen isynnerhet på fuktiga ställen fläckvis eller mot spetsen på båda sidor blodfärgade, hvilken färg dock torde ha en annan orsak än den vanliga, äfven hos denna på undersidan ofta utvecklade purpur- eller lefverfärgen.

Anträffad hufvudsakligast i skuggigare och fuktigare skogsängar på våta tufvor eller utefter mosskanter, mindre ofta på torrare mark.

Till denna ansluter sig en form från *Norge*, Torpen, Engejordet, hvilken ej är fullt identisk, men hufvudsakligen endast afviker genom ofta smalare och mera oregelbundet fliktandade blad (isynnerhet vid basen), ehuru den äfven varierar med nästan hela eller glesare, kortare och mera regelbundet tandade blad, som äro mera grågröna, genom något bredare, grönare holkfjäll med kortare spets, klädda af kortare hår och mera synligt, blåaktigt stjernludd, samt möjligen något mörkare korgar. Den växte på liknande ståndorter som den svenska formen.

Hufvudformen har jag anträffat i *Östergötland*, Sunds s:n, Löfåsa på flera ställen (lågväxt helbladigare), N. Vi s:n, Kärremåla och Siggemålen rikligt (på förra stället mången gång i sällskap med *β subcanitiosum* af föregående).

4. **H. *galbanum** *n. subsp.*

DAHLST., Hier exs., fasc. I, n. 70, 71. — DAHLST., Herb. Hier. Scand., Cent II, n. 10—12, n. 13—19 (modif. & formæ), Cent. III, n. 80, Cent. V, n. 53 (modif.).

Caulis mediocris — sat altus robustus — sat gracilis 0—3-folius, apice ± furcatus v. (a medio) ramoso-paniculatus, inferne sparsim — sat dense pilosus leviter stellatus, superne rare pilosus ± floccosus — tomentellus. *Folia basalia* pauca 2—5 ± firma lutescenti-viridia v. raro subglaucescentia — subprasina, exteriora ovalia — ovata vulgo sparsim et late dentata ± obtusa basi contracta v. rotundato-truncata, intermedia ± ovata — ovato-lanceolata late et breviter v. anguste et longe ± æqualiter basi magis irregulariter et profundius dentata ± acuta, interiora ± ovato-lanceolata — lanceolata vulgo longe acuta sparsim et inæqualiter ± longe dentata, basi cuneata v. abrupta — oblique cordata et dentibus nunc valde patentibus v. ad basin ± reversis nunc antrorsum versis, supra brevissime pilosa — subglabra, subtus pilis ± longis sparsis — densiusculis in nervo dorsali sat floccoso longioribus et densioribus obtecta, marginibus sat longe et densiuscule ciliata, petiolis brevibus — mediocribus pilis mollibus sat densis obtectis. *Folia caulina* omnia sessilia v. infimum petiolatum late ovato-lanceolata (v. ovata) — anguste lanceolata basi vulgo ± cuneata v. ± truncata raro (in infimo) subcordata ± acuta — cuspidata nunc regulariter nunc ± irregulariter sparsim — sat crebre longe et angustissime — breviter et late dentata raro crebre inciso-dentata. *Anthela* nunc ± furcata simplex — subsimplex magis ramosa acladio longo — longissimo (50—90 mm.) ramis ± divaricatis — suberectis, nunc valde divaricato-ramosa v. ramoso-paniculata ramis valde patentibus ± arcuatis acladio breviore 5—15 mm. longo determinata v. indeterminata, ramis sparsim — densiuscule pedicellisque brevibus — sat longis ± dense et laxe canofloccosis — tomentosis et pilis mollibus subobscuris — canis ± longis raris — densiusculis obtectis. *Involucra* mediocria — magna brevia — sat elongata crassa — sat gracilia nunc canescentia valde variegata nunc viridia — fuscoviridia nunc atro-viridia — fusco-atra basi ± ovata — rotundata postea ± truncata. *Squamæ* ± irregulariter imbricatæ latiusculæ — latissimæ, exteriores brevissimæ v. breves lineares apice obtuso — truncato ± comato, interiores e basi lata abrupte v. parum in apicem obtusiusculum — obtusum v. truncatum attenuatæ ± comatæ, ubique valde et laxe canofloccosæ v. dorso rare — sparsim stellatæ — subnudæ marginibus floccis sparsis — densis laxis anguste — late limbatis, et pilis ± longis tenuibus canis v. e basi ± longa crassa nigricante apice canescentibus sparsis — densis obtectæ eglandulosæ v. glandulis minutis solitariis vulgo vix conspicuis (præcipue ad basin squ. exteriorum) obsitæ. *Calathidium* saturate luteum vulgo subdensum. *Ligulæ* apice glabræ. *Stylus* luteus v. leviter fuscescens, siccus interdum sat obscurus.

Inv. $\frac{10—14}{5—8}$, D. 30—40(-45), L. m. 2,5—3 mm.

En i högsta grad variabel form och derföre svår att karakterisera. Mest utmärkande för densamma äro breda, glestandade, gulaktigt gröna blad med vanligen breda men spetsiga, oftast vinkelrätt utstående eller svagt framåtriktade tänder och oftast af bredt äggrundt-lancettlik eller äggrund form, vanligen stora eller åtminstone grofva holkar med breda, mer eller mindre trubbiga, hårtofsade, glest till tätt stjernludna fjäll, hvilka dessutom äro klädda af mer eller mindre långa, till större eller mindre delen af sin längd hvita hår (vanligen med grof svart bas), samt temligen täta, mörka, gula korgar med ljusa, mera sällan något mörka stift. Serdeles karakteristiska äro de yttre fjällen, hvilka genom sin breda, trubbiga eller tvära och hårtofsade spets afvika från de öfre fjällens grönaktiga eller mörka grund. Häri framträder (oafsedt andra likheter) isynnerhet dess slägtskap med *H.* **cæsiiflorum*. Inflorescensen vexlar från nästan gaffelgrenad, fåblomstrig med långt akladium och vidt utspärrade eller mera upprätta, raka eller mot toppen något böjda grenar till rikt och utspärradt grenig och vanligen nedåt obegränsad eller stundom mera sammanträngd, kvastlik, ej sällan låg och vid med utspärrade och isynnerhet uppåt bågböjda grenar samt kort akladium. Äfven häri visar denna form på en gång slägtskap och analogi med *H.* **cæsiiflorum*, hvars inflorescens är på samma sätt vexlande till byggnaden (jfr. hufvudformen och var. *galbaniforme*). Stjelken varierar i hög grad, grof till späd, låg eller hög, bladlös eller med ända till 3, stundom flera stjelkblad. Dessa liksom rosettbladen variera betydligt till formen, från äggrunda till smalt lancettlika, och äfven till tandningen. Än är denna gles, jemn, rak och bred, än smal och hvass, oftast regelbunden och utstående, men stundom oregelbunden, isynnerhet på stjelkbladen; och hos former med bredare blad, framförallt då bladbasen tenderar till eller är tvär eller svagt intryckt eller hjertlik, bli tänderna isynnerhet vid basen tätare och ofta djupare samt mer eller mindre bakåtböjda och i spetsen krökta, allt karaktärer, hvilka påminna om *silvaticum*-typen och ytterligare ådagalägga denna forms slägtskap med *H.* **cæsiiflorum*. Då endast ett stjelkblad utvecklas, är det antingen skaftadt (stundom långt) och har ofta tvär eller intryckt bas, eller oskaftadt med nedlöpande bas. Då flera stjelkblad äro utbildade, är det nedre vanligen skaftadt hos bredbladiga former, hos smalbladiga former deremot äro oftast alla oskaftade. Men oafsedt dessa förändringar, hvilka ej synas stå i något bestämdt samband med förändringarne i öfriga karaktärer, varierar denna underart i andra afseenden ofantligt. Dels synes den vara mycket känslig för ståndortens inflytande, så att hvar och en hyser sin serskilda, i något afseende utmärkande modifikation, dels synes den vara splittrad i en mängd svaga varieteter eller raser, af hvilka hvarje trakt synes ha någon, som förherrskar. Att döma af förekomsten af två eller flera lätt igenkänliga former jemte hvarandra på samma trakt äro en del ganska utpräglade, men på andra lokaler öfvergå former, som på vissa orter äro skilda, utan gräns i hvarandra eller i former från närliggande trakter, hvilket förhållande jemte den stora vexlingen af ståndortsmodifikationer gör det omöjligt och ändamålslöst att strängt begränsa dessa former. Dock vill jag här angifva de vanligaste förändringarne, hvilka (vare sig de äro att betrakta som modifikationer eller varieteter) träffa isynnerhet holkarne, och hvilka på många sätt äro kombinerade med de förut omtalade variationerna i örtståndet.

Allmännast åtminstone i Östergötland äro modifikationer (*f. fuscovirens*) med medelstora holkar af orent (ljusare eller mörkare) grönsvart till grönbrun färg, derigenom att de inre fjällen äro bredt och dunkelt grönkantade, de yttre mörkare, alla klädda af glest, mot kanterna och basen tätare tilltryckt ludd. Dessa modifikationer öfvergå dels i sådana med kortare holkar, hvilka äro mera brokiga genom rikligt ludd i fjällens kanter (f. *variegatum*), och hvilka dessutom oftast hafva mera grenig, hopträngd och utspärrad kvast, dels i modifikationer med långa och tjocka, grå till blygrå holkar med långa fjäll, klädda af öfverallt jemt spridt (mot kanterna dock vanligen något tätare) stjernludd (f. *canum*), dels i en form med mörkt svartgröna till svartbruna, stora och grofva holkar med mycket breda, i spetsen oftast tvärhuggna fjäll, klädda af fint, mot kanterna mera samladt stjernludd, hvilket än är föga synligt, än genom sin ljusa färg förlänar holkarne genom afbrottet mot den svarta eller svartbruna grundfärgen ett karaktäristiskt brokigt utseende (f. *atrum*). Denna form är vanligen låg och grofväxt samt är oftast på holkarne och skaften ganska rikt och groft mörkhårig. Habituelt är den af ett ganska distinkt utseende och torde nog vara en svagare markerad ras. Vid Bossgård i Wäderstads s:n anträffades den i sällskap med f. *canum*, hvilken den i habitus var alldeles lik, men utan mellanformer till denna och kunde redan på något afstånd igenkännas på holkarnes färg. Har vanligen äfven föga eller jemt och glest tandade till vinkliga blad. På andra ställen såsom på Gotland, der den derjemte på holkarne stundom blir ännu mera rikhårig och stundom får mera oregelbundet och djupt inskurna blad, mången gång med bladbas, påminnande om *silvaticum*-typen, öfvergår den deremot dels i en mera gråholkig och rikhårig, vanligen smalbladigare form, hvilken ibland närmar sig f. *obscurans* af följande underart, dels ehuru mindre tydligt i *β divaricans* af denna underart. Utan kännedom om de otaliga modifikationer, hvilka förbinda ifrågavarande underarts ytterlighetsformer med hvarandra, torde det sannolikt ej i första ögonblicket falla någon in att sätta f. *atrum* i närmare samband med en annan ytterlighetsform, utmärkt af temligen små och korta, genom det rikliga, ljusa, mot kanterna tätare stjernluddet ljusgrått brokiga holkar, hvilka genom stjernluddets lösa beskaffenhet derjemte få ett egendomligt luddigt utseende, men andra former med allt mindre luddiga holkar förmedla öfvergången. Denna form (f. *cinerascens*), hvilken till holkarne är analog och förvillande lik hufvudformen af *H. *variabile*, är måhända dock något mera än en blott modifikation. Likväl framgår af analogien med andra arter och af förhållandet mellan denna underarts olika former, att dessa förändringar i utseendet hos holkarne, hvilket framkallas hufvudsakligast genom så ringa hjelpmedel som stjernluddets större eller mindre riklighet eller dess tydligare framträdande eller fördelning, dess storlek, hvarigenom det blir löst eller tilltryckt, de enkla hårens vexlande mängd, storlek och groflek, fjällens något vexlande bredd och färg samt spetsens större eller mindre trubbighet, till ej ringa grad är att tillskrifva ståndortens inflytande.

Den närstående *H. *cæsiiflorum* varierar analogt med *H. *galbanum*, hvilket serdeles tydligt framträder, då de anträffas i sällskap på samma lokal. Exempelvis förekommer i Wist s:n bland f. *cinerascens* en analog form af den förre med rikt stjernludna, ljusgrå holkar. På andra lokaler äro anträffade former af *H. *cæsiiflorum* med mörka holkar, alldeles analoga med f. *atrum*. Analogien mellan dessa båda underarter sträcker sig äfven till andra organer. Så hafva former med stjernludna holkar af båda

ljusare bladfärg och öfvervägande gula stift, hvaremot former med mörkare holkar hafva mörkare bladfärg och företrädesvis orent färgade stift. Likaledes äro *H. *galbani* former med låg och vid, kvastlik inflorescens tydligen analoga eller beslägtade med *H. *cæsiiflorum* var. *galbaniforme*. Hos båda formerna varierar äfven tandningen analogt, äfvensom bladbasen.

I Kristianiatrakten och i nordkanten af *H. *galbani* utbredningsområde (men äfven h. och d. söderut) förekomma allmännare eller nästan uteslutande former med mycket gröna holkar (f. *virens*), men för öfrigt vexlande i habitus, bladform och tandning liksom flertalet öfriga former. Dylika i Kristianiatrakten anträffade former äro serdeles anmärkningsvärda genom vexlingen i bladbasens utseende, hvilken hos låga, bredbladiga former ej sällan blir nästan hjertlik, hvarigenom dessa ofta med svårighet kunna skiljas från former af *H. *cæsiiflorum* v. *galbaniforme*, äfven denna med grönare holkar anträffad på samma lokal. Dessa lågväxta former äro der genom alla mellanstadier förenade med högväxta, smalbladiga former med ända till trebladig stjelk.

Traktvis eller i enstaka exemplar uppträda former, än som det synes med svag, än utan all konstans, hvilka genom sin högre, flerbladiga stjelk och äfven i rosetten smala (smalt lancettlika) blad med skarpare tandning samt smalare holkar i betydlig grad närma sig former af *H. *variabile*. På Gotland, utom hvilket den sednare underarten ej är känd, äro de ofta talrika och synas på sina ställen alldeles öfvergå i former af denna underart (se nedan).

Här må vidare anföras, att former från öppen och fastare mark hafva tydligast *cæsium*-habitus, derigenom att de bli grofva, lågväxta och bredbladiga samt få större och gröfre holkar, hvaremot lundbacksformer eller former från friskare ängsmark och liknande lokaler än närma sig *silvaticum*-typen än genom sin bladrika stjelk *vulgatum*-typen. På torrare lokaler äro bladen rikligare håriga, på friskare mera glatta. Till färgen variera de stundom på båda sidor eller på undersidan ljust glaucescenta, stundom något lökgröna eller gråaktiga.

I det föregående har påpekats, huru *H. *cæsiiflorum* i en del af sina former i karaktärer närmar sig *H. *sublividum*, och anmärkningsvärdt är äfven att *H. *galbanum*, hvilken, som förut antydts, utan tvifvel är motsvarande *cæsium*-form till den förstnämda, ofta (hos de former, som hafva gråa och långa holkar) till förvexling liknar den sednares motsvarande *cæsium*-form, *H. *ravusculum*. Här må äfven nämnas den analogi, som äger rum med afseende på holkarnes utseende mellan flera modifikationer af *H. *galbanum* å ena sidan och de tre formerna *H. *ravusculum* med *β subcanitiosum* och *H. *fraudulentum* å andra sidan. Förhandenvarande form är dock lätt skild från alla dessa bland annat genom sina bredare och trubbiga fjäll.

Inom området anträffad i *Östergötland*, Tingstads s:n, Odensberget; Gryts s:n (N. C. KINDBERG); Wists s:n, Sturefors, Sundsbro och Wessentorp; Kärna s:n, Malmskogen (förf.); Wäderstads s:n, Bossgård, Lindekullen, Torpa och Skållerud; Svanshals s:n, Strömstad (förf.); Ödeshögs s:n, Stora Åby och Orrnäs, f. fuscovirens och f. variegatum (förf. och G. A:N MALME); Omberg, Stocklycke, Rödgafvel och Anudden (förf.); Sunds s:n, Ed, Sunds Norrgård, Sundsö m. fl. st. (förf.); N. Vi s:n, Kärremåla och Siggemålen (förf.) samt Kyrkohögmålen (K. F. DUSÉN); V. Ryds s:n, Tunarp (förf.); Asby s:n, Lindåsen; Oppeby s:n, Drabo (förf.); Åtvids s:n, Slefringe och Karstorp (förf.): *Småland*, Gärdserum s:n, Bossgård (förf.); Forserum s:n, Lättarp (K. JOHANSSON); Eksjö s:n, Brevik

(förf.); Westervik, Svinnersbo (A. W. LUND): *Gotland*, Hau och Ar, Fårösund och Skälsö i Fleringe s:n; Lärbro s:n; Othem s:n; Bunge s:n; Lummelund; Wisby (S. ALMQUIST och K. JOHANSSON); Ventinge i Hejde s:n (FR. AHLFVENGREN) mestadels f. *atrum* eller liknande, ofta grofväxta och med rikhåriga holkar; samt vid Fårösund och på Skälsö, f. *canum*, (enl. explr. af S. ALMQUIST); dessutom vid Bunge och Lärbro samt Ar mellanformer till följande samt i Rute s:n derjemte former med mer än vanligt framträdande *silvaticum*-habitus.

Utom området funnen i *Westergötland*, Alingsås (A. BERLIN): *Södermanland*, Stora Malms s:n (G. A:N MALME); Södertelge (M. FLODERUS): *Westmanland*, Kungsör, f. *virens* (C. O. v. PORAT): Stockholms skärgård, ss. Vadholma och Djurö, (S. ALMQUIST), f. *atrum*: *Gestrikland*, Gefle, f. *atrum* och f. *virens* (C. O. SCHLYTER): *Helsingland*, Söderhamn, Grisberg (A MAGNUSSON), f. *virens*: *Jemtland*, Åre (J. P. NORRLIN) samt i *Norge* nära Trondhjem (J. P. NORRLIN, Hier. exs. n. 122); Ringebo och Veblungsnäs (FR. AHLBERG) och i Kristianiatrakten samt i Etnedalen vid Bruflat, f. *virens* (förf.); Tonsåsen (W. NORDENFELT).

En i flera afseenden mera utmärkt form än de öfriga är:

β divaricans n. var.

Utmärkt af 0- eller 1—2-bladig, späd och föga hårig eller nästan endast vid den violettfärgade basen rikligare hårig, föga stjernhårig, vanligen låg stjelk med få, 2—3, små tunna rosettblad, af hvilka de yttre äro ovala till omvändt äggrunda eller nästan rundade med vigglik eller tvär till hjertlik bas och rundad eller t. o. m. tvär eller mycket trubbig spets samt tätt, bredt och triangulärt tandade till bugttandade, det inre bredt äggrundt till rhombiskt kortspetsadt, mera skarptandadt med bas som hos de öfriga, alla med tänderna utstående eller basaltänderna, isynnerhet då basen är hjertlik, bakåtrigtade (ofta långa och smala), undertill isynnerhet på medelnerven och på bladskaften tätt långhåriga, ofvan glest korthåriga till glatta, af små, rhombiska eller rhombiskt lancettlika till lancettlika stjelkblad, af hvilka de öfre äro långt skarpspetsade, det nedre kortspetsadt och oftast långskaftadt eller, då endast ett är utveckladt, än oskaftadt än långskaftadt, af gles vippa, som är gaffelgrenad, 2—3-blomstrig, ibland mera sammansatt och ibland mera tät med merändels vidt utspärrade och ofta nästan vinkelrätt utstående, fina grenar samt 30—50 mm. långt akladium. Holkarne äro små, korta och mörka med mycket ojemt tegellagda fjäll, de yttre oftast ytterst korta, klädda af glesa hår och spridt, sällan tätare, mot kanterna vanligen tydligare och något rikligare stjernludd samt temligen glesa hår. Korgar medelstora. Stift vanligen m. l. m. mörkt. Stjelkbasen, bladskaften och medelnerven äro oftast lifligt och glänsande purpurfärgade.

Typiskt är denna form låg och fåbladig, men uppväxer stundom hög och flerbladig, hvarvid stjelkbladen ofta bli smalt lancettlika och tandade som hos varieteten *β* af följande, hvilken den ibland till den smalare vippan och de mera grågröna holkarne mycket liknar. De lågväxta individen med ett skaftadt stjelkblad och flertalet af rosettbladen med tvär eller hjertlik bas erinra mycket om magra former af *H. *cæsiiflorum*. Till holkarne, hvilka oftast äro mörka, erinrar den mest om gleshårigare individ af föregåendes f. *atrum;* äfven är den lik föregåendes lågväxtare former till den fåblomstriga, utspärrade inflorescensen, men holkarne äro mindre än hos densamma vanligen är fallet, och grenarne tendera att vara eller äro ännu mera utspärrade än hos någon af dess former. I alla sina individuella modifikationer bibehåller den alltid ett serdeles eget utseende, framkalladt hufvudsakligast genom de små bladens form och tandning, isynnerhet hos de mycket trubbiga rosettbladen, hvilka äfven hos mångbladiga, åt var. *β* af *H. *variabile* tenderande

former bibehålla sin egendomliga tandning och lika ofta som hos lågväxta och fåbladiga individ hafva tvär eller hjertlik bas.

Till sin plats står den sålunda nära både *H. *cæsiiflorum*, *H. *galbanum* (f. *atrum*) och *H. *variabile β angustilobum*, af hvilka alla den äger karaktärer, dock med bibehållande af en skiljaktig prägel. Sannolikt är den en väl differentierad form, hvilken, såsom anträffade exemplar gifva vid handen, likväl ännu genom mellanformer är förbunden med *H. *galbanum* och *H. *variabile*. Till *H. *cæsiiflorum* synas, oaktadt den mången gång mycket stora likheten med denna, inga verkliga öfvergångar finnas, ehuru slägtskapen är tydlig.

Anträffad på *Gotland* i Bunge och vid Ar i Fleringe, på båda ställena talrikt jemte *H. *galbanum* och *H. *variabile* samt ett ringare antal mellanformer till dessa sednare (S. ALMQUIST).

5. H. *variabile *Lönnr.*

H. variabile Lönnr. p. m. p., Resa i Smål. och på Gotl., p. 73.[1] — H. ramosum C. J. LINDEBERG, Hier. Scand. exs. n. 75 et Hn. Fl. ed. 11, p. p. — DAHLST., Hier. exs. fasc. IV, n. 69. — H. (vulgatum v.) parvifolium P. C. AFZELIUS, Nov. Flor. Gotl., p. 18, p. p.[2] — H. ramosum — simplex Fr. Symb. et Epicr. p. p.?

Caulis mediocris — elatus sæpius strictus et sat rigidus usque a basi vel sæpius a medio vel apice subdivaricato-ramosus 2—7- v. multifolius, inferne ± dense pilosus et sparsim — sat dense stellatus, superne rare — sparsim ad basin foliorum vero densissime et longe pilosus, apice ± dense stellatus — sat tomentellus, ceterum rare stellatus. *Folia* dilute viridia, *rosularia* persistentia ± congesta v. parum remota pallide viridia subtus subglaucescentia v. subcinerascentia, exteriora ± late — anguste elliptica ± denticulata breviter acuta, interiora ± elliptico — ovato-lanceolata subrhomboidea ± acuta — sat cuspidata, omnia in petiolum late alatum abrupte contracta v. basi ± cuneata — descendentia breviter petiolata breviter v. ± longe et acute haud raro subinæqualiter dentata, dentibus vulgo ± porrectis curvatis v. sæpius rectis sat latis, supra glabra v. rare pilosa levissime stellata, subtus sparsim in nervo dorsali ± dense albido-hirsuta et sparsim in nervo densius stellata; *caulina* sursum decrescentia, summa bracteiformia, raro 2 vulgo 4—5 rarissime plura (ad 7—8), omnia v. saltim superiora ± patentia plerumque brevia lanceolata — ovate lanceolata (— sat rhomboidea) sat grosse et ± acute 4—6-dentata, omnia sessilia vel infima, quum caulis magis foliosus est, brevius petiolata, basi breviter — sat longe cuneata, omnia acuta — cuspidata, supra leviter stellulata, subtus sparsim floccosa et pilosa, basi ad insertionem barbata. *Anthela* oligocephala plerumque ± divaricata ramoso-paniculata contigua rarius magis contracta sat determinata, ramis valde patentibus — erecto-patentibus, inferioribus foliolatis v. bracteolatis, summis leviter curvatis, pedicellis sat brevibus — elongatis apice ± incrassatis squamiferis acladioque 15—30 mm.

[1] Häri indrogos nog af LÖNNROTH äfven former af *H. *galbanum* utom mellanformer till denna.
[2] Enligt originalexemplar i K. J. LÖNNROTHS herb., nu förvaradt i Riksmuseum, Stockholm.

longo inferne sat dense superne dense canofloccosis et pilis albis brevibus raris crispulis v. nullis vestitis. *Involucra* mediocria brevia et sat crassa e viridi v. fusco ± canescentia basi ovata postea rotundata — truncata. *Squamæ* sat imbricatæ latiusculæ — sat latæ, exteriores sublineares obtusæ, interiores in apicem obtusum — obtusiusculum ± attenuatæ, intimæ paucæ acutiusculæ, omnes ± comatæ late viridimarginatæ, dorso præsertim superne fusco- v. atrovirides, undique dense v. marginibus et ad apices densius albo- v. canofloccosæ breviter et sparsim v. densiuscule pilis crispulis sat longis ± canescentibus obtectæ. *Calathidium* obscure luteum sat plenum. *Ligulæ* glabræ. *Stylus* luteus — subluteus, siccus sat obscurus.

Inv. $\frac{10—11}{5—6}$, D. 30—35, L. m. c. 2,5 mm.

Denna form, hvilken är att anse som artens bäst utpräglade typ, utmärker sig genom sin styfva, fler- oftast 3—6-bladiga stjelk, föga håriga, på båda sidor m. l. m. fint och glest stjernhåriga blad af vackert ljusgrön färg, af hvilka rosettbladen äro kortskaftade och hafva mer eller mindre bredt elliptisk till lancettlik form med nedlöpande bas samt äro skarpt och vanligen regelbundet tandade och stjelkbladen vanligen äro utstående eller snedt uppåtrigtade, till största delen oskaftade, spetsiga, skarptandade och uppåt decrescerande, utspärrad m. l. m. vid, vanligen ej mångblomstrig inflorescens med långa eller medellånga, ofta tjocka grenar, hvilken nedåt är obestämd genom utspärrade grenar från bladvecken, hvarvid stjelken ofta är grenad ända ned till basen, samt genom medelstora, oftast ljusgrå holkar, som äro brokiga af tätt, isynnerhet mot kanterna samladt stjernludd och vanligen ej talrika, fina, grå hår. Grenarne äro svagare stjernhåriga och grönaktiga, korgskaften deremot ljusgrå af tätt ludd samt klädda af fina, glesa hår. Stjelken är mer eller mindre glest till tätt, isynnerhet vid basen och i spetsen, stjernhårig, vid basen och isynnerhet vid bladfästena tätare långhårig. Stjelkens bas och bladskaften äro föga eller icke färgade och bladens undersida nästan aldrig violett. Habituelt varierar den rätt betydligt, å ena sidan närmast utbildad efter *ramosum*-typen, å andra sidan utvecklad efter *vulgatum*-typen. Lågväxtare former med få (1—2) stjelkblad hafva bredare blad, mera färgade bladskaft och stjelkbas och nedåt begränsad inflorescens. Stjelkbladen äro hos dessa föga decrescerande och det nedersta bladet vanligen m. l. m. långt skaftadt, hvilket sällan är förhållandet hos den typiska formen, hos hvilken vanligen alla äro oskaftade. Denna form med *vulgatum*- habitus är att anse som en mellanform både till följande form och till *H. *galbanum*, hvars forma *cinerascens* den liksom hufvudformen mycket liknar till holkarne, hvilka stundom i alla detaljer öfverensstämma, men den skiljes från denna genom i allmänhet smalare blad med mindre grof och jemnare tandning samt mindre holkar. På Gotland finnas dessutom enstaka former, hvilka mera likna f. *cinerascens* af föregående och måhända äro identiska med denna. Den typiska, mångbladiga formen varierar ibland med mörkare holkar i analogi med förhållandet hos *H. *galbanum;* den mörka färgen synes dock mindre framkallad genom svagare ludd än genom fjällens egen färg. Dessa former öfvergå äfven gradvis i (ofta lågväxta) fåbladiga former, hvilkas ytterligheter än påminna om föregåendes *β divaricans*, än om dess f. *atrum*, till hvilken spridda mellanformer här och der synas förekomma. De mest lågväxta af dem tendera att få starkt utspärrade, långa inflorescensgrenar. Såsom vigtiga öfvergångsformer kunna alla dessa fåbladiga former, emedan de

äro oftare anträffade, sammanfattas under serskildt namn, ehuru begränsningen mot *H. *galbanum* är svår och deras öfvergång i hufvudformen sker gradvis.

b *subgalbanum* n. f.

Stjelk fåbladig med 1—2 stjelkblad, men ofta högväxt. Yttre rosettblad breda, ganska stora och äggrunda — äggrundt lancettlika, bredt men tätt tandade, de inre som hos hufvudformen. Stjelkblad utdraget och smalt äggrunda — lancettlika med lång spets, mera fliktandade än hos hufvudformen. Inflorescens vanligen starkt utspärrad med långa grenar och långt (ända till 50 mm.) akladium. Holkar något större och bredare än hos hufvudformen, rikligt eller ibland något mindre stjernhåriga och af mörkare eller ljusare gråsvart färg.

Från liknande *galbanum*-former skiljes denna i allmänhet genom mindre grofva holkar, hvars fjäll vanligen ej äro så breda, smalare, oskaftade (eller det understa kortskaftadt) stjelkblad och i allmänhet äfven smalare rosettblad, samt i allmänhet spetsigare och smalare tandning. Deremot öfvergår den, som förut är sagdt, gradvis i hufvudformen. Den olika färgen på holkarne hos skilda individ af såväl hufvudformen som b *subgalbanum* utmärker utan tvifvel modifikationer, beroende af ståndorten. Mellanstadier i anseende till färgen finnas. Dessa modifikationer äro intressanta för den analogi de hafva med dylika af *H. *galbanum* och *H. *cæsiiflorum*.

På ungefär samma sätt som hufvudformen synas tvenne andra formserier förhålla sig, af hvilka den ena är att anse som varietet, den andra (*H. *galbanifolium*) som en sjelfständig, ehuru med *H. *variabile* nära förbunden underart.

β **angustilobum** n. var.

H. (vulgatum) parvifolium P. C. Afz. l. c. p. p.? — H. ramosum — simplex Fr. Symb. & Epicr. p. p.? — H. ramosum Lbg. in Hn. Fl. ed. 11, p. p.

Caulis simplex elatus flexuosus firmus 4—8 folius, basi colorata vix stellatus, superne sparsim apice densius floccosus, inferne dense — sparsim, superne ± rare pilosus — subglaber. *Folia rosularia* sub anthesi ± emarcida v. pauca — plura, exterioria elliptica sat crebre — sparsim serrata, interiora ± elongate lanceolata — linearilanceolata ± inæqualiter et grosse dentata ± longe acuta, omnia basi ± descendentia; *caulina* sat erecta, superiora magis patentia ± angusta lanceolata — linearilanceolata ad medium v. infra ± crebre et ± profunde serrata v. ± inæqualiter longe et anguste dentata in apicem ± longum ± integrum acutum protracta sensim in bracteas decrescentia sessilia v. infimum breve petiolatum, omnia lutescenti- v. læte viridia, subtus pallidiora subglaucescentia ± longe et sparsim in nervo dorsali sat floccoso densius pilosa, ceterum rare — sparsim stellata, supra subglabra et leviter stellulata. *Anthela* parva vulgo simplex angusta determinata ramis ± strictis erecto-patentibus gracilibus brevibus v. mediocribus, sæpe corymbosa et interdum ramis ex axillis foliorum sæpe usque a basi caulis evolutis strictis ± patentibus

gracilibus foliolatis indeterminata. *Pedicelli* apice incrassati squamati dense canofloccosi, rare — sparsim pilis mollibus crispulis vestiti. *Involucra* ± gracilia — crassiuscula parva — mediocria cano- v. fuscoviridia, basi ± ovato-descendente. *Squamæ* ± laxæ angustæ ± regulariter imbricatæ plurimæ, exteriores obtusiusculæ — sat acutæ, interiores ± acutæ, intimæ subulatæ ± elongatæ incumbentes, apice levissime comatæ, ceterum undique rare — sparsim et adpresse apices interdum et margines versus sæpe densius stellatæ et pilis mollibus crispulis canescentibus sparsis — sat densiusculis obtectæ. *Calathidium* luteum sat plenum. *Ligulæ* glabræ. *Stylus* luteus — fuscescens.

Inv. $\frac{10-12}{5-6}$, D. 30—35. L. m. 2—2,5 mm.

I sin typiska gestalt är denna väl skild från föregående genom sin höga, styfva men vågböjda, vid basen lifligt violetta stjelk, smalare blad, isynnerhet de inre rosettbladen och stjelkbladen, hvilka äro utdragna, m. l. m. smalt jembredt lancettlika och långspetsiga samt jemt sågtandade till oregelbundet och smalt långtandade med vanligen 2—3 par tänder betydligt längre än de öfriga, oftast kort och smal inflorescens med ej sällan långa och mera utspärrade, raka och fina eller m. l. m. snedt utstående till uppåtrigtade grenar samt medelstora, gröngrå eller orent svartgröna holkar med smala, till större delen spetsiga fjäll, klädda af vanligen jemt utbredt, tilltryckt stjernludd, hvilket mera sällan är samladt i fjällens spetsar, oftare mot kanterna (hvarigenom holkarne stundom få ett eget brokigt utseende), men derjemte med glesare eller tätare, gråa, endast vid sjelfva basen mörka, krusiga, fina hår. I de flesta fall är stjernluddet glest spridt öfver fjällens hela yta, högst sällan mot spetsarne något rikligare (hos modifikationer påminnande om följande form). Hos lågväxtare och fåbladigare modifikationer med mörkare, spetsigare fjäll, hvilka dessutom ofta hafva längre och smalare holkar, är det vanligen glesare eller åtminstone mindre framträdande på midten af fjällen, tydligare mot kanterna. Dessa modifikationer, hvilka gradvis öfvergå i hufvudformen, påminna äfven om följande form till örtståndet, isynnerhet till bladrosetten, hvars yttre blad äro temligen breda, och hvars inre blad och få stjelkblad ofta äro glest och långt samt nästan fliktandade. De mest lågväxta med blott 1—2 stjelkblad erinra ibland till de yttre, breda, trubbigare och ofta bredtandade bladen med någon gång tvär eller svagt intryckt bas samt den lifligt violetta färgen på stjelkbas och bladskaft om *β divaricans* af *H. *galbanum*. Stundom äga äfven högväxta, flerbladiga former något eller ett par af de yttersta bladen breda med tvär eller intryckt bas. Tandningen är hos dessa blad mera utåtrigtad, vid basen äfven bakåtrigtad, hvarigenom likheten med *H. *cæsiiflorum* blir rätt framträdande.[1] Alla modifikationer och mellanformer få gerna bladens undersida m. l. m. violettfärgad; stundom bli äfven stjelkbladen på öfversidan från spetsen och m. l. m. långt ned liksom tänderna brunaktigt purpurfärgade. Bladen äro vanligen fasta och läderartade.

Någongång varierar denna form grenig ända från basen, hvarigenom inflorescensen blir obegränsad. Hos sådana former äro grenarne vanligen längre och mera utstående, hvarigenom

[1] Anmärkningsvärd är analogien mellan *H. *cæsiiflorum*, **galbanum* och **variabile* å ena sidan och *H. *lacerifolium*, **læticeps* och **resupinatum* med beslägtade å andra sidan.

de mycket påminna om föregående form, till hvilken mellanformer synas förekomma. De högväxta formerna med liten, smal, begränsad inflorescens tillhöra till sin öfre del fullkomligt *rigidum*-typen, men öfvergå gradvis i former, hvilka äro utvecklade efter *vulgatum*-typen. Från dessa sednare former leda öfvergångar till följande, hvilken är utvecklad efter *cæsium*-typen. Öfriga tillhöra *ramosum*-typen. Sålunda framställer denna varietet med sin nedannämda form (liksom hufvudformen) tre skilda morfologiska typer jemte en mängd öfvergångar mellan dem.

Den efter *cæsium*-typen utbildade formen, hvilken till habitus och tandning är analog med vissa fliktandade former af *H. *cæsium*, är tillräckligt märkvärdig, ehuru den måhända blott är en mera utpräglad ståndortsmodifikation, för att serskildt anföras:

b. *turbinatulum* n. f.

Skild från föregående genom glest 2—3-bladig stjelk, stora, temligen breda, ovala — elliptiska yttre blad, hvilka äro glest och bredt tandade och kortspetsade, samt långa, lancettlika, ojemnt och långt glestandade inre blad med utstående tänder, genom m. l. m. lancettlika, hastigt uppåt decrescerande stora stjelkblad (de 1—2 nedre oftast skaftade), hvilka äro ut- eller nedböjda och glest samt långt fliktandade af 2—3 par långa (10—15 mm.), m. l. m. smala, utstående tänder, samt genom större holkar med något bredare fjäll och ännu tydligare konisk, nedlöpande bas och med samma beklädnad som hos föregående eller med något rikare stjernludd, hvilket ännu tydligare framträder i fjällens spetsar. Vanligen äro äfven de enkla håren öfverallt längre. Oftast utgå 2—3-bladiga grenar från alla bladvecken äfvensom bistjelkar från rosettbladen. Inflorescensen blir sålunda vanligen obegränsad nedåt och dess egentliga, af verkliga brakteer stödda grenar äro få, oftast 2—3.

Är att betrakta som föregåendes ytterlighetsform med *cæsium*-habitus. Möjligen är den blott en ståndortsmodifikation (friskare ängsmark.) Stundom inträffar såväl hos denna form som hufvudformen och mellanliggande modifikationer att ett par stjelkblad, vanligen några af de mellersta, bli alldeles motsatta, isynnerhet hos exemplar med rikare förgrenad stjelk.

En något afvikande form, kanske blott en modifikation af föregående, är:

c *fracidodes* K. Johanss. in litt. n. f.
H. Dahlst., Herb. Hier. Scand., Cent. II, n. 20.

Den afviker genom ofta bredare (de yttre ej sällan med tvär eller intryckt bas), kortare samt skarpt och mera jemnt tandade basalblad, genom få, oftast kortare, kort- och skarptandade stjelkblad samt långgrenad, mycket utspärrad inflorescens med tjockare, orent gröngrå holkar med vid basen temligen breda fjäll, klädda af en smal strimma af ludd i kanterna och korta, glesa, ljusa hår. Holkarne äro temligen korta och breda och nedlöpa liksom föregående ofta i det upptill förtjockade, småfjälliga skaftet. Bladen äro liksom hos föregående af ljusgrön färg.

*H. *variabile* uppträder helst i magra skogsängar med kalkgrund eller på kalkhedar på norra Gotland. De olika formerna äro anträffade på följande ställen:

Hufvudformen är funnen på Gotland vid Ar och Hau i Fleringe s:n; Bunge s:n; Snäckgärdet vid Wisby; Kapellshamn (S. ALMQUIST, O. JUEL och K. J. LÖNNROTH); b *subgalbanum* och mellanformer till hufvudformen vid Flenvik i Hangvars s:n, nära Kapellshamn; Ar i Fleringe s:n och i Bunge s:n, på sednare ställena äfven jemte öfvergångar till modifikationer af *H. *galbanum* f. *atrum* (S. ALMQVIST, K. J. LÖNNROTH); *β angustilobum* vid Flenvik, nära Kapellshamn; Lärbro s:n, Storungs; Ar och Wialms i Fleringe s:n riklig; Bunge s:n mellan Stux och Utbunge flerestädes riklig; Arhamn (K. J. LÖNNROTH, S. ALMQUIST och O. JUEL), på de flesta med öfvergångar till b *turbinatulum*, som är funnen vid Fårösund (S. ALMQUIST och K. JOHANSSON); c *fracidodes* är träffad bland föregående vid Fårösund (K. JOHANSSON).

6. **H. *galbanifolium** n. subsp.

H. microphyllum Lönnr. in sched. — H. variabile Lönnr. *δ* microphyllum Lönnr., DAHLST., Hier. exs., fasc. IV, n. 70. — H. galbanifolium DAHLST., Herb. Hier. Scand., Cent. II, n. 22, 23.

Caulis altus strictus v. ad basin leviter flexuosus firmus 5—6-folius, inferne ± obscure purpureus v. vinose coloratus longe et sat dense pilosus, ceterum rare — sparsim pilosus, superne leviter — densiuscule stellatus, apice v. interdum a medio raro usque a basi ramosus. *Folia* saturate et obscure viridia, subtus sæpius violascentia, *basalia* 2—3(—5) breviter petiolata haud raro magna, exteriora ovata basi sæpe subtruncata, interiora ± ovata — ovato-elliptica, omnia ± breviter acuta basi ± ovata — cuneata sparsim — crebrius dentibus triangularibus sat latis sed acutis ± æqualiter dentata; *caulina* sensim decrescentia, inferiora ± ovata — elliptica, superiora ovato-lanceolata — anguste elliptica, summa elliptico-lanceolata, inferiora sæpe 2—3 sat (longe) petiolata breviter acuta, cetera sessilia ± acuta, omnia sæpius parva basi abrupte — sat longe cuneata inferiore parte sat crebre et anguste ± late et ± regulariter haud profunde serrato-dentata; omnia saturate et obscure viridia firma, supra subglabra — glabra levissime stellulata, subtus pallida subcinerascentia et sæpe ± intense violascentia (præsertim rosularia) sparsim — densiuscule in nervo dorsali rare floccoso longius et densius pilosa, ceterum leviter et minute stellata, marginibus sat rigidule ciliata, petiolis densiuscule pilosis ad insertionem longe et sat dense barbatis. *Anthela* contracta parva v. laxiora ramis longioribus, oligocephala subsimplex ramis mediocribus — brevibus v. sat longis erecto-patentibus rectis acladioque (5—)15—25 (—40) mm. longo et pedicellis ± brevibus apice valde incrassatis squamatis dense canotomentosis et pilis canescentibus sat longis sparsis — sat densis vestitis; inflorescentia sæpe ramis brevibus v. longis foliolatis ex axillis foliorum interdum usque a basi evolutis aucta et indeterminata. *Involucra* crassa ± lata sordide atroviridia subcanescentia basi ovata postea truncata. *Squamæ* latæ dorso angusto et ad apicem ± obscuræ ± late virescenti-marginatæ, exteriores fere triangulares, interiores ± oblongo-lanceolatæ, omnes ± obtusæ — obtusiusculæ v. intimæ subacutæ albocomatæ, marginibus levissime (v. densius) stellatæ ad apices sæpe latius floccoso-marginatæ, vulgo apice summo ubique adpresse et leviter sed

conspicue albido-stellatæ, ceterum dorso pilis sat densis (v. densis) et sæpe longis canescentibus crispulis obtectæ et minute et sparsim sed vix conspicue glandulosæ. *Calathidium* sat obscure luteum sat densum. *Ligulæ* glabræ. *Stylus* subfuscescens.

Inv. $\frac{10-12}{6-7}$, D. c 35, L. m. 2,5 mm.

Denna underart är mycket närstående *H. *variabile*, men är likväl i högre grad än den sednares habituelt ofta mera afvikande varietet *β angustilobum* differentierad från densamma. Från båda äger den ett serdeles afvikande utseende, isynnerhet genom de bredare rosettbladen af m. l. m. äggrund form med vanligen färre och gröfre tänder och mera tvär bas samt de mindre och bredare stjelkbladen, af hvilka åtminstone de tvenne nedersta äro skaftade. För öfrigt utmärker den sig genom mörkare grön, på undersidan af bladen mera i blågrått stötande färg, breda, ganska blekkantade och oftast serdeles trubbiga holkfjäll, hvilka nästan endast i kanten äro (svagt) stjernhåriga eller äfven i hela spetsen äro klädda af utbredt, blåhvitt stjernludd samt på ryggen bära ganska ymniga, gråa, långa och krusiga hår. Inflorescensen är vanligen fåblomstrig, hopdragen med korta upprätta grenar men blir ibland mera långgrenig. Stundom utgå korta, snedt utåtrigtade grenar från de öfre bladvecken, och ej sällan fortskrider förgreningen ända till basen, men de nedre grenarne äro mången gång ej fullständigt utvecklade. Stundom blir dock hela växten ända från basen utspärradt långgrenig. Bladens tandning, som i allmänhet på rosettbladen är grof, triangulär, på stjelkbladen finare och tätare samt skarpare, varierar på friskare ställen mera oregelbunden och lång till nästan flikig, isynnerhet vid bladbasen, och blir på stjelkbladen ofta smal och syllik. Basalbladen äro mången gång stora och breda samt hafva ofta äggrund, ibland t. o. m. något intryckt bas. Så beskaffade individ få i bladrosetten ett starkt tycke med *silvaticum*-typen. Oftast är isynnerhet rosettbladens undersida mörkt lefverfärgad eller violett; stjelkens bas är m. l. m. högt upp och bladskaften samt hela eller en del af medelnerven äro deremot nästan alltid mörkt brunvioletta eller ljust vinfärgade. Holkskaften äro alltid under holkarne starkt förtjockade, hvarigenom holkbasen i yngre stadier ser ut att vara nedlöpande, men den blir snart först äggrund och sedan tvär eller t. o. m. intryckt. På skaften äro alltid utvecklade 3—5 smala, syllika, brungröna brakteer. Holkfjällen äro mångradiga, breda och ganska jemnt tegellagda, de yttre mycket korta och triangulära, något utstående, de inre mera tilltryckta i motsats mot föregående, hvars alla fjäll äro m. l. m. frånstående.

Som jag förut nämt synes denna form mycket skarpare utpräglad och torde sällan äga fåbladiga åt *H. *galbanum* tenderande former eller modifikationer. Men den är tydligen till holkarne analog med de former af den sednare, hvilka hafva föga eller svagt utbildad stjernludd i kanterna af fjällen eller luddet mera tydligt utbredt i deras spetsar samt rikligare hår på holkarne, såsom de gotländska formerna, hvilka ansluta sig till f. *atrum*.

Till följande form står den tydligen i ett, som det synes, visserligen mera afbrutet slägtskapsförhållande, men som är i full analogi med föregående formers förhållanden till sina respektive lågväxtare och fåbladigare former med *vulgatum*- eller *cæsium*-habitus och hvilka m. l. m. närma sig till *H. *galbani* olika former.

b *obscurifolium* n. f.

Denna form, hvilken är mycket närstående föregåendes b *turbinatulum* eller analog med den, i hvars närhet den måhända snarare för sin utbildning bort ställas, upptages dock här, emedan den i sina karaktärer äger antydningar till de egenskaper, hvilka äro fullt utvecklade och fixerade hos *H. *galbanifolium*, liksom b *turbinatulum* antyder de egenskaper, hvilka äro fullt utbildade hos *β angustilobum*.

Den utmärker sig genom medellåg, 1—3(—4)-bladig stjelk med uppåt hastigt decrescerande blad, kortskaftade, äggrunda — ovala eller lancettlika rosettblad, hvilka äro längre än hos föregående och än mera trubbigt och bredt än längre och något spetsigare samt mera ojemnt tandade, äggrundt lancettlika till jembredt lancettlika stjelkblad (oskaftade eller det nedersta skaftadt) med gles, m. l. m. utstående, kortare eller längre, ofta endast vid basen utbildad tandning, gles, fåblomstrig inflorescens med upprätta grenar och som oftast är nedåt obegränsad genom utstående grenar från de flesta eller alla bladvecken ända till basen, temligen stora och breda, orent grönsvarta eller ibland gråare holkar med basen i början nedlöpande i det förtjockade och smalfjälliga skaftet sedan tvär till intryckt, genom breda och temligen trubbiga fjäll (ehuru ej i lika hög grad som hos föregående) med samma eller något rikligare beklädnad af stjernludd, men ofta något svagare hårighet samt något vidare och glesare korgar än hos föregående men lika mörka stift. Den mörka bladfärgen, hårigheten hos örtståndet och den mörkt färgade stjelkbasen samt holkens utseende påminna mest om hufvudformen. Genom de hårigare, mörkare bladen, hvilka derjemte äro kortare och bredare, och genom de trubbigare fjällen är den tydligt, ehuru kanske ej långt skild från b *turbinatulum*. De ofta jembreda, glest och utstående långtandade stjelkbladen, hvilka ofta nästan ända mot spetsen äro jembreda och derefter tvärt hopdragna i en kort spets, häntyda på denna forms sammanhang med nyssnämda form och dess öfvergångar till *β angustilobum*.

Af hvad ofvan blifvit anfördt visar det sig sålunda, att *H. *variabilis* formkrets är differentierad i trenne mera utpräglade former: *hufvudformen*, *β angustilobum* och *H. *galbanifolium*, af hvilka de två förstnämda genom oafbrutna serier af mellanformer, den sednare med afbrott äro förenade med eller respective låta härleda sig ur de sinsemellan mycket nära beslägtade formerna, *divaricans*, *turbinatulum* och *obscurifolium*, af hvilka den förstnämda synes omedelbart öfvergå i former af *H. *galbanum*, den andra synes sammanhänga med en varietet af densamma, och den tredje står mera isolerad, ehuru äfven här slägtskapen med nyssnämda underart rätt tydligt framträder. De tre formerna visa sig äfven ha utbildat sig i olika rigtningar, hvilket isynnerhet framträder, om man jemför de mest spetsfjälliga formerna af *β angustilobum* med de mest trubbfjälliga af *H. *galbanifolium*, mellan hvilka båda former differensen i alla händelser vid en genomgående jemförelse visar sig så stor, att om alla mellanformer i naturen saknades ingen torde tveka att anse dem för synnerligen goda arter. Både *β angustilobum* och *H. *galbanifolium* stå också, isynnerhet den sistnämde, äfven om man medräknar deras lägst utvecklade former, längre från *H. *galbanum* än hufvudformen af *H. *variabile* (ehuru denna i sin typiska gestalt är synnerligen väl utpräglad) på grund af den sednares mera jemnt fortlöpande mellanformer till den förra. Alla tre formerna

uppvisa i alla sina delars variation mer eller mindre sträng analogi med variationerna inom *H. *galbanum* (och t. o. m. *H. *cæsiiflorum*), hufvudformen af *H. *variabile* dock aldra tydligast, hvilket framträder i synnerhet i modifikationerna i anseende till holkarnes beklädnad, hvarigenom den i detta afseende, ehuru eljest i örtstånd och habitus väl skild, kan bli förvillande lik f. *cinerascens* af *H. *galbanum*. Hos alla formerna, mest hos de två första, men äfven mycket ofta hos *H. *galbanifolium*, framträder liksom hos *H. *galbanum* en antydan om slägtskap med *H. *cæsiiflorum*, hvilket visar sig i de yttre bladens benägenhet att få basen hjertlik eller åtminstone tvär med utåt eller bakåt rigtade tänder. Men äfven flera andra, i det föregående omnämda likheter mellan *H. *cæsiiflorum*, *H. *galbanum* och *H. *variabile* samt *H. *galbanifolium* göra det sannolikt, att de äro nära beslägtade och troligen utvecklade ur en och samma grundform. I sjelfva verket ger *H. *galbanum β divaricans* genom sina i det föregående anförda likheter med de nyssnämda underarterna en ganska god föreställning om, huru en sådan grundform torde ha sett ut.

Då *H. *galbanum* och *H. *cæsiiflorum* på Skandinaviens fastland (äfven i Finland) hafva en ganska vidsträckt utbredning, hvarjemte båda förekomma på Gotland, äro deremot *H. *variabile* och *H. *galbanifolium* med sina former ej kända från fastlandet. De två förstnämda kunna oaktadt sina mången gång rätt mycket framträdande likheter med lätthet begränsas från hvarandra. Den första af de båda sistnämda deremot går tydligen som ofvan visats i en del af sina former gradvis öfver i former af *H. *galbanum*, och den föreställningen tränger sig ovilkorligen vid betraktandet af dessa förhållanden fram, att den tillhör en i jemförelsevis sen tid från den sednare utbildad formgrupp, inom hvilken tvenne mera markerade utvecklingsrigtningar sedan gjort sig gällande, och i hvilka den håller på att afskilja sig. *H. *galbanifolium*, hvilken tydligen tillhör samma formgrupp, är deremot i det närmaste differentierad. Detta förhållande står i full öfverensstämmelse med förhållandet hos många andra former på Gotland, hvilka där äro högeligen variabla men på fastlandet mera beständiga. Serskildt faller det i ögonen, att flera former, hvilka på fastlandet äro utbildade efter *cæsium*- och *vulgatum*-typen, på Gotland sträfva att utbilda former, analoga med *rigidum*-typen men med tendens till en egendomlig utspärrad förgrening från de flesta af stjelkbladen, och hvilken typ jag dels efter det äldre namnet för den först iakttagna formen af denna typ, dels efter stjelkens förgrening kallat *ramosum*-typen.

Denna allmänna variabilitet hos Gottländska former synes mig stå i full öfverensstämmelse med det allmänt iakttagna sakförhållandet, att sedan en längre tid från fastlandet afskilda öar och ögrupper äga ett jemförelsevis mindre antal typer, inom hvilka deremot variabiliteten är synnerligen stor och mångformig.

*H. *galbanifolium* är funnen vid Gerungs i Rute s:n bland stenar på solöppna platser, blommande i början af Juli 1882, ett mycket tidigt år (K. J. LÖNNROTH), och vid Fårösund i talldungar och på strandvallar (S. ALMQUIST och K. JOHANSSON); b *obscurifolium* vid Fårösund under olika år (S. ALMQUIST och K. JOHANSSON).

7. H. *sublustre K. Johansson in litt.

Dahlst., Herb. Hier. Scand., Cent. II, n. 21.

Caulis 30—50 ctm. altus crassiusculus v. crassus erectus et rectus v. leviter flexuosus 2—5-folius, ex axillis sæpe ramiger, inferne sparsim — sat dense et molliter pilosus sat stellatus, superne sparsim pilosus et sat floccosus, sub anthela densius floccosus, viridis v. basi obscurascens. *Folia* dilute viridia sæpe sublutescentia, *basalia* sæpe in rosulam 5—8-foliam dense congesta, exteriora cordato-ovata — late ovalia apicibus rotundato-obtusa late et crebre sæpe præsertim ad basin subinciso-dentata dentibus elongate triangularibus v. ovato-oblongis patentibus — subarrectis v. basin versus sæpe reversis minoribus, intermedia ovali-elliptica et intima ovali-lanceolata ± acuta (intima sæpe in apicem sat longum integrum protracta) longe et sat æqualiter ad basin angustius sinuato-dentata apicem versus latius et brevius dentata basi ± cuneata v. longe descendente, *caulina* bene evoluta apicem versus cito decrescentia, infimum subpetiolatum, superiora basi angusta descendente sessilia ± elliptico- v. ovato-lanceolata — lanceolata in apicem longum angustum integrum acutum — cuspidatum attenuata, ceterum dentibus longis angustis ± erecto-patentibus iisdem brevioribus triangularibus acutis inæqualiter pinnatifido-dentata; omnia subtus sparsim et breviter pilosa sat dense (præsertim in nervo dorsali) stellata, in costa marginibusque molliter densius et longius pilosa supra glabriuscula v. glabra, leviter stellata. *Anthela* composita v. abortu simplex paniculata laxa et ampla superiore parte sæpe subumbellata deorsum ramis ex axillis bractearum et foliorum evolutis indeterminata, ramis inferioribus remotis superioribus sæpe umbellatim congestis longis rectis v. basi subarcuatis erecto-patentibus sæpe longe superantibus ± gracilibus cum acladio 35—50 mm. longo pedicellisque mediocriter longis canovirescentibus et sat dense tomentosis pilis raris mollibus adspersis eglandulosis. *Involucra* latiuscula — lata pallide canescenti-viridia basi ovata primo in pedicello apice 2—7-squamifero incrassata ± decurrentia, postea rotundato-truncata. *Squamæ* angustæ sublineares subirregulariter imbricatæ obtusiusculæ — obtusæ apicibus ipsis mucronatis, intimæ paucæ acutæ — subulatæ, exteriores basi sparsim floccosæ, ceteræ præsertim in apicibus piceis nudæ ± viridi-marginatæ, dorsis obscurioribus pilis parcis v. sparsis e basi crassiore nigricante apicibus canis obsitæ glandulisque nullis v. solitariis adspersæ. *Calathidium* saturate luteum (sat plenum?). *Stylus* subsordide croceus, siccus obscurius.

Inv. $\frac{11—12}{6—7}$, D. l. 35., L. m. 2. mm.

Denna form, hvilken är af synnerligen karaktäristiskt utseende, igenkännes lätt på sin ljusa bladfärg, de i en tät rosett hopade bladen vid stjelkens bas, af hvilka de yttre äga tydligt hjertlik eller åtminstone tvär bas och af hvilka alla äro tätt inskuret tandade, ofta med utåt eller bakåtrigtad tandning, den ganska höga, styfva, fåhåriga men stjern-

ludna stjelken, hvilken ofta blir ända till 5-bladig och ej sällan grenad ända från basen med mera ojemt fliktandade, långspetsade, uppåt eller snedt utåtrigtade blad, och den vida, långgreniga, ofta uppåt nästan flocklika inflorescensen med ganska raka och utspärrade, fina grenar och skaft, långt akladium samt temligen breda, blekt gröngrå holkar, hvilkas i spetsen tjärfärgade fjäll till största delen (isynnerhet i spetsarna) äro nakna och för öfrigt klädda af glesa hår och knappt märkbara, enstaka glandelhår. Isynnerhet är denna form märkvärdig för sin täta bladrosett, bladens tandning och de yttre rosettbladens *silvaticum*-lika form samt den vida inflorescensen, hvilken tenderar att bli flocklik. I detta sednare afseende, i bladfärgen och stjelkbladens tandning samt till holkarnes utseende och de smala fjällen erinrar den ej litet om *H. *variabile β angustilobum* och är sannolikt närmast beslägtad med denna. Liksom denna har den ofta de yttre bladen med något hjertlik form och liknar häri och i deras tandning former af *H. *cæsiiflorum* och *H. *galbanum*, med hvilka den torde räkna en något aflägsnare slägtskap. Från alla dessa skiljes den lätt såväl genom sin egendomliga habitus som genom holkens sparsammare beklädnad,[1] isynnerhet genom saknaden af stjernludd på fjällens öfre delar och deras tjärfärgade spetsar. Stjelkens bas är ofta vackert rödbrun liksom hos *H. *variabile β angustilobum*, och bladens spetsar äro ofta på båda sidor, stundom ett längre stycke utefter medelnerven, blodfärgade.

Anträffad på *Gotland* på sandiga och steniga, solöppna lokaler vid Visby och vid Ar i Fleringe (enl. K. J. Lönnroth) samt vid Fårösund (K. Johansson), hvilka båda urskiljt den oberoende af hvarandra. Lönnroth sammanstälde den med *H. Pollichiæ* C. H. Schultz.

8. **H. *exaltatum** Dahlst.

H. *exaltatum Dahlst. apud Stenstr., Wärml. Archier. 1889. — Dahlst., Hier. exs., fasc. I, n. 76; fasc. IV, n. 68. — Dahlst., Herb. Hier. Scand., Cent. II, n. 24, 25.

Caulis plerumque elatus 35—80 ctm. altus gracilis — crassiusculus 0—3(—5)-folius sæpe sat firmus et rigidus, inferne dense — sat dense et longe pilosus vix floccosus ± coloratus, superne densiuscule — rare pilosus magis magisque floccosus, apice sparsim floccosus — sat tomentosus. *Folia rosularia* plerumque pauca vulgo 3—4, læte gramineo-viridia interdum subtus subglaucescentia, exteriora sub anthesi sæpe emarcida (parva—) mediocria ± ovata v. ovalia — oblonga crebre et acute haud longe dentata obtusiuscula — brevissime acuta, intermedia ± oblonga — late v. anguste lanceolata magna v. maxima ± argute et longe sat crebre et subinæqualiter dentata ± acuta, interiora ± elongate lanceolata sæpe valde elongata inæqualiter acute et longe — longissime antrorsum sparsim deorsum crebrius dentata ad basin sæpe longissime pinnatifida in apicem longissimum ± integrum acutum protracta, omnia præsertim interiora basi in petiolis alatis laciniis v. dentibus longis — longissimis liberis descendentia, supra vulgo rare pilifera v. glabra, subtus sparsim — densiuscule in nervo dorsali sparsim stellata densius et longius pilosa, marginibus pilis

[1] På gamla afblomstrade holkar bli håren såsom vanligt rikligare och gråare.

densiusculis mediocribus ciliata, petiolis pilis mollibus sat longis densiusculis — sat densis villosis. *Folia caulina* nunc cito et abrupte nunc sensim decrescentia ± subovate — elongate lanceolata crebre subulato-dentata — sparsim et longissime præcipue ad basin pinnatifido-dentata basi ± longe descendentia, infimum vel infima 2—3 sat longe petiolata petiolis sæpe dentibus v. laciniis liberis instructis, summum v. summa sessilia, omnia in apicem ± integrum sæpe longissime v. acutissime subulatum protracta; dentibus in rosulariis exterioribus ± porrectis in rosul. inferioribus et caulinis sæpe valde patentibus. *Anthela* plerumque laxe paniculata composita v. subsimplex determinata v. interdum (in speciminibus multifoliis) subcorymbosa indeterminata, ramis ± erecto-patentibus sæpe leviter arcuatis plerumque gracilibus, superioribus ± approximatis, inferioribus sæpe sat remotis ± longis et sæpe longe superantibus pedicellis sat longis — mediocribus ± curvatis acladioque 25—50 mm. longo ± dense floccosis — canotomentosis pilis mediocribus — sat longis ± mollibus sat obscuris — canis raris — sparsis et glandulis brevibus — minutis paucis v. nullis vestitis. *Involucra* obscura atroviridia — sat canescentia ± elongata basi ovata postea ovato-rotundata. *Squamæ* latæ — latiusculæ e basi lata in apicem obtusiusculum — acutum leviter comatum attenuatæ, exteriores breves angustiores ± obtusiusculæ — sat acutæ ± fuscæ — sat nigræ, interiores virescentes v. late viridimarginatæ, pilis densiusculis — densis basi longa crassa nigricante apice albidis v. totæ fere canescentibus mediocribus — sat longis et glandulis nunc parvis v. mediocribus nigris sat conspicuis nunc minutis parum v. vix conspicuis raris — sparsis obtectæ, ceterum ubique rarissime v. sparsim, in marginibus interdum paullo densius floccose, sursum rarius stellatæ. *Calathidium* sat obsure luteum v. luteum sat radians. *Ligulæ* glabræ. *Stylus* luteus v. leviter fuscescens.

Inv. $\frac{11—13}{6—7}$, D. ad 40, L. m. 3 mm.

Utmärkt af stora, öfvervägande äggrundt eller ovalt-lancettlika till utdraget lancettlika, långspetsade inre rosettblad och stjelkblad med vanligen lång och hvass, ej serdeles tät tandning eller lång, smal och skarp flikighet med tänderna eller flikarne framåt- eller utåtrigtade, ofta något oregelbundet ordnade utefter bladsidorna och omvexlande med smärre tänder, mera ovala yttre rosettblad med tätare, bredare och kortare tänder, lifligt grön, ofta något glaucescent bladfärg, isynnerhet på den blekare undersidan, hvilken jemte bladskaften är ganska rik- och mjukhårig, högväxt, vanligen 0—1-bladig, mera sällan ända till 5-bladig stjelk, hvilken isynnerhet nedtill är rikt mjukhårig och oftast lifligt färgad, vanligen rikblomstrig, något gles, kvastlik inflorescens med långa, öfverskjutande, något böjda, till hvarandra närmade öfre och mera aflägsnade nedre grenar eller mera obegränsad inflorescens genom förgrening från något eller några af de öfre bladvecken, temligen långa holkar, som hafva breda, i en mer eller mindre skarp spets småningom afsmalnande fjäll, klädda af vanligen täta, vid basen temligen grofva och långt svartfotade eller till större delen gråa hår med inblandade svarta, medelstora, tydliga eller små och föga märkbara, ej serdeles rikliga glandler, och än äro gråa af rikligare, öfverallt spridt stjernludd, än mörka med stjernhåren mera glest samlade i kanterna af de inre och vid basen af de yttre fjällen, samt slutligen

ej synnerligen täta korgar med gula stift. Varierar ganska mycket till holkarnes färg, beroende hufvudsakligast på hårens och fjällens färg samt i någon mån på m. l. m. rikligt utveckladt stjernludd. På Gotland förekommer en modifikation med afseende på holkarne, hvilken för öfrigt är oafhängig af förändringar i andra delar och utan konstans. Hos denna modifikation, hvilken är helt och hållet beroende af lokalen (öppna hafstränder) och har sin motsvarighet hos andra gottländska former t. ex. *H. *cæsium*, *H. *stenolepis* m. fl., äro holkarne mycket ljusa och blekgröna. Denna färgförändring åtföljes äfven af en urblekt färg hos bladen. Glandlerna hos H. *exaltatum variera mycket till storleken. Hos glesare håriga former äro de på holkfjällen ofta rätt stora, mörka och lätta att upptäcka samt synas vara något rikligare äfven på skaften. Sådana modifikationer träffas vanligen på friskare, skuggigare ängsmark. Hos former med rikligare hårighet äro de sällan utvecklade på skaften eller så små, att de föga observeras, och på holkarne äro de oftast ytterst små och dolda af håren, så att de endast med möda kunna upptäckas. Till bladformen varierar den äfven något. Här och der förekomma fläckvis eller i enstaka individ former med bredare, mera äggrunda yttre och bredt äggrundt lancettlika inre blad. De yttre bladen hos dessa hafva ej sällan tvär eller hjertlik bas, eller är basen endast föga nedlöpande. Vanligen är hos dessa stjelken bladlös eller försedd med blott ett skaftadt blad. Tandningen, hvilken vid basen isynnerhet af de yttre bladen är m. l. m. bakåtrigtad, påminner för öfrigt hos dessa former i hög grad om *H. *silvatici* tandning. Dylika exemplar bevisa tydligt den nära slägtskapen med den sednare. Men äfven hos de normala formerna med långsträckta blad erinra de långa, spetsiga tänderna och flikarne, hvilka ofta nedstiga på bladskaften, om *H. *silvaticum*. Fastlandsformer äga i allmänhet föga bladig, vanligen 1- sällan mer än 2-bladig men mycket högväxt stjelk. De hafva derjemte oftast mycket stora blad, och isynnerhet äro de inre och stjelkbladen karaktäristiska genom sina långa, smala, merändels glesa, utdraget triangulära till lancettlika tänder och flikar, hvilka ofta isynnerhet vid bladbasen äro lika långa eller längre än skifvans hela bredd (ända till 30 à 35 mm. långa). På Gotland är den mera föränderlig till bladform, habitus och stjelkens bladrikedom m. m. Der förekomma utom fåbladiga *silvaticum*-lika former äfven robusta former med kortare tandade blad, grofva holkar och *cæsium*-habitus och från dessa alla medelformer till sådana med 5- ända till 8-bladig, spensligare men styf stjelk, smalare, finare holkar och *vulgatum*- eller nästan *subrigidum*-habitus, analoga med och till bladform mycket lika de mångbladiga formerna af *H. *variabile* (isynnerhet *β angustilobum*), från hvilka de ibland äro svårskilda. Dessa ytterlighetsformer (var. *peæum* K. Johansson in sched.) hafva ofta ända till 6—8-bladig stjelk med smalt lancettlika, tätt och långt tandade blad med smala, m. l. m. framåt rigtade, ofta sylhvassa tänder och äro oftast från öfre bladvecken kortgreniga samt hafva smärre holkar med smalare fjäll; härigenom bli de, som nyss nämnts, ofta ytterst lika *β angustilobum* af *H. *variabile* men skiljas lättast genom sin mörkare bladfärg, mera tvärt och skarpare tillspetsade stjelkblad samt förekomsten på holkarne af glandelhår, hvilka dock vanligen äro fina och små samt döljas af de tätare håren och derför lätt förbises. Denna form torde måhända vid närmare studium visa sig böra afskiljas som egen underart. Den i mina Hier. exs., fasc IV, n. 68 utdelade formen närmar sig till holkarnes hårighet mycket den nyss omtalade och är måhända medelform till den. För öfrigt förekomma med afseende på holkfjällens utseende såväl på Gotland

som isynnerhet på fastlandet tvänne modifikationer, hvilka möjligen vid närmare undersökning torde visa sig vara svagare utpräglade varieteter. Den ena modifikationen har spetsigare fjäll, af hvilka de yttre ej äro betydligt kortare än de öfriga, samt rikligare och längre håriga holkar med fin och föga synlig beklädnad af glandler, och motsvarar såsom *cæsium*-form *H. *silvaticum* bland *Subcæsia*. Den andra, hvilken har glesare och kortare samt mörkare håriga holkar med större och mera framträdande glandler samt de yttre fjällen kortare, trubbigare och genom sin mera framträdande hårtofs i spetsen tydligt afstickande från de inre, hvilka till ett mindre antal m. l. m. tydligt tendera att få trubbad (till tvär) spets, motsvarar *H. *sinuosifrons*, hvilken den liknar genom kortare holkar med mera tvär bas och tendens till ännu större flikighet hos bladen. Dock kunna dessa endast i sina ytterligheter serskiljas och äga sitt största intresse genom den antydan de lemna om *H. *exaltati* slägtskap med ofvannämda båda former af *Subcæsia*.

Från H. *basifolium är denna form bland annat skild genom de aldrig fläckiga bladen, längre och smalare tandning samt längre holkar, hvilkas fjäll hafva bredare bas och småningom afsmalna i en mera skarp spets.

Inom området anträffad på följande ställen: *Östergötland*, Sunds s:n, Löfåsa, Sandbäckstorp, Sunds Norrgård: *Småland*, Sommens järnvägsstation; Eksjö s:n (förf.); Dref s:n, Braås, mycket påminnande om *H. *sinuosifrons* (G. E. Hyltén-Cavallius); Vestervik, Kilmare (C. M. Nyman): *Gotland*, Ar och Hau i Fleringe allmän i såväl former med *cæsium*- som (var. *pexum*) med *vulgatum*- och *ramosum*-habitus och varierande till hårigheten, isynnerhet dess riklighet (S. Almquist); Lärbro i flera former, hvaribland äfven sådana med rätt framträdande *silvaticum*-habitus (S. Almquist); Hangvar s:n, Flenvik (K. Johansson); Bunge (S. Almquist). Vid Ar är äfven anträffad (af S. Almquist) den egendomliga, förut omtalade, men för öfrigt alldeles inkonstanta ståndortsmodifikationen med mycket ljusa, blekgröna holkar.

Utom området anträffad i *Södermanland*, St. Malms s:n, Jakobsberg, med långa och håriga, gråare holkar (G. A:n Malme): *Dalsland*, Dalskogs och Skålleruds s:r (A. Fryxell): *Värmland* (K. O. E. Stenström) samt i *Norge* på öarne i Kristianiafjorden, rätt allmän, med rikligare håriga och gråare holkar (förf.).

9. **H. *basifolium** (Fr.) Almqu.

H. diaphanum Fr. var. collinum Fr., Nov. Flor. Suec. Mant. II, p. 46 (?). — H. vulgatum c. basifolium sive muroro-vulgatum Fr. H. N. II:10. — H. cæsium Fr., Summa Veg. Scand., sect. post., p. 541, p. p. — H. cæsium Lbg., Hn. Fl. ed. 11, p. p. — H. vulgatum *basifolium Almqu. Stud., p. XXIII. — H. *basifolium (Fr.) Almqu. apud Stenstr., Wärml. Archier. 1889, p. 43. — H. cruentatum Stenstr. Wärml. Archier. 1889, p. 44, p. p. (quoad specimina verml.) — H. cæsium Lbg. Hier. Scand. exs., n. 60. — Dahlst., Hier. exs. fasc. I, n. 73, 74, 75 (forma). — Dahlst., Herb. Hier. Scand., Cent. II, n. 26, 27, Cent. III, n. 86.

Caulis 45—70 ctm. altus crassiusculus ± firmus 1—4-folius, inferne sat dense et longe pilosus v. glabriusculus subefloccosus, superne sparsim — densiuscule pilosus sparsim stellatus — sat tomentellus. *Folia rosularia* 2—6 ± longe petiolata saturate viridia sæpe subprasina, exteriora rotundato-ovalia — ovali-oblonga obtusa sparsim denticulata, interiora elliptico- vel ovato-lanceolata — oblongo-lanceolata

vel anguste lanceolata sparsim — sat dense sæpe longe et argute (sæpe patentim) subulato-dentata basi in petiolo sæpe longe decurrentia v. cuneata raro truncata in apicem sat longum integrum cuspidatum protracta, supra subglabra v. sparsim pilifera vulgo valde et intense purpureo- v. fusco- maculata, subtus pallidiora subglaucescentia sparsim — densiuscule in nervo dorsali rare — sat dense stellata densiuscule — dense pilis sat longis vestita, marginibus sparsim — sat dense ciliata, petiolis pilis mollibus longis densiusculis villosis. *Folia* caulina cito et abrupte decrescentia, infimum vulgo ± petiolatum, superiora sessilia ± ovato-lanceolata — lanceolata basi cuneata v. subtruncata sparsim et argute ± longe et sæpe præsertim ad basin pinnatifido-dentata in apicem ± longum integrum cuspidatum protracta, subtus in nervo dorsali ± dense ceterum sparsim stellata. *Anthela* ± paniculata simplex — composita contracta — sat laxa ramis ± distantibus v. summis sæpe valde approximatis erecto-patentibus leviter curvatis ± superantibus, pedicellis sat longis acladioque (10—)15—30 mm. longo ± virescentibus sat dense canofloccosis pilis brevibus mediocribus subobscuris — albidis sparsis — densis glandulis minutis raris (—sparsis) immixtis obtectis. *Involucra* e viridi ± obscure — dilute canescentia plerumque brevia sat crassa deflorata incrassata basi ± rotundata postea truncata. *Squamæ* ± angustæ breves lineares v. e basi latiore sublineares obtusæ — obtusiusculæ, intimæ ± acutæ, exteriores angustiores sæpe brevissimæ et obtusæ, pleræque sat late viridimarginatæ v. intimæ fere totæ virides — fusco-virentes et exteriores obscuræ, dorso ± nigro-fuscescentes pilis brevibus — mediocribus subobscuris v. sat longe canescentibus sparsis — sat densis hirtæ glandulis minutis sparsis — densiusculis inter pilos sæpe fere conditis vestitæ, marginibus fere ad apicem (comatum) obscuriorem leviter et laxe v. ubique floccis raris — sparsis ad basin sæpe sat densis conspersæ. *Calathidium* ± saturate luteum, sat plenum. *Ligulæ* apice glabræ. *Stylus* vivus fuscescens (interdum concolor), siccus obscurius.

Inv. $\frac{9—11}{6—7}$, D. 35 (—40). Lm. ad 3 mm.

En serdeles utmärkt men isynnerhet till habitus mycket variabel form, hvilket utan tvifvel står i samband med dess rikliga förekomst på en mängd ganska olikartade lokaler och dess vidsträckta utbredningsområde.

Utmärkt af sina mörkgröna, ofvantill oftast mörkfläckiga blad med vanligen glesare, framåt- sällan mera utåtrigtad och skarp tandning af omvexlande korta och långa (till ganska långa) tänder, vanligen grof, m. l. m. hårig, oftast 2-bladig stjelk, af hvars blad det nedre oftast är skaftadt, det eller de öfre oskaftade med åtminstone något eller några af dem med bred bas, korta och breda holkar med typiskt ganska smala, jembreda, m. l. m. trubbade fjäll med medeltät till tät beklädnad af vanligen ej långa, något grofva och styfva, kort hvitspetsade hår och glesare till tätare inblandade, små, ofta föga märkbara glandler samt i fjällkanterna rikligare, för öfrigt spridt eller vid sjelfva holkbasen temligen tätt, löst tilltryckt stjernludd, hos fåblomstrigare former än kort- än långgrenigt kvastlikt-gaffelgrenad, hos mångblomstriga former m. l. m. hopträngdt till glest kvastlik inflorescens med m. l. m. utspärrade (till något upprätta), öfverskjutande grenar samt meränd els redan från början m. l. m. mörka stift och täta korgar. Inom området synes den vara ganska

konstant och varierar hufvudsakligen i kvantitativt afseende eller i habitus. På friskare mark och i djupare skugga får den vanligen stora, tunna blad. Här äfvensom på hård, fast mark, där bladen blifva mera blågröna, blir den vanligen lågväxt med fåbladig stjelk. På torrare, bergig eller stenig mark bland buskar blir den gerna högväxt och flerbladig. Med afseende på holkarnes och skaftens beklädnad varierar den äfven något. Än bli håren rikligt utvecklade och ganska täta samt glandlerna små och glesa, än framträda glandlerna rikligare och bli större och kraftigare, hvaremot håren bli glesare. Stundom blir hårigheten lång, ljus och mjukare. Bladen omvexla bredare eller smalare med äggrund eller någon gång (isynnerhet på stjelken) tvär bas eller med långt nedlöpande skifva. Tandningen är vanligen rak, skarp och föga tät samt utstående och något ojemn, men varierar oregelbunden och tät med krökta tänder samt vid basen stundom bakåtrigtad. Vanligen är den smal och lång, stundom nästan flikad vid sjelfva basen, hvilken till formen, tändernas utseende m. m. ofta erinrar om den hos *H. *maculosum*, som är att uppfatta som ifrågavarande underarts *silvaticum*-form. Isynnerhet framträder denna likhet hos en del småbladiga former, hvilka ofta förekomma i Norges södra fjälldalar och lägre fjälltrakter. Dessa former äro vanligen lågväxta med tätt samlade, bredare, vanligen glattare och småtandade rosettblad samt 0—1-bladig stjelk. Men jemte dessa förekomma, isynnerhet i björkregionen, former med späd, högväxt stjelk, vanligen endast 1 skaftadt stjelkblad med tandningen hufvudsakligen framträdande vid basen och öfverallt svagare hårighet. Dessa former hafva vanligen mindre och ljusare korgar, kortare holkar och korta, mycket trubbiga, jemnbreda fjäll. Bladen äro föga eller alls icke fläckade eller endast med antydning till fläckighet mot stjelkbladets spets. Genom mångfaldiga, intermediära modifikationer öfvergå dessa former, hvilka ofta hafva ganska utpräglad *silvaticum*-habitus, i former, hvilka väsentligen öfverensstämma med de östsvenska. Hos dessa sednare äro ofta fjällen längre och äga i samband dermed bredare bas och afsmalnande spets. Traktvis varierar den äfven med mycket gråa holkar såsom i *Upland*, genom rikligare utbildning af stjernluddet. På några ställen i *Småland* är anträffad en modifikation med ytterst smala blad och utdragna, ganska spetsiga fjäll. Den öfvergår utan gräns i den allmänna formen, men är intressant för sin motsats till de trubbfjälliga norska formerna och framställer liksom dessa en annan ytterlighet i artens variationskrets. Stjelkbasen, bladskaften och medelnerverna äro oftast mörkt purpurfärgade och rosettbladens (de yttres) undersida intensivt lefver- eller violettfärgad. De karaktäristiska fläckarne på bladens öfversida saknas som ofvan är nämdt sällan helt och hållet. Åtminstone finnes de svagt förhanden på stjelkbladen. Stundom sammanflyta de nästan helt och hållet, hvarvid endast några smärre fläckar af bladets gröna färg bli synliga. Stiftet är oftast redan från början mörkt. Någon gång påträffas enstaka individ eller grupper af sådana med gula stift. En dylik form (utdelad i mina Hier. exs., f. I, n. 75) har derjemte djupare flikade ligulæ och större, något glesare korgar än den vanliga.

I östra Sverige förekommer den oftast i sällskap med H. *vulgatum,[1] med hvilken den lätt kan förvexlas, men är skild genom de fläckiga bladen med längre och smalare tandning, tätare korgar och fjällens form och beklädnad. I södra Norges fjälltrakter växer den

[1] I Upland och Stockholmstrakten växa *H. *vulgatum*, **basifolium* och **læticolor* vanligen i hvarandras sällskap och utesluta på en del lokaler, der de äro rikligt förhanden, nästan alla andra hieracier.

oftast i sällskap med *H. *gravastellum* (Dahlst., Hier. exs., f. I, n. 80, 81, = H. cæsium v. alpestre Lbg., Hier. Scand. exs., n. 61.) men mindre talrik än denna, med hvilken den derstädes är lätt att förvexla. Skiljes dock i lefvande tillstånd lätt på de ljusare och mindre korgarne och för öfrigt på beklädnaden, de oftast fläckiga bladen m. m.

Med H. vulgatum c. basifolium Fr. H. N. II : 10 är ifrågavarande form, såsom lektor S. Almquist visat, identisk, hvilket äfven framgår af de originalexemplar i enskildas herbarier, hvilka jag haft tillfälle att granska. I likhet med lektor Almquist anser jag, att detta artens äldsta, säkra namn åtminstone tillsvidare bör upptagas. E. Fries förenade den sedermera (i Symb. delvis och Epicr.) med *H. bifidum* Auctt. scand. och *H. læticolor* Almqu. (se denna) under namnet *cæsium*. Möjligen hör äfven, att döma af de få exemplar, jag sett, *H. arenarium* Sch. Bip.[1] (= H. maculatum Sch. Bip.[2]) såsom en varietet till denna art, i hvilket fall den sålunda får en vidsträckt utbredning utom Skandinavien. Denna form är dock skild genom alltid flerbladig stjelk, bladens starkare fläckighet samt mörkare, större, mindre stjernhåriga och mera glandulösa holkar.

Inom området anträffad i *Östergötland*, Vestra Hargs s:n, Norrbo (H. Strömfelt); Krokek s:n, Marmorbruket (S. Almquist); Qvillinge (Fr. E. Herfurth); Johannes s:n nära Norrköping (J. Hulting); Wist s:n, Sturefors, Sundsbro, Tobo, Söderby och Hamra samt Wessentorp (förf.); Wårdsbergs s:n, Wimarka, Rosenlund (A. R. Dahlgren); S:t Lars s:n, Rosenkälla, Smedstad, Walla, Ryd m. fl. st.; Kärna s:n, Malmslätt; Wreta s:n, Bergs och Brunneby slussar (gulskiftig form) och Stjernorp; Wånga s:n, Grensholmen; Wäderstad s:n, Lindekullen, Skållerud och Bossgård; Sunds s:n, Sundsö, Sunds Södergård och Norrgård, Sundstorp, Rökulla; N. Vi s:n, Siggemålen och Kärremålen samt Kyrkohögmålen (förf.); Torpa s:n, Torpaön; Kisa s:n, Karleby; V. Eneby s:n (N. C. Kindberg och K. F. Dusén); Åtvids s:n, Åtvidaberg; Oppeby s:n, Drabo (förf.): *Småland*, Äggerud; Moheda s:n, Lidsjö; Urshults s:n, Svikön samt Drefs s:n, Braås (G. E. Hyltén-Cavallius); Femsjö (enl. originalex. af E. Fries); Burseryds s:n, Mölneberg och Åsberg (K. A. Th. Seth); Kalmar, Ryssbylund (A. Egerström); Grenna, Björnberget (F. Hag; Ström); Askeryds s:n, Bordsjö; Gärdserum sn, Bossgård; Almvik (förf.). Utom området anträffad i *Helsingland*, Söderhamn (A. Magnusson): *Upland*, Upsala, Åsen (Fr. Ahlberg), Gottsunda, Flottsund (Hj. Östergren). Sigtuna (M. Flodenus): Stockholmstrakten (S. Almquist): *Södermanland*, Södertelje (G. L. Sjögren): *Vestmanland*, Lindå s:n, Salvik (A. E. Luhr); Kungsör (C. O. v. Porat): *Dalarna*, Venjans s:n, Johannesholm (K-P. Hägerström): *Vermland*, Arvika (E. Holmgren); Gillberga och Borgviks socknar (K. O. E. Stenström): *Dalsland*, Örs s:n, Berga, Lilla Linda, Storön i Örsjön; Skålleruds s:n, Upperud; Dalskogs s:n, Hedan (A. Fryxell): *Vestergötland*, Toarps s:n, Senåsabergen och Målsryd (A. O. Olsson): *Bohuslän* (Lbg. Hier. Scand exs., n. 60) och Uddevalla, Tjufkil (S. Almquist); Göteborg (förf.). — *Norge*, Kristianiatrakten; Torpen såsom i Kinn, Finden, Engejordet, Hugelien och Hugelisætern på Synsfjeld samt på Tonsåsen (förf.); Valders, Hofverudssætern i V. Slidre (F. Ahlberg). — Går upp i björkregionen (stundom högre). — Äfven funnen på *Åland*, Ekerö (A. Arrhenius).

10. **H. *læticolor** Almqu.

H. cæsium Fr. Symb. p. max. p. et Epicr. p. p. — H. cæsium Fr., Herb. Norm. XII, n. 19, 20. — H. cæsium Fr., Summa Veg. Scand. p. p. — H. cæsium Almqu. in Thed. Fl. 1871, p. 359. — H. cæsium Lbg. in Hn. Fl. ed. 11, p. p. — H. cæsium C. J. Lbg. Hier Scand.

[1] I C. F. Schultz Arch. de Fl., p. 22, 23.
[2] I Pollichia X, p. 24.

exs., n. 125. — H. *læticolor Almqu. Stud., p. XXIII. — H. læticolor var. prolixiforme Dahlst., Hier. exs., fasc. I, n. 72. — Dahlst., Hier. exs., fasc. IV, n. 64, 65. — Dahlst., Herb. Hier. Scand., Cent. II, n. 28, 29 et 30, 31 (formæ).

Caulis sat altus crassus — crassiusculus firmus, inferne ± coloratus parce pilosus — glabriusculus, superne glaber rare — sparsim v. apice densius floccosus, 1—3-folius. *Folia rosularia* plerumque læte viridia, exteriora ± ovalia — elliptica v. spathulato-ovalia obtusa æqualiter brevidentata, interiora ± elliptica ± ovato-oblonga v. ± lanceolata vulgo breviter acute et sparsim denticulata — dentata interdum subintegra raro pinnatifido-dentata, dentibus sæpe patentibus v. præsertim ad basin haud raro subreversis, basi cuneata v. sæpe dentibus v. laciniis liberis in petiolo alato ± longe descendente, acuta sat cuspidata, supra glabra v. parce pilifera, subtus rare — sparsim in costa sat floccosa densius et longius pilosa, ceterum sparsim v. rare stellata, marginibus pilis sparsis — densiusculis ciliata, petiolis vulgo brevibus alatis pilis sat longis mollibus ± densiusculis vestitis. *Folia caulina* cito et abrupte decrescentia, infimum vulgo ± petiolatum, superiora sessila ± ovato-lanceolata — lanceolata sparsim et minute v. ad basin longe et sæpe pinnatifido-dentata basi abrupte cuneata — sat descendente, in apicem ± longum acutum — cuspidatum attenuata, subtus densius stellata. *Anthela* ± paniculata v. furcata subcomposita — simplex ± laxa ramis ± longis erecto-patentibus superantibus ± distantibus v. sæpe valde aproximatis — fere umbellatis pedicellis longis v. mediocribus acladioque 20—60(—90) mm. longo sparsim v. ± dense floccosis pilis brevibus raris v. subnullis et glandulis raris — sparsis obsitis. *Involucra* plerumque humilia sat crassa parva — mediocria raro magis elongata plerumque e viridi ± fusco-canescentia rarius obscuriora fuscoviridia basi rotundata postea truncata. *Squamæ* plurimæ pleræque subæquales anguste lineares v. (e basi latiore) linearilanceolatæ et sensim attenuatæ obtusiusculæ — sat acutæ, intimæ acutæ v. paucæ subulatæ, exteriores paucæ breves sat obtusæ, omnes ± comatæ v. interiores apice sæpe epilosæ, marginibus ± late virescentes, pilis brevibus obscuris firmulis et glandulis minutis — mediocribus dilutis v. obscuris sparsis — densiusculis obtectis, exteriores ad basin sæpe dense albido-floccosæ, ceteræ fere nudæ v. dorso marginibusque tenuiter (raro densius) stellatæ. *Calathidium* sat obscure luteum subradians (— sat radians). *Ligulæ* apice glabræ. *Stylus* vivus et siccus sat obscurus.

Inv. $\frac{9—10(—11)}{5—6(—7)}$, D. 35—40, L. m. 2,5 mm.

Denna form, hvilken är i ganska hög grad variabel, hufvudsakligast till habitus och bladtändernas längd, är i flertalet af sina former utmärkt af ljust färgade, vanligen kort och glest tandade blad af oftast oval till elliptisk form med på de vingade och vanligen korta skaften nedlöpande bas, små eller medelstora, vanligen korta och breda, mångfjälliga holkar, hvars fjäll äro smala, nästan jembreda eller föga bredare vid basen, de flesta nästan jemnhöga, klädda liksom de stjernludna skaften af glesa eller något tätare, korta, långt svartfotade, något styfva hår och små till medelstora, glesare eller tätare, alltid väl framträdande glandler samt för öfrigt öfver hela fjället af sparsamt eller mot kanterna

något rikligare och endast på de yttre fjällens bas tätt, blåhvitt stjernludd. Stjelken är vanligen mycket glatt och hos den typiska formen 2—3-bladig. Stjelkbasen, bladskaften och bladens medelnerver äro vanligen ljust och lifligt violettfärgade; stundom hafva äfven några af de yttre bladen på undersidan samma färg. Typiskt äro bladen glest och ytterst kort tandade, stundom nästan helbräddade. Skuggformer få dock alltid längre, men aldrig tätt tandade blad.

Denna form är af stort intresse för sin påtagliga slägtskap och fullkomliga motsvarighet till *H.* **prolixum* Norrl., hvars motsvarande *cæsium*-form den är, och hvilken den ofta i hög grad liknar till holkarne. Och liksom andra till *Cæsia* hörande former, t. ex. *H.* **exaltatum*, innefatta serier af former, hvilkas ytterligheter motsvara tvänne närstående former af *Subcæsia*, förhåller sig ifrågavarande form på samma sätt. Från den typiska formen, hvilken motsvarar de allmänna formerna med mera hopträngd inflorescens af *H.* **prolixum*, synes en hel formserie leda öfver till en annan form med längre holkar och utdragna, spetsiga, öfverskjutande fjäll (analog med H. cæsium)[1] samt breda, vanligen längre tandade, stundom nästan fliktandade blad, af hvilka rosettbladen stundom hafva tvär, stjelkbladen mångengång pillik bas, och som till holkarne i förvillande grad liknar *H.* **acidotum*, om hvilken den äfven till bladfärg och egendomligheter i tandningen erinrar och hvilken den sålunda såsom *cæsium*-form synes motsvara. Den erinrar äfven om *H.* **acidotum* till inflorescensen och den något nedlöpande holkbasen. Hufvudformen varierar för öfrigt till inflorescensens utbildning analogt med *H.* **prolixum*. Liksom denna sednare äger den samma obeständighet i inflorescensgrenarnes anordning. Än är korgställningen mera kvastlik med kortare akladium, än är den nästan flocklik med ofta mycket långt akladium, hvilket isynnerhet blir betydligt förlängdt (så att inflorescensen blir furkat) hos fåblomstriga backformer, fullkomligt såsom hos motsvarande former af *H.* **prolixum*.

Äfven i andra afseenden företer den likheter med denna sednare såsom i tendensen hos bladskaften att bli böjda, hvarigenom rosettbladen bli m. l. m. vridna rundt om stjelken (på fastare, öppen mark), och stjelkbladens tendens att bli utåt- och nedåtböjda. Serdeles tydligt framträder detta hos formerna från södra Östergötland, hvilka genom sin mörkare grönska, oftast mera tandade blad, utböjda stjelkblad och mörkare holkar med föga stjernludd (stundom nästan endast framträdande vid sjelfva holkbasen) samt den mera hopdragna inflorescensen erinra om de allmännare östgöta-formerna af *H.* **prolixum*. Denna form, b *subprolixum* (= H. læticolor v. prolixiforme Dahlst., Hier. exs., fasc. I, n. 72)[2], hvilken synes ensamt förekomma på sydligaste utkanten af utbredningsområdet men derjemte sparsamt äfven i Upland och Helsingland, torde stå närmare *H.* **prolixum*, såsom bladfärg m. m. angifver, än de allmännare upländska formerna. Till holkarnes beklädnad varierar denna underart i sin helhet på samma sätt som *H.* **prolixum*, isynnerhet till stjernluddets riklighet. Liksom denna sednare, och såsom oftast synes vara förhållandet med flera andra former, äger den i Upland i allmänhet betydligt stjernhårigare holkar än annorstädes.

[1] Denna form är af lektor S. Almquist förut i samlingar benämnd *H.* **pectinatulum*. Jag fann den sommaren 1880 ymnigt i Stockholms omgifningar och vid Dannemora i *Upland*. Från hufvudformen synes den mig numera väl skild genom sina djupt flikade blad och sina smalare holkar med något nedlöpande bas m. m. och förtjenar eget namn. Utdelad i mina Hier. exs., fasc. IV, n. 67.

[2] Namnet *prolixiforme* är redan förut gifvet af J. P. Norrlin (Herb. Mus. Fenn. p. 149) åt en annan form och måste derföre utbytas mot ett nytt.

Den i mina Hier. exs., fasc. II, n. 46, 47 (under namn af *H. *læticolor* forma) utdelade formen tillhör visserligen till sina allmänna karaktärer *H. *læticoloris* formområde men afviker i flera afseenden från densamma och är enl. S. ALMQUIST att betrakta som en serskild, mera utpräglad underart eller var. (*H. *miramarense* ALMQU. in litt).[1] Den förhåller sig till den upländska hufvudformen, i hvars fler- och smalbladigare former den sannolikt öfvergår, såsom *H. *variabile* h. f. och *β angustilobum* samt *H. *galbanifolium* till sina få- och bredbladigare former eller såsom den mångbladiga, gottländska formen var. *pexum* af *H. *exaltatum* till den fåbladiga fastlandsformen, d. v. s. den är utbildad mera enligt *vulgatum*- eller t. o. m. *subrigidum*-typen än öfriga former af *H. *læticolor*. Från hufvudformen är den skild genom i allmänhet högre växt, vanligen flerbladigare, ända till 5-bladig stjelk, smalare (vanligen m. l. m. lancettlika), mera i lökgrönt skiftande blad med tätare och mot stjelkbladens bas ofta lång och fin, stundom sylhvass tandning, småningom decrescerande stjelkblad, vanligen rikblomstrig, nedåt ofta obegränsad inflorescens med rakare och mera upprätta grenar och kort akladium samt i genomsnitt smärre, mörkare holkar med rikligare glandler men färre hår, sparsamt till temligen rikligt glandelhåriga nästan hårlösa holkskaft och för öfrigt alla vegetativa delars större glatthet och brist på stjernludd samt vanligen smärre korgar (omkr. 25—30 mm. i D.). Anträffad i *Helsingland* (A. MAGNUSSON), *Gestrikland* och *Upland* (S. ALMQUIST).

Hufvudformen med modifikationer är funnen i *Upland* allmän (enl. S. ALMQUIST m. fl.) och synes der hafva sitt centrum samt i *Södermanland*, Stora Malms s:n (G. A:N MALME) i modifikationer närmande sig f. *subprolixum*: *Vestmanland*, Kungsör (C. O. VON PORAT), Johannesberg och Frösåker samt, inom området, i *Östergötland* på Kolmården vid Qvarsebo och Marmorbruket (S. ALMQUIST). En spetsfjälligare lundform är anträffad inom området i *Östergötland*, Wist s:n, Sturefors och Wessentorp samt Wäderstad s:n, Lindekullen (form närmande sig b. *subprolixum*), vidare i *Upland* flerestädes ss. vid Focksta (S. ALMQUIST och förf.), Upsala (E. HOLMGREN) och Sigtuna (M. FLODERUS); Stockholms omgifningar (S. ALMQUIST och förf.). Mycket bredbladiga former äro funna kring Stockholm, på Ljusterö och vid Dannemora (förf.). En närstående form äfven i *Helsingland*, Hedvigs fors (N. WESTBERG); — b. *subprolixum* är anträffad i *Östergötland*, Ydre, Sunds s:n, Graby, Sunds Norrgård och Löfåsa samt N. Vi s:n, Kärremåla; Krokek s:n, Marmorbruket: *Upland* vid Upsala (enl. ex. af FR. AHLBERG). En hithörande, åt *H. *miramarense* tenderande form är funnen i *Helsingland* vid Hernösand (FR. LÖNNKVIST).

H. CÆSIOMURORUM LBG.

H. murorum L. var. hybridum LBG. in Blytt, Norg. Fl. 1874, p. 653. — H. cæsium LBG. in Hn. Fl. ed 11, p. 44, p. p. et H. cæsiomurorum LBG., Hier. Scand. exs., n. 59. — H. cæsiomurorum NORRL., Bidr. p. 113. — H. cæsiomurorum STENSTR., Werml. Arch. 1889, p. 35. — DAHLST., Hier. exs., fasc. I, n. 64, 65, 66. — DAHLST., Herb. Hier. Scand., Cent. II, n. 46, 47.

[1] Enligt S. ALMQUIST är denna form ej sällsynt i *Upland*; sjelf har jag anträffat den bland h. f. vid Dannemora (1890), der den syntes mig väl skild.

Caulis 35—90 ctm. altus crassiusculus 1—3(—5)-folius, inferne rare — densiuscule pilosus leviter stellatus, superne rare — sparsim pilosus et sparsim stellatus, apice sat tomentosus pilis brevibus subobscuris raris et glandulis parvis — mediocribus sparsis — densiusculis obtectus. *Folia rosularia* 3—6, exteriora ± ovalia obtusa v. obtusiuscula sub anthesi vulgo emarcida breviter et sparsim dentata, intermedia ± ovata — ovato-triangularia v. ovato-lanceolata basi cuneata v. sat descendente sæpe abrupta interdum cordato-sagittata sparsim et æqualiter nunc breviter nunc longe et acute dentata ad basin sæpe pinnatifido-dentata ± acuta, interiora ± late — anguste ovato-lanceolata plerumque præsertim ad basin magis dentata in apicem longum — longissimum subintegrum acutum — cuspidatum attenuata basi vulgo descendente — cuneata rarius abrupta v. cordato-sagittata; *caulina* plerumque abrupte raro sensim decrescentia, infimum v. inferiora vulgo petiolata, summa sessilia ± late — anguste ovata — ovato-lanceolata longe acuta — cuspidata sparsim nunc breviter nunc longe dentata v. ad basin densius longissime et acutissime dentata — pinnatifida, omnia obscure gramineo-viridia (v. subprasina — sublutescentia), supra rare — sparsim pilosa, subtus sparsim — sat dense in nervo dorsali sat stellato ± dense pilosa, marginibus densiuscule — sat dense ciliata, petiolis superne ± alatis laciniis v. dentibus liberis sæpe instructis pilis mollibus sat longis (sparsim —) sat dense villosis. *Anthela* ± paniculata simplex — sat composita sat contracta v. ± laxa, ramis inferioribus suberectis ± distantibus, superioribus sæpe valde approximatis, paucis interdum umbellatim congestis, ± erecto-patentibus omnibus ± rectis v. summis leviter arcuatis paullum v. valde superantibus, pedicellis brevibus — mediocribus acladioque 5—20 mm. longo floccis densis canis glandulis brevibus — mediocribus sublutescentibus — sat nigris dense — creberrime obtectis et pilis brevibus paucis v. sparsis immixtis. *Involucra* brevia mediocria e viridi v. fusco-nigro eximie canovariegata basi rotundata postea truncata. *Squamæ* ± late triangulari-lanceolatæ sat æqualiter imbricatæ apicibus — comatis obtusis intimæ paucæ solum subacutæ (et summo apice ipso brevissime denudatæ coloratæ) glandulis minutis — brevibus lutescentibus — nigris densis — confertis et pilis brevibus — mediocribus obscuris apice canescentibus (sparsis —) densiusculis — sat densis obtectæ, marginibus præcipue apices versus floccis albis laxis creberrimis ± late limbatæ, ceterum dorso fuscoviride — sat nigro rare — sparsim stellatæ. *Calathidium* saturate luteum sat plenum. *Ligulæ* apice glabræ. *Stylus* vivus fuscus, siccus ± obscurus — nigricans.

Inv. $\frac{9—10(—12)}{5-6(—7)}$, D. 35—40, L. m. 3. mm.

En af Skandinaviens utmärktare och mera fristående former, igenkänd på de mörkgröna än i lökgrönt än i gulgrönt skiftande bladen, hvilka vanligen äro af äggrundt triangulär till äggrundt lancettlik form med kortare eller längre vigglik, sällan tvär eller intryckt bas och af hvilka åtminstone de innersta rosettbladen och stjelkbladen hafva långt utdragen, nästan helbräddad spets samt till sin öfriga omkrets vanligen äro glest och jemt utåt eller framåtrigtadt tandade, sällan ojemnt och tätare tandade, vid basen ofta långtandade eller parflikigt tandade med utstående eller någongång med bakåtrigtade tänder, en- till flerbladig, van-

ligen högväxt stjelk, korta holkar, hvilka äro vackert brokiga af i de gröna kanterna af de korta triangulärt-lancettlika fjällen, isynnerhet mot spetsarne, bredt samladt, rikligt stjernludd, hvilket m. l. m. afbryter mot den mörka eller grönbruna ryggen, och som för öfrigt äga något vexlande beklädnad af m. l. m. täta, korta glandler och hår, genom m. l. m. hopdragen vippa med raka, upprätta eller i öfre delen något utspärrade, ibland föga, ibland långt öfverskjutande grenar samt temligen täta, mörka korgar och m. l. m. mörka stift. Lågväxta former hafva vanligen stora, högväxta ofta små holkar. Till habitus och bladens form, isynnerhet basens, varierar arten rätt mycket. Former med flerbladig stjelk hafva oftast smalare, äggrundt-lancettlika, jemnare och glesare tandade blad med m. l. m. nedlöpande bas och framåtrigtad tandning. Stundom träffas enstaka exemplar med ända till 5 stjelkblad, ehuru deras antal i allmänhet sällan öfverstiger 3. Former med få stjelkblad hafva i allmänhet breda blad med ofta tvär bas, och ej sällan är bladbasen, isynnerhet på de inre rosettbladen och nedre stjelkbladen, hjertlikt pillik med starkt bakåtrigtad tandning. Någongång äga alla rosettbladen eller endast något eller några af stjelkbladen pillik till hjertlik bas. Dylika individer påminna i hög grad om *H. *triangulare* och *H. *subtriangulare*, med hvilka båda denna art dessutom i holkarnes beklädnad i hög grad öfverensstämmer. Den är också utan tvifvel beslägtad med dessa, närmare än med någon form af *Cæsia*, och äger samma motsvarighet till dem, som förefinnes mellan flera andra former af *Cæsia* och *Subcæsia* sinsemellan. På samma sätt som föregående form äger modifikationer, hvilka motsvara tvenne närstående former af *Subcæsia*, motsvara ytterlighetsmodifikationerna af denna art dels *H. *triangulare* dels *H. *subtriangulare*. Om den förra erinra de mindre allmänna formerna med svag hårbeklädnad, om den sednare de vanligare formerna med rikligare hårbeklädnad på holkar och skaft. För öfrigt äro fjällen hos de förra vanligen bredare och kortare, hos de sednare längre och smalare. Efter ståndorten vexla holkarne mera gröna på varmare lokaler och i stark skugga, mörkare på öppna och kallare lokaler. På soliga eller varmare ställen bli håren ljusa och luddet rikligare, äfven mot midten af fjällen, hvarigenom holkarne bli ljust grågröna; på kallare lokaler mörkna håren och minskas luddet eller blir mindre tydligt genom fjällens mörkare färg. Tilläggas hör äfven att bladen bli finare eller kortare tandade och mera håriga samt mindre på torrare och soliga lokaler, längre tandade t. o. m. flikiga och glattare på friskare mark. I torrare lundar bli de vanligen stora och slappa samt glest och kort tandade.

Någongång uppträda modifikationer med alla rosettbladen aflånga med största bredden ofvan midten samt stundom nästan helbräddade. En anolog variation träffas då och då af *H. *triangulare*.

Stjelkens bas och bladskaften äro ofta lifligt violettfärgade. På skuggiga lokaler blir bladens undersida m. l. m. violett. På öppna ställen t. ex. på Gotlands kalkhedar bli bladen ej sällan äfven på öfversidan intensivt violetta. På en del trakter förekommer en form med gles, utspärrad och långgrenig vippa samt grofva, ända till 12 mm. långa och 7 mm. breda holkar.

Inom området allmän, ofta uppträdande i större massor: *Östergötland*, Gårdeby s:n, Örsby; Vestra Husby s:n, Korssäter (H. STRÖMFELT); Qvillinge kyrka (A. WIRÉN); Krokek s:n, Marmorbruket (S. ALMQUIST); Wånga s:n,

Grensholmen; Wist s:n, Sturefors och Sundsbro, Wessentorp samt Söderby; St. Lars s:n, Tinnerängen, Smedstad; Wreta s:n, Berg (förf.); Winnerstad s:n (E. ADLERZ); Motala; Omberg, Mullskräerna, Stocklycke m. fl. st.; Norsholm, Kalfholmarne (förf.); Wäderstads s:n, Lindekullen, Torpa, Bossgård; Rinna s:n, Stortorp; Trehörna s:n, Slangeryd; Sunds s:n, Löfåsa, Rökulla, Graby, Sunds Norrgård, Sundstorp och Sundsö; N. Vi s:n, Tullerum (förf.) och Kyrkohögmålen (K. F. DUSÉN); V. Ryds s:n, Tunarp; Åtvids s:n, Adelsnäs, Karstorp m. fl. st. (förf.): *Småland*, Grenna, Westanå (K. A. BELFRAGE och J. N. ÅKERMARK samt K. F. HAGSTRÖM), en storholkig form; Öggestorp s:n, Ljungarp och Rogberga s:n, Heljaryd, Tenhult (K. JOHANSSON); Askeryd sn, Bordsjö och Ingevaldstorp (förf.); Öfverums s:n, Tyllinge (förf.); Drefs s:n (G. E. HYLTÉN-CAVALLIUS); Oskarshamn (K. J. LÖNNROTH)[1]: *Gotland*, Rute s:n mellan Gerungs och Risungs; Fleringe s:n, Strandvägen (K. J. LÖNNROTH)[2]; Wisby snäckgärdet (K. J. LÖNNROTH och K. JOHANSSON): *Öland*, Borgholm (S. ALMQUIST): *Blekinge*, Bubbetorp och Skaftö (H. G. LÜBECK). Utom området funnen i *Södermanland*, Ålberga (S. ALMQUIST) m. fl. st.: Stockholmstrakten rätt allmän (S. ALMQUIST och O. JUEL): *Upland* flerestädes: *Vestmanland*, Kungsör flerestädes (C. O. VON PORAT): *Bohuslän*, Uddevalla (S. ALMQUIST): *Dalsland* flerestädes såsom Örs s:n, Stränge, Storön i Örsjön, Appelbol och Berga; Skålleruds s:n, Upperud; Gunnarsnäs s:n, Rostock, Dalskogs sn, Hedan (allt enl. A. FRYXELL): *Vermland*, Arvika (E. HOLMGREN); Gillberga s:n m. fl. st. (K. O. E. STENSTRÖM): *Dalarne*, Venjans s:n vid Venjanssjön (K. P. HÄGERSTÖM): *Helsingland*, Loos. I *Norge* på öarne i Kristianiafjorden allmän (förf.); Trondhjem (O. JUEL); Meraker (enl. ex. af FR. LÖNNKVIST och enl. J. P. NORRLIN). Dessutom enl. J. P. NORRLIN (Herb. Mus. Fenn.) anträffad i sydvestra *Finland*. I Riksmuseet finnes exemplar från Tavastland, Koski.

En mycket egendomligt utbildad form, anslutande sig till de flikbladigare fastlandsformerna med tvär eller något pillik bladbas är:

β umbraticum K. JOHANSSON in litt. — DAHLST., Herb. Hier. Scand., Cent. II, n. 48.

Caulis vulgo 1- v. subbifolius. *Folia basalia* in rosulam congesta lata ± ovata dense et longe præsertim ad basin pinnatifido-dentata dentibus patentibus ad basin truncatam v. cordatam sæpe subreversis — reversis. *Folium caulinum* breviter petiolatum v., si duo adsunt, summum sessile, infimum magis quam in fol. basal. pinnatifidum v. pectinatum basi sæpe cordato-hastatum. *Involucra* densius cano-floccosa quam in forma vulg. cum pedicellis magis etiam pilosa. *Squamæ* aliquantulum angustiores.

En mycket märkvärdig form, mera än de omnämnda, åt *H. *triangulare* tenderande formerna af hufvudformen anslutande sig till denna och *H. *subtriangulare*. Holkarne äro ännu gråare, än hos hufvudformen är vanligt, och öfverträffa häri t. o. m. *H. *triangulare*. Till habitus ser den nästan ut som en form af *Subcæsia* och liknar häri än *H. *triangulare* än *H. *subtriangulare*. Bladen äro dock betydligt mera flikade och långtandade än hos dessa och häri erinrar den mycket om *H. *cæsiiflorum*. Huru konstant den är, kan jag ej afgöra, men jag har varit i tillfälle att se ett större antal af auktor sjelf insamlade exemplar jemte former af vanligt utseende från samma trakt och från dessa sednare syntes den både habituelt och i ofvan anförda karaktärer ganska väl skild. Bibehåller i Bergi-

[1] Här äfven insamlad en mikrocefal form med ytterst små glandler och hår, mörka, mindre luddiga holkar och smala fjäll.

[2] Här insamlade exemplar utmärkas genom mycket blekgröna holkar och blad och äro analoga med dylika former af *H. *cæsium*, *H. *stenolepis v. littorale* och *H. *exaltatum* från samma lokal.

anska trädgården, odlad af frukter från nedan anförda lokal, i alla afseenden sitt egendomliga utseende och sina karaktärer, men blir ofta 2—3-bladig.

Funnen vid Fårösund på *Gotland* i tallskog å steniga strandvallar 1890 (K. JOHANSSON).

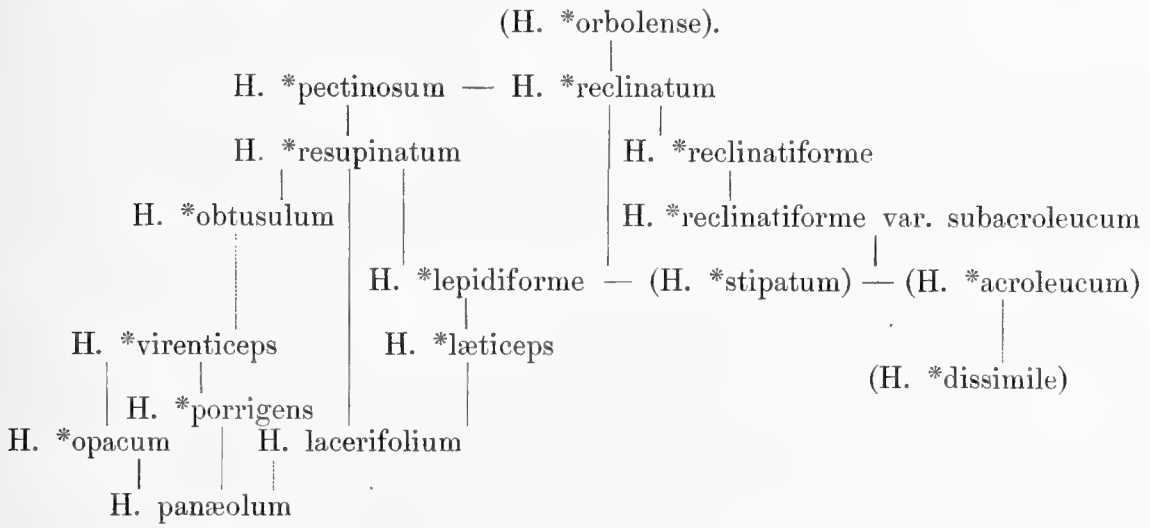
H. PORRIGENS ALMQU.

Caulis glabriusculus vel. parce, inferne sparsim pilosus. *Folia* caulina 0—3 cito decrescentia ± remota v. 3—10 sensim decrescentia approximata, infimum v. inferiora sæpius ± petiolata, cetera sessilia angustiora — latiora utrinque ± acute dentata basi sæpe irregulariter incisa — pinnato-dentata; *basalia* nunc in rosulam multifoliam congesta lata subintegra v. sparsim acute — obtuse dentata, dentibus brevibus v. longis angustis et basi sæpe irregulariter et longe incisa — pinnata, v. angusta magis æqualiter serrato-dentata, raro sub anthesi pauca v. plurima emarcida (in formis caulibus multifoliis) basi descendente v. ovato-obtusa (raro cordulata). *Involucra* crassa — crassiuscula sat elongata — brevia magna — parva obscura — diluta, squamis longis — brevibus lanceolatis — linearibus glandulis densis — sparsioribus nigris mediocribus — sat longis v. dilutis ± lutescentibus parvis obsitis dorso densiuscule — sparsim stellatis marginibus leviter (saltim ad basin magis conspicue) v. ± late floccoso-limbatis, epilosis (v. pilis solitariis obsitis). *Anthela* paniculata simplex haud raro (in. sp. 3 primis) subfurcata laxa ramis ± longis patentibus v. ramoso-paniculata ± indeterminata ramis brevioribus, in omnibus ± rectis. *Styli* raro subobscuri, vulgo mere lutei.

Hitförda underarter bilda en ganska naturlig grupp af tydligt och nära sammanhängande former, af hvilka de trenne första morfologiskt tillhöra *cæsium*-typen, de följande *ramosum*-typen och mer eller mindre närma sig till *subrigidum*-typen. Alla, utom den första och vanligen den sista, utmärka sig genom åtminstone vid basen inskurna och ofta långt flikade blad, af hvilka basalbladen vanligen bilda en mångbladig rosett med oftast breda blad, och alla kännetecknas de af m. l. m. glandelhåriga och åtminstone i kanterna af fjällen, och der vanligen tydligast, stjernhåriga holkar samt i allmänhet gula stift. *H. *opacum*, *H. *virenticeps* och *H. *porrigens* äro sinsemellan mycket närstående, den första och den sistnämda, oaktadt sina ganska väl utpräglade skiljaktigheter förenade genom mellanformer, hvilka dock stundom men ej alltid äro att uppfatta som hybrider. Dessa former hafva fåbladig stjelk och breda samt rikliga rosettblad äfvensom stora holkar med mörka, ofta långa glandler. De närma sig i sina karaktärer så betydligt *H. *panæolum* af *Subvulgata*, att de utan tvifvel äro att uppfatta såsom närmast beslägtade med denna, efter *silvaticum*-typen utbildade form. *H. *porrigens* påminner äfven om *H. lacerifolium* och är utan tvifvel äfven beslägtad med densamma, men den sammanhänger dessutom genom varieteten *intermedium* med *H. *resupinatum*, hvilken alldeles otvetydigt är *H. *lacerifolii* närmaste slägting och dess motsvarande *cæsium*- eller *ramosum*-form. Denna kan nämligen ibland hafva fåbladig stjelk

och breda, djupflikade stjelkblad, som till färg och tandning i hög grad påminna om den nyssnämnda, med hvars mera små och ljusholkiga modifikationer den ofta har en synnerlig likhet. *H. *pectinosum* är att uppfatta som en från *H. *resupinatum* afledd eller parallelt med denna utbildad form med ännu mångbladigare stjelk och af mera utpräglad *ramosum-* eller *subrigidum*-typ. *H. *reclinatum* åter är en annan parallelform till *H. *resupinatum* med smalare och mindre tandade blad och af mera framträdande *subrigidum*-typ och ofta habituelt mycket liknande former af *rigidum*-typen. Äfven denna påminner om smalbladiga former af *H. lacerifolium*. Mellanlänkar mellan denna sednare och de nyssnämnda äro de utom området påträffade *H. *lœticeps* och *H. *lepidiforme*. Dessa nyssnämnda, mångbladigare former äga oftast smärre och småningom decrescerande stjelkblad, någongång färre och vid blomningen afvissnade basalblad, hvilket står i samband med stjelkens större bladrikedom, samt smärre holkar med glesare och små, gulaktiga glandler. Hela artkomplexen visar dessutom tydlig slägtskap med vissa former af *Vulgata genuina* isynnerhet med *H. *acroleucum* och *H. *irriguum*, och anmärkningsvärdt nog stå dess motsvarande båda former af *silvaticum*-typen nära en del former af *Subvulgata* (såsom *H. lacerifolium*) eller äro att föra till denna grupp (såsom *H. panœolum*).

Hithörande formers förhållande till hvarandra och till de nyssnämnda af *silvaticum*-typen torde vara följande:



Conspectus subspecierum.

A. *Caulis* 0—3 folius; folia caulina abrupte decrescentia remota. *Glandulæ* involucri obscuræ mediocres — magnæ, sat densæ — confertæ.

Involucra brevia crassa; *squamæ* sat angustæ e basi paullo latiore sublineares sat breves ubique sat æqualiter floccosæ ad basin in marginibus floccis densioribus obsitæ breviter glandulosæ. *Folia* subintegra v. breviter acutiuscule v. sæpius subobtuse dentata, prasino-viridia sæpe maculata.

1. *H. *opacum* Lönnr.

Involucra parva crassa; *squamæ* latæ — v. sat latæ e basi paullo latiore sublineares sat breves dorso præsertim superne sparsim — sat densiuscule inferne in marginibus paullo densius stellatæ breviter glandulosæ. *Folia* breviter et acute dentata, læte gramineo-viridia, non maculata.

2. *H.* **virenticeps* Dahlst.

Involucra plerumque elongata crassa; *squamæ* subangustæ — latiusculæ e basi latiore lineari-lanceolatæ sat elongatæ dorso sparse stellatæ marginibus anguste — sat late et conspicue floccoso-limbatæ, sat longe glandulosæ (pilis raris interdum immixtis). *Folia* ± acute brevius et longius dentata ad basin sæpius inæqualiter et grosse pinnatifido-dentata v. laciniata, gramineo-viridia, subglaucescentia.

3. *H.* **porrigens* Almqu.

B. *Caulis* 4—10-folius; folia caulina sensim decrescentia ± approximata. *Glandulæ* involucri vulgo lutescentes v. fuscæ parvæ — minutæ, sparsæ — sat densæ.

Involucra breviuscula parva latiuscula; *squamæ* angustæ lineares sat elongatæ, dorso rare stellatæ marginibus anguste floccoso-limbatæ, brevissime glandulosæ. *Folia* basalia lata læte viridia sublutescentia sparsim et præsertim ad basin anguste pinnatifido-dentata; caulina sat angusta. Gracilius.

4. *H.* **resupinatum* Almqu.

Involucra brevia mediocria crassa; *squamæ* e basi lata lanceolatæ haud elongatæ, marginibus inferne leviter superne densius stellatæ, sat breviter glandulosæ. *Folia* basalia ± lata ± longe et grosse laciniata — pinnatifido-dentata sat læte viridia; caulina ± lata. Robustius.

5. *H.* **pectinosum* Dahlst.

Involucra subminuta crassiuscula; *squamæ* sat angustæ e basi latiore ± attenuatæ breves, dorso rare stellatæ, marginibus ± anguste et haud dense floccoso-limbatæ, minute glandulosæ. *Folia* basalia ± angusta argute et sparsim subserrato-dentata, læte viridia; caulina angusta.

6. *H.* **reclinatum* Dahlst.

1. **H.** **opacum* Lönnr. *in sched.*

Dahlst., Hier. exs., fasc. II, n. 51. — Dahlst., Herb. Hier. Scand., Cent. II, n. 34; Cent. IV, n. 26.

Caulis 30—60 cmt. altus firmus (0—)1—2(—3)-folius interdum a basi ramosus, inferne (v. totus) obscure purpurascens parce pilosus et rare stellatus, superne subglaber leviter — frequenter stellatus rarissime glandulosus sordide vire-

scens. *Folia rosularia* plerumque numerosa ex axillis florendi tempore vulgo rosulifera, exteriora rotundato-ovalia — quadrangularia obtusa — obtusissima basi ± abrupte truncata haud raro subcordata, intermedia ± late ovalia — elliptica v. suboblonga breviter acuta, interiora ± ovato- v. elliptico-lanceolata — lanceolata in basin ± cuneatam — descendentem attenuata ± longe acuta v. haud raro infra apicem brevem acutum abrupte contracta subintegra — minute et breviter crebre et sat acute ± inæqualiter dentata v. sæpius ± obtuse undulato-dentata, dentibus patentibus, basalibus sæpe minutis subulatis apice recurvatis; *caulina* abrupte et cito decrescentia a bracteis bene discreta, infimum v. duo infima vulgo petiolata, summum v. summa sessilia ovato-lanceolata — lanceolata v. linearia (summa) basi ± longe descendente in apicem subulatum ± longe protracta haud crebre minute et subulate denticulata v. ± obtuse undulato-dentata v. infimum, si folium summum deficit, subintegrum, omnia firma obscure et prasino-viridia, supra sæpius maculis atropurpureis crebre adspersa rarius emaculata, glabra — parce pilifera, subtus subglaucescentia pilis raris in nervo dorsali substellato frequentioribus vestita, marginibus ± dense breviter et molliter ciliata, petiolis brevibus — sat longis superne præsertim alatis purpurascentibus sat longe et sat dense pilosis. *Anthela* ramoso-paniculata — indeterminata, ramis inferioribus longe remotis elongatis erectisque, superioribus sæpe valde patentibus rectis (v. subarcuatis) brevibus approximatis ± superantibus plerumque gracilibus sat stellatis, pedicellis brevibus acladioque 3—20 mm. longo fusco-canescentibus dense floccosis et glandulis parvis nigris crassiusculis — gracilioribus inferne sparsim superne dense — creberrime vestitis. *Involucra* humilia crassa — sat gracilia fusco-nigra et canescentia v. obscure plumbea basi rotundato-ovata postea ± truncata. *Squamæ* angustæ v. latiusculæ e basi paullum latiore in apicem obtusiusculum — sat acutum sæpe piceum efloccosum vix comatum sensim attenuatæ v. sæpius lineares, intimæ paucæ subulatæ, exteriores breves v. brevissimæ sat obtusæ, omnes ± late virescenti-marginatæ ubique v. præsertim dorso obscuro basique (marginibusve exteriorum) floccis (raris—)sparsis v. densiusculis obtectæ, ceterum glandulis brevibus nigris subcrassis — gracilibus dense — conferte vestitæ. *Calathidium* ± obscure luteum vix radians. *Ligulæ* apice glabræ. *Stylus* primo subluteus — fuscescens, postea sat obscurus.

Inv. $\frac{9—10}{5—6}$, D. 30—35, L. m. 3 mm.

Stjelken är vanligen lågväxt med ett utveckladt eller brakteliknande, vanligen helbräddadt stjelkblad eller 2—3, mycket kort tandade, långspetsade blad, af hvilka det nedre alltid är skaftadt och stort, stundom äfven det nästföljande, de öfre vanligen oskaftade och små samt vanligen hastigt decrescerande med tvärt afbrott mot brakteerna. Vanligen är nedre delen, stundom hela stjelken, bladskaften och en större eller mindre del af bladens undersida lifligt purpurfärgad eller brunaktig. Stundom är stjelken grenad ända från basen; vanligen utgår en gren från det öfre stjelkbladet ej särdeles långt från inflorescensen, hvarigenom denna blir något obegränsad. De nedre grenarne äro långa, raka och m. l. m. upprätta och aflägsnade från hvarandra, de öfre allt mera närmade och ut-

spärrade samt kortare, ju högre upp de sitta, alla mer eller mindre eller åtminstone de öfre öfverskjutande akladiet, hvilket i allmänhet är mycket kort. För öfrigt utmärkt af sina mörkgröna, undertill m. l. m. glaucescenta, ofvantill vanligen tätt purpurfläckade blad, hvilka än äro bugtigt och glest trubbtandade af korta, rundade eller triangulära tänder, än tätare och ojemt tandade af korta, spetsiga, ofta sylhvassa tänder, af sina små, grå- eller brunsvarta holkar med rundad eller tvär bas och nästan jemnsmala, mörka fjäll, klädda liksom öfre delen af de ganska tätt stjernludna skaften af korta, gröfre eller finare, mörka, tättsittande glandler och rikligare eller glesare, öfver hela fjällen, utom de nästan nakna, mörka spetsarne, men isynnerhet på midten af de inre och mot basen eller kanterna af de yttre samladt, blågrått stjernludd samt täta korgar och mörka stift. Bladen förläna genom sin vanligen bugttandade och ofta ojemna kant samt sin rika fläckighet växten ett karaktäristiskt utseende. Vanligen äro de yttre trubbade och stundom i spetsen nästan tvärhuggna samt hafva liksom ibland något af de mellersta tvär eller stundom svagt hjertlik bas. De inre och stjelkbladen äro vanligen nedlöpande på de isynnerhet upptill bredt vingade skaften. Spetsen är vanligen hos de innersta och stjelkbladen långt utdragen och m. l. m. helbräddad och hvass. Stundom bli alla rosettbladen mera aflångt rektangulära och äro då oftast i spetsen tvärt hopdragna och derpå kort tillspetsade. I bladens tandning och form äfvensom till holkarne påminner den ej obetydligt om *H. panæolum*. Isynnerhet hafva skuggformer och spädare former en i ögonen fallande likhet med denna sednare. Möjligen skall den vid närmare studium visa sig vara dess närmast beslägtade *cæsium*-form. Men då den på Gotland synes genom mellanformer (kanhända delvis genom hybridisering) tydligen vara förbunden med *H. *porrigens*, anser jag dess plats vara här. Möjligen förhålla sig dessa båda former tillsammans till de skarpt skilda *H. lacerifolium* och *H. panæolum*, som t. ex. de olika modifikationerna af *H. *exaltatum* eller af *H. *læticolor*, till sina respektive *silvaticum*-former. Men bland de förstnämnda har differentieringen mellan de nämnda *silvaticum*-artadt utvecklade formerna *H. panæolum* och *H. lacerifolium* fortskridit så långt, att blott en svag antydan till slägtskap mellan dem förefinnes, då deremot deras motsvarande *cæsium*-former, *H. *opacum* och *H. *porrigens*, på långt när ej i samma grad äro skiljda från hvarandra.

Om helbladigare former af *H. *porrigens* påminna redan former med bugttandade blad, men ännu mera de former, hvilka hafva skarpare och längre tandning och flera stjelkblad. Mellanformer till den förra, hvilka erinra om densamma genom större holkar (dock af typisk form), äga stjernluddet företrädesvis hopadt i kanterna af fjällen samt längre glandelhår, men erinra deremot om den typiska formen af *H. *opacum* till bladen och i habitus. De äro anträffade vid Visby (Snäckgärdet). Andra former, hvilka till bladen mera likna *H. *porrigens* men till de något tjockare och större holkarnes beklädnad af öfverallt spridt stjernludd och till de visserligen något breda men temligen jemnbreda, m. l. m. trubbade fjällen (med temligen groft skaftade glandelhår) mera närma sig *H. *opacum*, äro anträffade vid Lunderhage i Nors och Hessle i Fleringe (K. J. Lönnroth).

Är endast anträffad på *Öland* (hvar?) enligt exemplar i S. Almquists herbarium och på *Gotland*, Fleringe s:n, Ar och Hessle (K. J. Lönnroth); Hangvars s:n, Flenvik (T. Vestergren); Rute s:n, Vidangen och mellan Gerungs och Risungs (K. J. Lönnroth); Bunge s:n (K. Johansson); Lärbro s:n, Angelbos (S. Almquist);

Tingstäde s:n, Lummelund (S. ALMQUIST); Visby flerestädes isynnerhet på kalkhedarne såsom vid Galgberget, S:t Görans kapell, på Snäckgärdet (K. J. LÖNNROTH, V. B. WITTROCK, K. JOHANSSON m. fl.). Vid Lunderhage i Fleringe invid Strandvägen är (af K. J. LÖNNROTH) anträffad en modifikation med bleka holkar och blad, hvilken är särskildt anmärkningsvärd såsom analog med de förut under *H. *exaltatum* m. fl. omnämnda strandformerna. Hela växten är blekgrön, bladen ljust purpurfläckade, holkar blekt gröngrå och fjällen i spetsen liftigt purpurfärgade samt stiften ljusa. En modifikation från S:t Görans ruin vid Visby (samlad under skilda år af K. J. LÖNNROTH och F. J. ÖFVERBERG) är anmärkningsvärd för sin habituella likhet med *H. panæolum*.

2. **H. *virenticeps** *n. subsp.*

DAHLST., Herb. Hier. Scand., Cent. II, n. 33.

Caulis 35—70 cmt. altus gracilis 1—3 folius viridis, inferne sparsim et longe pilosus, superne rarius pilosus, ubique sparsim floccosus, apice glandulis solitariis obsitus. *Folia rosularia* 2—4, exteriora parva ovalia obtusa minute et sparsim dentata — mucronato-dentata basi ± cuneata, interiora ± ovalia — oblongo-elliptica v. elliptico-lanceolata et intima ± angusta elliptica — lanceolata plerumque sat crebre et anguste sæpe patenter dentata — crenulato-dentata ± acuta basi plerumque in petiolis sat longis ± alatis sensim descendentia; *caulina* sat distantia abrupte decrescentia, infimum petiolatum, superiora sessilia ± ovato-lanceolata — anguste lanceolata subæqualiter argute sed haud profunde dentata basi ± descendente apice ± longo acuto v. cuspidato, omnia læte gramineo-viridia, supra glabra nitentia v. leviter pilifera, subtus pallidiora rare in nervo dorsali sat floccoso densius pilosa, ceterum rare — sparsim stellata, marginibus sparsim ciliata petiolis pilis mollibus longis ± villosis. *Anthela* paniculata simplex v. sat composita contracta v. sublaxa, ramis inferioribus ± remotis erecto-patentibus, superioribus brevibus sat patentibus ± approximatis, omnibus rectis v. leviter curvatis ± superantibus, pedicellis brevibus — mediocribus apice incrassatis acladioque 10—25 mm. longo virentibus sparsim — subdense-floccosis rare v. sursum sparsim (— densiuscule) glandulis nigris mediocribus — sat longis basi incrasssatis obtectis. *Involucra* mediocria crassa obscure virescentia basi rotundata postea subobtusa. *Squamæ* sat latæ — latæ sublineares v. ad basin paullum latiores, intermediæ obtusæ, intimæ paucæ acutæ subulatæ, exteriores brevissimæ obtusæ, omnes præsertim interiores apice marginibusque ± late virides dorso ± fusco-viridi glandulis sat densis sat longis et brevibus v. minutis immixtis apice lutescentibus basi crassa nigricante obtectæ, ceterum ad basin et sursum dorso præsertim sparsim — sat densiuscule stellatæ, apicibus glabris v. fere glabris efloccosis. *Calathidium* sat obscure luteum — aureum sat radians. *Ligulæ* apice glabræ. *Stylus* vivus et siccus luteus.

Inv. $\frac{10—11}{5—7}$, D. 35—40., L. m. ad 3 mm.

Utmärkt af sina rent gröna, jemförelsevis glatta, vanligen glest skarptandade blad med framåt- eller något utåtrigtade tänder, vanligen åtminstone 2-bladig, ganska glatt och grön stjelk, oftast fåblomstrig inflorescens med åtminstone uppåt närmade grenar, upptill för-

tjockade, rätt stjernludna och glandelhåriga, till öfriga delen liksom grenarne sparsamt beklädda, gröna skaft, korta och breda, gröna eller svartgröna holkar med öfvervägande trubbiga, upptill nakna och glatta, för öfrigt m. l. m. isynnerhet vid basen brokigt stjernludna fjäll, hvilka derjemte äro klädda af medeltäta, omvexlande längre och kortare glandler med grof, mörk bas och ljusare spets samt oftast gulaktiga, ytterst små knappar. Stjernluddet är vanligen endast samladt mera rikligt på de yttre fjällen och ett stycke uppåt utefter midten af de inre, lemnande kanterna och spetsen nakna. På stjelkbladens undersida är det vanligen ganska rikt utveckladt, på rosettbladen hufvudsakligen inskränkt till bladnerven. Stjelkbasen och bladskaften äro oftast svagt violetta, sällan äfven några af de yttre bladens undersida.

Synes stå närmast *H. *opacum* till sina allmänna karaktärer, men lätt skild genom gröfre växt, tjockare, grönare holkar, glattare, ljusare gröna, mera skarptandade, alltid ofläckade blad och redan från början ljusa stift. Äfven torde den stå nära *H. *lepidiforme*, hvilken den i bladfärg, indumentets anordning m. m. liknar, men den är på flera af nyss afgifna karaktärer, såsom gröfre holkar och sin mera utbildade *cæsium*-habitus, lätt skild från denna mera enligt *vulgatum*-typen utvecklade form. För öfrigt påminner den i habitus och bladform ej obetydligt om glattare former af *H. *porrigens* med mindre tandade blad.

Den synes liksom ett flertal af de rikbladigare formerna af denna artgrupp stå på gränsen till *H. anfracti* och *H. irrigui* m. fl. formgrupper, men är framförallt genom sin *cæsium*-artade habitus ganska lätt skild från dessa. Dock påminner en smalbladig form med längre basaltänder på stjelkbladen mera om *H. *lepidiceps* och äfven något om *H. *eurycybe*, ehuru den till holkarne är typisk.

Den sistnämnda formen är anträffad på *Gotland* i Lärbro (S. ALMQUIST). Hufvudformen är funnen i *Östergötland*, Väderstad s:n, Lindekullen och Skållerud, allmänt spridd på flera lokaler, men ej talrik på samma ställe.

3. **H. *porrigens** ALMQU.

H. silvaticum L. subsp. 6. F., ALMQU. Stud. p. XVI. — H. porrigens ALMQU. apud LÖNNR. Resa i Smål. och på Gotl. sid. 58, noten. — DAHLST., Hier. exs., fasc. I n. 67, 68. — DAHLST., Herb. Hier. Scand., Cent. II, n. 35, 36.

Caulis 30—60 ctm. altus crassiusculus — sat gracilis (0—)1—3(—4)-folius, inferne sparsim — densiuscule et longe pilosus leviter stellatus, superne rare — sparsim pilosus sparsim — densiuscule stellatus, apice glandulis solitariis et pilis paucis longis obscuris obsitus subtomentellus. *Folia rosularia* 3—6, exteriora ± late ovalia — oblonga basi abrupte v. sensim angustata ± obtusa late et sparsim brevi-dentata, interiora ovato-lanceolata — lanceolata v. ovato-oblonga sparsim et minute ± obtuse v. etiam argute longius et crebre dentata sæpe præsertim ad basin inæqualiter et longe ± grosse pinnatifido-dentata dentibus lanceolatis antrorsum curvatis patentibus v. ima basi subreversis ± acuta basi descendente v. abrupta subhastata, intimum magis inæqualiter et longe dentatum ovato-lanceolatum — lanceolatum

acutum — cuspidatum, omnia ± longe petiolata; *folia caulina* abrupte et cito decrescentia, inferiora v. infimum ± petiolatum, superiora sessilia, longe acuta — cuspidata ovato-lanceolata — lanceolata v. sublinearia basi descendente v. truncata — subhastata minute et crebre ± argute dentata — irregulariter præsertim ad basin pinnatifido-partita; folia, si valde partita, in petiolo dentibus et laciniis liberis sæpe decurrentia; omnia saturate viridia, supra sæpe purpureo-maculata sparse pilosa v. subglabra haud raro nitentia, subtus subglaucescentia, sparsim — sat dense in nervo dorsali ± stellata densius et longius pilosa, marginibus sat longe et ± dense ciliata, petiolis pilis longis mollibus sat dense — densissime villosis. *Anthela* ± paniculata — ramoso-paniculata v. subsimplex ramis (superioribus) ± approximatis ± erectis — erecto-patentibus — sat patentibus subrectis — sat arcuatis mediocribus — longis ± superantibus, pedicellis brevibus apice incrassatis acladioque 15—40 (—50) mm. longo ± dense canofloccosis et dense — conferte glandulosis pilis paucis obscuris interdum immixtis. *Involucra* nunc elongata nunc breviora subgracilia v. ± crassa obscure atroviridia et cano-variegata basi ± ovata — decurrente postea ± rotundato-truncata. *Squamæ* subangustæ — latiusculæ e basi latiore linearilanceolatæ nunc ± elongatæ et flores virgineos longe superantes nunc breviores, in apicem ± comatum ± acutum sensim attenuatæ v. sat obtusæ, intimæ paucæ subulatæ, exteriores brevissimæ late — anguste lineares dorso nigro marginibus ± virescentes, glandulis nigris ± longis sat densis — confertis obtectæ interdum etiam pilis paucis longis nigris vestitæ, marginibus præsertim apices versus stria angusta — sat lata albido-floccosa conspicue notatæ, ceterum sparsim v. rare interdum densiuscule stellatæ. *Calathidium* saturate luteum — aureum, plerumque eximie radians. *Ligulæ* apice glabræ. *Stylus* primo vulgo luteus, dein interdum fuscescens.

Inv. $\frac{12—16}{5—6}$ — $\frac{10—12}{6—7}$, D. 40—45, L. m. 3 mm.

Utmärkt af mörkgröna, ofvan oftast fläckiga blad, vanligen fåbladig stjelk, oftast rikblomstrig, vanligen långt ned förgrenad inflorescens med upptill närmade m. l. m. öfverskjutande, upprätta till temligen utspärrade grenar, upptill förtjockade korgskaft och mörka m. l. m. rikt och långt samt svart glandelhåriga, oftast långa holkar, hvilka äro gråbrokiga af m. l. m. tätt stjernludd, hufvudsakligen samladt i fjällens kanter isynnerhet mot spetsarne, samt i regel vida, glesa korgar med gula stift.

Med bibehållande af sina väsentliga kännetecken varierar den mycket till habitus men i synnerhet till bladform och tandning, i något mindre grad till holkarnes form och längd m. m. Ibland äro bladen groft och ojemnt fliktandade med böjda, långa, utåtrigtade tänder, omvexlande med smärre. Sådana former, hvilka oftast hafva få stjelkblad och i allmänhet breda blad, hvilka tendera att till större eller mindre antal få tvär eller något pillik bas, hafva största likhet med *silvaticum*-typen. Dessa former, hvilka äro utan all konstans, hafva ofta längre och smalare holkar med utdragna, mera spetsiga fjäll och ofta i vanligen ringa antal inblandade, mörka, långa hår bland glandlerna. Vanligen hafva de äfven glattare och alltid rikt fläckade blad. De äro analoga med dylika former af *H.* **cæsium*, hvilka de ofta habituelt äro förvillande lika. Former med rikligare hår på

holkarne erinra häri äfven något om *H. *acroleucum* och ännu mera om *H. *subporrigens* (Dahlst., Hier. exs., fasc. II, n. 53), hvilken är att anse som en nordlig parallelform, skild hufvudsakligast genom förekomsten af typiskt rikliga hår på holkarne, svagare stjernludd i kanterna af fjällen m. m. Oftare äro bladen glesare eller tätare korttandade, med än bred än smal, vanligen hvass och oftast jemn tandning. Vanligen äro dylika former mera högväxta med styf, oftast 3—4-bladig stjelk, och hafva mera *cæsium*- eller *vulgatum*-habitus än de förut nämnda. Ofta hafva dessa former smalare blad och kortare holkar med trubbigare fjäll. Stjelkbladen kunna variera, alla oskaftade eller flera af dem skaftade. Vanligen är det nedersta mer eller mindre skaftadt. Dessa nyss nämda båda ytterlighetsformer öfvergå utan gräns i hvarandra, och fåbladiga former äga ej alltid fliktandade blad eller mångbladiga former korttandade, utan förhållandet är mången gång omvändt och variationen beror nog delvis äfven på ståndorten. Här och der träffas former med breda, fåtandade eller nästan helbräddade blad, hvilka mycket erinra om dem hos *H. *opacum* och *H. *virenticeps*. I skogstrakter uppträder ofta en dylik form med nästan helbräddade eller glest, ehuru stundom långt tandade, glattare blad af mörkare blågrön färg, men hvilken ej äger någon konstans utan öfvergår i den allmännare formen. Den har, liksom i allmänhet former växande i skugga, gerna svarta, större glandler och mörkare holkar, hvilka äro korta med svagare framträdande stjernludd. På solöppna ställen blir stjernluddet rikligare, isynnerhet i fjällens kanter, och derjemte lösare.

Till inflorescensen varierar den äfven betydligt. Utom den allmänna, kvastlika korgställningen förekomma äfven enkla, hopdragna till sammansatta, glesa och nedåt obegränsade inflorescenser. Hos mycket rikblomstriga individer blir stundom blomstersamlingens öfre del nästan flocklik med långt eller kort akladium. Ibland blir den nästan gaffelgrenad med mycket långt akladium.

Följande form, till hvilken antydningsvis modifikationer här och hvar synas leda öfver, är troligen mera sjelfständig än öfriga.

f. *extractipes* n. f.

Anthela simplex furcata v. paniculata oligocephala, ramis strictis ± erectis, acladio 15 v. sæpissime longiore usque ad 50 mm. longo. *Involucra* brevia crassa dilutiora, squamis sat latis triangulari-lanceolatis — lanceolatis densius floccosis, apice obtuso valde comatis et glandulis sat densis cum pilis dilutioribus frequentibus immixtis. *Folia* lata lutescenti-viridia acute — acutissime serrato-dentata cum inferiore parte caulis petiolisque pilis ± longis albis firmis ± dense hirsuta. *Caulis* humilis, foliis 2—3 lanceolatis — linearibus v. bracteiformibus sat æqualiter descrescentibus instructus.

Utmärkt af vanligen m. l. m. långt ned gaffelgrenad, fåblomstrig inflorescens med långt utdragna, raka korgskaft och oftast långt akladium, ljusare och kortare, mera bred- och trubbfjälliga holkar med bland glandlerna ganska rikligt inblandade ljusspetsade hår, ofläckade, gulgröna blad samt på örtståndet ganska rik, tät och styf hårighet, påminnande om den hos *Oreadea*.

Bäst utpräglad vid Bläse, Lunderhage och Hessle i Fleringe s:n på *Gotland* (K. J. Lönnroth och K. Johansson).

Former, hvilka likna denna till holkarne, äro anträffade här och där på fastlandet såsom i *Östergötland*, Väderstad s:n, Lindekullen. Vid Fagerhult i Småland (K. J. LÖNNROTH) äro anträffade former med liknande, rikhåriga och gulgröna blad men till holkarne öfverensstämmande med den vanliga skogsformen.

Hufvudformen med modifikationer är anträffad på följande ställen: *Östergötland*, Qvillinge s:n (FR. E. HERFURTH); Krokek s:n, Marmorbruket (S. ALMQUIST); Vreta s:n, Berg och Brunneby (förf.); Motala (P. DE LAVAL); Kärna s:n, Malmslätt, Ryd och Gårdstorp; S:t Lars s:n, Smedstad, Ekkällan; Vist s:n, Sturefors, Sundsbro, Hamra och Vessentorp; Väderstad s:n, Bossgård, Lindekullen, Skållerud och Torpa; Svanshals s:n, Stora Kullen (förf.); St. Åby vid kyrkan (G. A:N MALME); Omberg, Rödgafvel, Stocklycke, Mullskräerna m. fl. st.; Rinna s:n, Stortorp; Trehörna s:n, Slangeryd; Sunds s:n, Rödkulla, Sundsö och Sunds Norrgård; Norra Vi s:n, Kärremålen och Siggemålen; Oppeby s:n, Drabo; Åtvids s:n, Karstorp och Slefringe (förf.): *Småland*, Grenna (F. HAGSTRÖM); Rogberga s:n, Tenhult (på Ufberget äfven en form med jemt utbredt stjernludd); Forserums s:n; Öggestorps s:n, Romelsjö och Högåsen (K. JOHANSSON); Kråksmåla mellan Fröskelås och Askaremåla; Fagerhults s:n, Eskebäck; Målilla s:n, Stensryd (K. J. LÖNNROTH): *Gotland*, Fleringe s:n, Hessle, mellan Hessle och Nors, mellan Bläse och Lunderhage (K. J. LÖNNROTH); Bunge s:n, vid strandvägen söder om Fårösund (K. J. LÖNNROTH m. fl.); Rute s:n, Gerungs och Risungs (K. J. LÖNNROTH); Haugvars s:n, mellan Snäckers och Fleuvik (K. J. LÖNNROTH); Lärbro s:n, Angelbos (S. ALMQUIST); Tingstäde s:n, Lummelund (S. ALMQUIST); Visby allmän såsom på Snäckgärdet (K. J. LÖNNROTH, K. JOHANSSON m. fl.); Klinte s:n. Bönders vid Valla kvarn, mellan Valla södra kviar och vägen till Klintehamn (K. J. LÖNNROTH): *Öland*, Borgholm (A. V. LUND). Former med långa holkar, spetsiga fjäll och mörka hår bland glandlerna äro jemte den vanliga formen synnerligen rikligt anträffade vid Visby, Lummelund, mellan Bläse och Lunderhage i Fleringe (K. J. LÖNNROTH och S. ALMQUIST) och på Skälsö (K. JOHANSSON).

Utom området funnen i Stockholmstrakten, Djurö (S. ALMQUIST): *Södermanland*, Stafsjö bruk (HJ. MOSÉN) samt Stora Malms s:n, Brännkärr och Qvarntorp (G. A:N MALME), en form närmade sig följande varietet: *Nerike*, Porla (E. ADLERZ).

β intermedium n. var.

Caulis ± altus gracilis, inferne multum pilosus, 2—3-folius. *Folia* læte viridia sublutescentia; rosularia exteriora ± ovali-oblonga, interiora ± elliptica — lanceolata ± acuta ± longe et anguste petiolata; caulina elliptico-lanceolata — lanceolata cuspidata, infimum ± petiolatum, summa sessilia, omnia argute et minute sparsidentata et cum petiolis sparse — sat dense pilis firmulis hirta. *Involucra* virentia — viridi-obscura basi ovata in pedicello sparsim floccoso et glanduloso apice incrassato ± descendentia squamis angustis linearibus obtusiusculis sparsim — sat dense fusco- v. luteolo-glandulosis marginibus leviter et sat anguste floccosis, ceterum rare stellatis v. nudis.

En anmärkningsvärd form, utmärkt af sina gulaktigt gröna, ofläckade, uddtandade, utdragna, åt båda ändar afsmalnande, långskaftade, liksom bladskaften och stjelken sträfhåriga blad, smalare, grönare holkfjäll än föregående med smalare och otydligare luddkanter samt högväxt och spensligare, i toppen till en kortgrenig och liten inflorescens förgrenad stjelk. Påminner till hårigheten betydligt om *f. extractipes*, men erinrar habituellt och i sina allmänna karaktärer mycket om fåbladigare former af *H. *reclinatum* och till holkarne isynnerhet om *H. *resupinatum*, mellan hvilka och *H. *porrigens* den bildar en tydlig mellanform. För det intresse, den erbjuder såsom belysande bådas slägtskap, upptages den här, ehuru den strängt taget ej tillhör området.

Endast anträffad i ett tjugutal individ i *Upland* vid Brevik på Vermdö (A. MAGNUSSON).

4. **H. *resupinatum** Almqu.

H. resupinatum Almqu. (Stenstr., Verml., Archier. 1889). — Dahlst., Hier. exs., fasc. IV, n. 73, 74. — Dahlst., Herb. Hier. Scand., Cent. II, n. 37, 38.

Caulis 35—70 ctm. altus gracilis firmus strictus (2—)4—10-folius, apice v. a medio ramosus, inferne parce pilosus, superne glaber — subglaber, apice leviter stellatus. *Folia rosularia* numerosa persistentia v. sub anthesi pro parte v. raro omnino emarcida læte viridia sublutescentia, exteriora (sæpissime emarcida) ± ovalia obtusa minute dentata, intermedia ± ovata — ovato-elliptica v. ± ovato-lanceolata basi breviter cuneata v. truncata — fere subcordata sparsim et præsertim ad basin dentibus longis — longissimis angustis acutis antrorsum v. retrorsum curvatis ± patentibus instructa acuminata — longe acuta, interiora ovato-lanceolata — lanceolata vulgo valde at sparsim pinnatifido-dentata basi ± cuneata in apicem longum — longissimum integrum v. inferiore parte denticulatum cuspidatum — subulatum attenuata; *caulina* vulgo sensim in bracteas decrescentia parva v. minuta, infimum vulgo ± petiolatum, reliqua sessilia basi ± cuneata in apicem ± longum acutum — subulatum attenuata infra medium dentibus longis — longissimis patentibus apicibus ipsis retrorsum v. antrorsum curvatis subulatis 3—4 pinnatifida; omnia tenuia supra subglabra, subtus pallidiora in nervo dorsali et in petiolis ± alatis obscure violaceis (— fuscis) leviter stellatis rare — sparse pilifera, ceterum leviter v. caulina rare — sparsim stellata. *Anthela* ramoso-paniculata nunc contracta nunc ampla indeterminata, ramis inferioribus brevioribus magis erectis ± distantibus vix superantibus, superioribus magis magisque approximatis ± superantibus erecto-patentibus — sat patentibus, omnibus gracilibus ± strictis rectis v. leviter curvatis, pedicellis gracillimis mediocribus v. brevibus acladioque 10 - 20 mm. longo virentibus inferne sparsim superne dense albofloccosis, inferne vix v. rarissime superne rare — sparsim glandulis minutis lutescentibus gracilibus obsitis. *Involucra* parva latiuscula virentia basi ovata postea rotundata. *Squamæ* plurimæ angustæ lineares, exteriores breves obtusiusculæ obscuriores, extimæ sublaxæ in squamas 1—2 superiore parte pedicelli insertas abeuntia, interiores ± virides obtusiusculæ — acutiusculæ apice ± albocomatæ ± dense glandulis dilutis gracillimis minutis obtectæ rare stellatæ, marginibus præsertim ad apices levissime et anguste floccosæ, intimæ paucæ subulatæ. *Calathidium* ± obscure luteum. *Ligulæ* apice glabræ. *Stylus* vivus et siccus luteus.

Inv. $\frac{9-11}{5-6}$, D. 30, L. m. c. 2 mm.

En i hög grad framstående och lätt igenkänd form, utmärkt af högväxt, styf och mångbladig stjelk med uppåt småningom i brakteer öfvergående blad, af hvilka endast det nedersta mer eller mindre ofta är skaftadt, af vanligen vid blomningen kvarsittande, talrika rosettblad, hvilka liksom stjelkbladen äro ljust gröna och oftast smalt och långt samt

hvasst fliktandade, af små, gröna holkar med smala fjäll, i kanterna, hufvudsakligen mot den kort hårtofsade spetsen, klädda af tunt, föga framträdande stjernludd och för öfrigt liksom holkskaftens öfre del af ytterst små, fina, vanligen gulaktiga glandler. Korgarne äro små, temligen täta och stiften alltid gula. Hos mångbladiga former är stjelken vanligen endast i toppen förgrenad och korgsamlingen är hos dessa oftast mera hopdragen, kortgrenig och smal. Hos fåbladigare former är inflorescensen mera gles och vid samt långgrenig med ofta mera utspärrade grenar. Ibland fortskrider förgreningen till eller nedom midten af stjelken. Isynnerhet hos stjelkbladen framträder den karaktäristiska tandningen tydligast. De äro till sin nedre del djupt och smalt men ej särdeles tätt 3—4-tandade. Tänderna äro oftast längre än skifvans hela bredd, stundom ända till 20 mm. eller derutöfver. Ofta äro de skärformigt framåt- eller bakåtkrökta med syllik spets. Spetsen af bladet är m. l. m. långt utdragen, vanligen långt helbräddad eller med få korta tänder. Stundom är tandningen inskränkt till sjelfva basen. I allmänhet stiger tandningen, då den är kortare, längre upp mot spetsen. De större flikarne omvexla oregelbundet med korta uddtänder. Hos mångbladiga former med *rigidum*-habitus äro rosettbladen vanligen kortare tandade med mera nedlöpande bas. Stundom äger äfven hos dessa ett och annat af bladen tvär eller svagt pillik bas. Stjelkbladen bli hos dessa former stundom rudimentära och brakteliknande. Hos fåbladigare former äro afstånden mellan stjelkbladen längre. Dessa hafva äfven mera *cæsium*-habitus genom större och vidare, glesare inflorescens och större korgar. Tandningen hos dessa är vanligen öfverallt djup och rosettbladens bas tenderar att bli tvär eller genom tändernas bakåtrigtning pillik. Hos dylika former, hos hvilka stjelkbladen reducerats till ett par, af hvilka det öfre är föga utbildadt, det nedre stort, flikadt med bakåtkrökta tänder, framträder en anmärkningsvärd likhet med *H. lacerifolium*, isynnerhet med dess ljusbladiga och grönholkiga, uppländska modifikationer. Sannolikt är denna sednare nära beslägtad med förhandenvarande underart, liksom med *H. *porrigens*, och bör snarare anses vara motsvarande *silvaticum*-form till den förra än till den sednare. Under det flera andra *Cæsia* synas motsvara tvänne utpräglade former af *Subcæsia*, tyckes förhållandet här vara motsatt. Förhandenvarande formgrupp är nämligen differentierad i en mängd olika former, af hvilka ytterligheterna tendera att bli utbildade enligt *rigidum*-typen och närma sig flera andra grupper såsom de *anfractum*-artade och måhända äfven de *tridentatum*-artade (se *H. *striaticeps*). Deremot äro hittills inga andra, dessa motsvarande former med *silvaticum*-typ kända, än *H. lacerifolium* (och *H. panæolum*).

Det förtjenar anmärkas, att liksom hela *porrigens*-gruppen närmar sig *anfractum*-gruppen (af *Vulgata*) går äfven *H. lacerifolium* mera åt gruppen *Subvulgata* (motsvarighet till *Vulgata*) än någon annan form af *Subcæsia*.

I Kristianiatrakten, der högväxta, mångbladiga former af förhandenvarande underart träffades på stela bergbranter i sällskap med *H. onosmoides* och *H. tridentatum*, hade dessa genom sin morfologiska utbildning på något afstånd en förvillande likhet med de båda sednare.

Inom området endast anträffad i *Östergötland*, Björsäters s:n, Björsäter station (H. NORDENSTRÖM) samt möjligen på Kolmården nära Marmorbruket. Utom området funnen i *Södermanland*, Bettna s:n, Al och Råby s:n, Limsäter (K. J. LÖNNROTH): *Upland* flerestädes allmän såsom vid Upsala (F. AHLBERG, E. HOLMGREN); Sigtuna; Steninge s:n vid Embarsbo m. fl. st. (M. FLODERUS); Norrtelje (T. HEDLUND); Stockholms skärgård, Ljusterö hufvud (S. ALMQUIST): *Vestmanland*, Kung Karls s:n, Skillinge Norrgård (K. J. LÖNNROTH);

Kungsör m. fl. st. (C. O. v. PORAT): *Vermland*, Gillberga m. fl. st. (K. O. E. STENSTRÖM); Arvika (E. HOLMGREN); Eng i Nysunds s:n (LAGERSTEDT). I *Norge* vid Kristiania och på öarne i Kristianiafjorden flerestädes rätt allmän (förf.).

En sjelfständig mellanform mellan denna och *H. lacerifolium* är *H. *læticeps* (DAHLST., Hier exc., fasc. I, n. 69; fasc. II, n. 54: DAHLST., Herb. Hier. Scand., Cent. IV, n. 29), hvilken till habitus, bladform, större holkar m. m. något liknar *H. *porrigens*, till färg och beklädnad deremot mest närmar sig nyss beskrifna form. Ännu en annan sjelfständig form, anslutande sig till *H. *resupinatum* och följande är *H. *obtusulum* STENSTR. (Verml. Archier. 1889; DAHLST., Hier. exs., fasc. II. n. 52). Mången gång är denna ännu högväxtare än den förra och liknar den då ofta något till bladformen; ibland närmar den sig följande till bladen och påminner i sina lägre, fåbladigare former stundom om *H. *virenticeps*. *H. *læticeps* är anträffad i *Sverige*, Helsingland (A. MAGNUSSON) och i *Norge*, Torpen flerestädes rikligt (förf.).

5. **H. *pectinosum** *n. subsp.*

DAHLST., Hier. exs., fasc. IV, n. 75.

Caulis elatus rigidus et rectus v. leviter flexuosus crassus, circiter 60—80 cm. altus phyllopodus v. hypophyllopodus, inferne fusco-violascens et ± pilosus, ceterum fere glaber v. glaber, apice levissime stellatus, 5—10(—12)-folius. *Folia* basalia sub anthesi plerumque emarcida v. 2—3 in rosulam laxam approximata, exteriora elliptica — oblongo-elliptica obtusa sparsim denticulata — subintegra, interiora ± ovato-lanceolata — late lanceolata longe acuta basi subobtusa v. (in intimis) cuneata irregulariter et subdense et præsertim ad basin longe laciniato-dentata dentibus patentibus v. arrectis et in petiolo sæpe evolutis filiformibus subulatis; *caulina* primo sensim sub anthela ± abrupte decrescentia internodiis sæpius longiora, in speciminibus reductis etiam versus basin magis magisque conferta (in medio caulis duo sæpe subopposita v. tria valde approximata), inferiora 3—5 sæpius sat longe petiolata et magna, superiora magis magisque sessilia et minora ± ovato- v. late lanceolata acuta ± irregulariter et longe dentibus erectis v. patentibus angustis pectinata — laciniata, omnia supra fere glabra subtus sparsim in nervo mediano et in marginibus paullo densius pilosa, in petiolis longius pilosa, ceterum rare stellata, læte viridia exsiccatione sæpius lutescentia. *Anthela* ramosa — paniculata v. subcorymbosa polycephala ± composita, deorsum vulgo ± indeterminata ramis inferioribus remotis brevibus haud superantibus, superioribus magis magisque approximatis, summis sat confertis superantibus, omnibus ± patentibus leviter stellatis et glandulis solitariis obsitis, acladio circ. 10 mm. longo pedicellisque brevibus sat gracilibus sparsim — sat dense stellatis et glandulis parvis sparsis — densiusculis obsitis. *Involucra* brevia mediocria crassa atroviridia v. sat viridia subcanescentia basi ovata postea rotundato-truncata. *Squamæ* multiseriales e basi lata ± lanceolatæ, exteriores breves obtusæ, interiores obtusiusculæ v. subacutæ, apice sæpe roseo-violaceæ, dorso ± angusto nigro late viridi-marginatæ, marginibus inferne leviter superne densius stellatæ, ceterum glandulis brevis sparsis — sat densis nigris v. subluridis obtectis, apicibus ± albocomatis. *Calathidium* obscure luteum densiusculum. *Stylus* mere luteus.

Inv. $\frac{10—12}{6—7}$, D. (30—)35—40, L. m. circ. 2 mm.

En märkvärdig form af synnerligen karaktäristiskt utseende, hvilken jag här, ehuru den ej tillhör området, upptagit för dess nära slägtskap med föregående och för det särskilda intresse den erbjuder såsom en mera *ramosum*-(eller *subrigidum*-)artadt utbildad parallelform till denna. Den karaktäriseras af sin höga, grofva och fasta, mångbladiga (sällan fåbladiga) från 3- och oftast ända till 10-bladiga stjelk med småningom decrescerande, stora, glestandade, oftast med 3—4 långa och smala, något böjda och framåtrigtade tänder eller flikar försedda stjelkblad, af hvilka de nedre 2—3 oftast äro skaftade, stundom långskaftade, af få (2—3) stora, långskaftade och glest långflikade basalblad, hvilka ej sällan vid blomningen äro afvissnade, af rikblomstrig, kvastlik inflorescens, nedåt m. l. m. obegränsad och med korta, raka, utspärrade grenar, af hvilka de nedre äro mera aflägsnade från hvarandra och ofta knappt nå öfver de öfres bas, de öfversta deremot ofta tätt och ibland flocklikt anordnade, af medelstora, tjocka holkar med smala, grönsvarta fjäll, klädda af temligen små, gulaktiga eller vanligen mörka glandler med ljusa knappar och en svag, uppåt tydligare rand af stjernludd i fjällens kanter, och af temligen stora, mörka korgar samt gula stift. Oftast är den mångbladig med temligen tättsittande och småningom uppåt i storlek och bredd aftagande blad, men den varierar ibland med 3, sällan färre, aflägsnade, hastigt decrescerande blad och liknar då ibland stor- och fåbladiga former af föregående, från hvilken den dock alltid är skild genom mera regelbundna och gröfre bladflikar, längre nedlöpande och vid basen mindre tätt och djupt flikade blad samt större, gröfre och mörkare holkar.

Ibland, då tandningen blir grundare och bladen smalare, erinrar den mycket om *H. *orbolense* Stenstr., hvilken måhända tillhör denna grupp och i så fall är en *subrigidum*-artadt utbildad parallelform till *H. *reclinatum*, ehuru den dock har många likheter med *Oreadea* och möjligen tillhör dessa. Men den är äfven i denna gestalt skild från nyssnämda form genom smalare och skarpare bladtänder, öfverallt svagare hårighet och smalare fjäll utan inblandade hår bland glandlerna. Till holkarne liknar den ej sällan rätt mycket *H. *obtusulum* Stenstr., men är utom i bladens tandning samt smalare och mindre luddiga holkfjäll m. m. lätt skild genom sina breda och alltid spetsiga blad.

Anträffad i *Vestmanland* i Kung Karls socken vid Kungsör m. fl. st. (K. J. Lönnroth och C. O. v. Porat).

6. **H. *reclinatum** Almqu. in litt. *n. subsp.*

Dahlst., Hier. exs., fasc. IV, n. 76. — Dahlst., Herb. Hier. Scand., Cent. II, n. 39.

Caulis 30—70 cm. altus gracilis — crassiusculus plerumque strictus rigidus (2—)3—8-folius, inferne sparsim et longe pilosus fusco-violascens, superne glabrescens v. rare pilosus, a medio v. apice glandulis minutis solitariis — raris obsitus, ubique rarissime v. apice rare — sparsim stellatus. *Folia rosularia* breviter petiolata sub anthesi 2—6, exteriora sæpius emarcida ± ovalia obtusa obtuse et sparsim denticulata, interiora ± elliptica — anguste ovato-lanceolata v. lanceolata ± longe acuta, intima ± elongate lanceolata sæpius longe cuspidata, omnia basi ± descendentia minute — profundius, sat æqualiter et anguste, sparsim — sat dense serrato-dentata; *caulina*

vulgo sensim decrescentia ± ovato-lanceolata v. ± elliptica v. elongate lanceolata — sublinearia in apicem ± longum integrum cuspidatum — subulatum attenuata sat crebre — sparsim ± æqualiter et acute dentata dentibus ± patentibus — arrectis, folia summa raro ad basin longius 3—4-dentata; omnia læte viridia, supra fere glabra, subtus pallidiora, in nervo dorsali sat floccoso sparsim ceterum rare pilosa et rare — sparsim stellata, petiolis fusco-violaceis præsertim superne alatis leviter pilosis stellatis. *Anthela* paniculata — valde ramoso-paniculata sæpius indeterminata nunc parva contracta nunc ampla laxa, ramis inferioribus erecto-patentibus remotis haud v. vix superantibus, superioribus ± patentibus magis magisque approximatis, summis sæpe umbellatis superantibus, omnibus gracilibus rectis — leviter curvatis pedicellis brevibus gracillimis acladioque 20—40 mm. longo virentibus sparsim v. ± dense canofloccosis et glandulis minutis — minutissimis luteolis raris superne sparsis — densiusculis obtectis. *Involucra* parva v. minuta humilia virentia basi primo ovato-rotundata postea subtruncata. *Squamæ* breves sat angustæ e basi latiore in apicem obtusum attenuatæ, exteriores brevissimæ angustæ lineares, læte (— obscurius) virides, dorso obscuriore glandulis minutis lutescentibus fere simplici serie dispositis sat densis obsitæ, marginibus floccis raris — sparsis laxis ad apicem comatulum frequentioribus obtectæ, ceterum rare stellatæ. *Calathidium* luteum sat radians. *Ligulæ* apice glabræ. Stylus luteus v. leviter livescens.

Inv. $\frac{8-10}{4-6}$, D. c. 30, L. m. c. 2 mm.

Utmärkt af sin höga, smala och vanligen styfva och raka, flerbladiga stjelk med decrescerande blad, vanligen stora och långa m. l. m. utdraget lancettlika eller äggrundt lancettlika rosettblad och smärre stjelkblad af samma form, alla med oftast långt nedlöpande bas och utdragen, skarp, m. l. m. helbräddad spets samt regelbundet och vackert tandade till sågtandade med framåtrigtade eller utstående, ej långa tänder, hvilka (isynnerhet på stjelkbladen) ofta hafva tillbakaböjda spetsar, alla till färgen mycket ljust gröna, särdeles undertill med särskildt framträdande blek nerv, tunna och undertill något eller endast de öfre märkbart stjernhåriga, af kvastlik, nedåt ofta obegränsad inflorescens med aflägsnade, uppåt närmade, smala, m. l. m. utstående, raka, stundom något bågböjda, glest stjernhåriga grenar med genomlysande grön färg och fina, mera stjernludna, m. l. m. glest, tätt och fint glandelhåriga skaft, af små holkar med korta, tegellagda, oftast liftigt gröna fjäll med något mörkare rygg, något bredare än hos föregående och nästan alla trubbiga, i spetsen finhåriga, besatta med glesa men stora stjernhår, som mest synas i kanten och mot spetsarne samt med en nästan enkel rad ganska tättsittande, fina, gulaktiga och korta glandler på ryggen (särdeles tydligt å de mellersta fjällen); vidare af ljusare blommor än föregående, glesare korgar och gula eller ibland svagt livescenta stift.

Får ett mycket i ögonen fallande utseende genom sin ljusa, gröna färg, smala bladform och holkarnes beklädnad. Är mycket närbeslägtad med *H.* **resupinatum*, från hvilken den förnämligast är skild genom bladformen och tandningen samt de smärre holkarne med färre, bredare och trubbigare fjäll. Skuggformer och frodigare former påminna om densamma genom något längre tänder (isynnerhet på stjelkbladen), hvilka oftare äro i

spetsen svagt utåt eller bakåtböjda. Mångbladiga former hafva ofta ganska utpräglad *rigidum*-habitus och hafva oftast alla stjelkbladen oskaftade. I allmänhet äro rosettbladen till större delen kvarsittande vid blomningen, men äro ibland till större delen bortvissnade; fåbladiga former hafva mera utpräglad *vulgatum*-habitus och ofta det nedersta eller ett par af de nedre stjelkbladen m. l. m. skaftade. Backformer hafva ofta hopträngd, till marken tryckt bladrosett och rudimentära stjelkblad och få härigenom ett från öfriga former mycket afvikande utseende. Aldrig förekommer äfven hos de mest fåbladiga formerna någon antydan till tvär eller pillik bladbas som hos föregående. Nedersta delen af stjelken och bladskaften äro nästan alltid lifligt eller mörkt brunvioletta. Stiften variera ibland (mest hos mångbladiga former) svagt grönaktiga. Utom med föregående former är den äfven beslägtad med *H.* **lepidiforme* Stenstr., men är från denna väl skild bland annat genom sina ljusare, smalare, jemnare tandade blad, bredare och trubbigare holkfjäll, hvilka ej äro i spetsarne nakna som hos denna utan stjernhåriga och hårtofsade, och i öfrigt äro rikligare stjernludna och mera glandelhåriga, samt genom sin mera framträdande *rigidum*-artade habitus. De äro utan tvifvel att uppfatta som tvänne parallelformer.

Äfven *H.* **reclinatiforme* (Dahlst., Hier. exs., fasc. II, n. 57) med former, hvilka framdeles skola utförligare beskrifvas, kan anses som en nordlig parallelform till ifrågavarande form. Den är hufvudsakligast skild utom i andra afseenden äfven genom mörkare bladfärg, rikligare hårighet, mörkare, mera glandelhåriga men derjemte sparsamt mörkhåriga holkar med i spetsen naknare fjäll och för öfrigt svagare stjernludd samt redan från början livescent eller snart mörknande stift. Genom *var. subacroleucum* (Dahlst., Hier. exs., fasc. II, n. 59), som har oftare skaftade nedre blad, längre holkar med talrikare hår m. m., sammanbindes den i någon mån med *H.* **acroleucum*.

Inom området är *H.* **reclinatum* anträffad i *Östergötland*, Vestra Husby s:n, Ludden (H. Strömfelt); Åtvids s:n, Åtvidaberg, Slefringe (förf.): *Småland*, Rogberga s:n, Tenhult i björkskog (K. Johansson); Almvik (förf.). Utom området anträffad i *Södermanland*, Jakobsbergs s:n, Brännkyrka, Vinterviken m. fl. st.; Dalarö (förf.); Vestermo prestgård; Öja s:n, Långsyn; Tullinge och Ålberga (S. Almquist); Vårdinge s:n (A. Torssander); Stockholmstrakten, flerestädes såsom på Djurgården (förf.) och i Stockholms skärgård; Vadholma (S. Almquist): *Upland* flerestädes och gerna i sällskap med *H.* **læticolor* allmän såsom vid Dannemora (förf.), Upsala (Fr. Ahlberg); Ultuna; Löfsta s:n, Åsen mellan Horsbäck och Hvilstena (C. A. E. Lenström); Knifsta (E. Holmgren); Sigtuna flerestädes (M. Floderus); Fogelbolandet (K. Fr. Thedenius); Torp och Embarsbo i Steninge s:n (M. Floderus); Värmdö (A. Magnusson); Ljusterö, Tranvik (förf.); Rindö (S. Almquist): *Vestmanland*, Kungsör, Ulfshäll m. fl. st. rikligt (C. O. v. Porat); Skillinge Uppgård (K. J. Lönnroth): *Dalsland*, Örs s:n, Sanda och Hagen (A. Fryxell). På *Gotland* vid skogsvägen mellan Sanda och Klintehamn är af K. J. Lönnroth en hithörande form funnen, hvilken synes skild endast genom något längre tandade blad. Habituelt är den ganska lik *H.* **lepidiforme*, men är till holkarne en fullkomlig typisk *H.* **reclinatum*.

D. VULGATA GENUINA (Almqu.).

Stjelk isynnerhet nedtill mjukt och rikt, upptill vanligen glesare hårig, mera sällan nästan glatt, ofta isynnerhet vid basen och upptill rikt stjernluden, hos en del former till öfre delen eller ända från basen äfven m. l. m. glandelhårig, (2—)5—10-bladig. *Stjelkbladen* äro hos fåbladiga former ofta stora och m. l. m. aflägsnade samt uppåt hastigt och tvärt decrescerande, hos flerbladiga former mindre och m. l. m. långsamt aftagande uppåt i storlek och bredd. Ofta äro de öfre alldeles oskaftade och endast 1 till 2 af de

nedersta m. l. m. skaftade, men hos en del rikbladiga former äro de alla oskaftade. *De nedersta bladen* äro hos fåbladiga former samlade till en föga rik, vanligen 2—3 eller 4-bladig rosett vid stjelkens bas; hos mångbladiga former kan förhållandet ibland vara detsamma, men vanligen äro basalbladen hos dessa färre och bilda ej en hopträngd rosett samt afvissna vid blomningen ofta helt eller delvis. Till färgen äro bladen vexlande men oftast af mörkare eller blekare rent grön färg, stundom med mer eller mindre dragning åt lökgrönt, glaucescent eller gulgrönt. Ofta äro de på båda sidor eller åtminstone undertill och på bladskaften m. l. m. rikt och mjukt håriga. Ej sällan äro de på undre sidan, isynnerhet på medelnerven m. l. m. rikt stjernhåriga. *Basalbladen* variera till bredden hos de respektive formerna, men äro vanligen af m. l. m. äggrundt-lancettlik till lancettlik form med m. l. m. nedlöpande bas. Hos former med färre stjelkblad (*vulgatum*-typen) äro de till större delen m. l. m. trubbade eller kortspetsade, hos former med talrika stjelkblad (*subrigidum*-typen) äro de mera spetsade och smalare. Tandningen varierar mycket till djupleken. Hos en del former äro basalbladen alldeles helbräddade, hos andra korttandade till djuptandade och vid basen någongång flikade. Tänderna äro i allmänhet skarpa och spetsiga med m. l. m. raka sidor och framåtrigtade. Vanligen är tandningen gles, isynnerhet hos former af *subrigidum*-typen, men äfven hos ett större antal former af *vulgatum*-typen; hos en del former af sistnämda typ är den ibland dock tätare och på samma gång ojemnare. Inom denna afdelning finnes grupper af former, hvilka hvar för sig omfatta mycket närstående parallelformer, af hvilka en del äro mera *vulgatum*-artadt, en annan del mera *subrigidum*-artadt utbildade, och i allmänhet eger det förhållandet rum, att en form af *subrigidum*-typen äger mångbladigare stjelk, glesare och rakare bladtänder, smalare blad, större holkar samt mindre differentieradt indument än sin motsvarande och närmast besläktade form af *vulgatum*-typen. *Holkarnes* beklädnad är inom denna grupp mycket vexlande och häri liknar den i hög grad *Subvulgata*, men den dekorativa anordning, som så starkt framträder hos nyssnämda grupp, är här i allmänhet ej på långt när så skarpt utpräglad. Vanligen uppträda glandler, hår och stjernludd i vexlande proportioner, mera sällan ensamt glandler eller glandler och stjernludd. Hos några grupper af former t. ex. *H. subramosum*, *H. lepidotum* m. fl. äro håren öfvervägande och stjernluddet m. l. m. rikt utveckladt, hvaremot glandlerna i allmänhet äro få eller sparsamma och ej sällan mycket små samt ofta m. l. m. dolda af håren. Dessa former närma sig mången gång *Cæsia* och äro sannolikt nära besläktade med denna grupp. *Holkfjällen* äro hos de respektive formerna af vexlande form och bredd och förhålla sig för öfrigt som hos *Subvulgata*. Holkformen varierar för öfrigt på samma sätt som hos föregående grupper.

Hithörande former äro m. l. m. nära besläktade med former af *Subvulgata* och samma parallelism synes råda mellan närvarande och nyssnämda grupp, som mellan *Subcæsia* och *Cæsia*, ehuru ej på långt när så skarpt utpräglad som hos dessa. Af hithörande former synas de som gruppera sig kring *H. subramosum* och *H. lepidotum* m. fl. vara, som ofvan antydts, närmast besläktade med de hårigare formerna af *Subvulgata* t. ex. *H. sagittatum* och *H. sarcophyllum*, och på samma sätt som dessa sistnämda närma sig vissa former af *Subcæsia* (såsom förut påpekats) närma sig äfven de förstnämda motsvarande former af *Cæsia*. Det ser derföre ut som om alla de nyssnämda formerna stode närmare ett äldre stadium för hela gruppen *Vulgata*, isynnerhet som många af dessa former äfven äga större eller

mindre likheter med andra grupper såsom *Andryaloidea* och *Oreadea*. Mellan de glandelhåriga formerna af denna grupp och *Subvulgata* framträder slägtskapen hos områdets former i allmänhet ej så tydligt, men är deremot påtaglig hos ett temligen stort antal nordliga former. Dessa glandelhåriga former af båda grupperna närma sig betydligt former af *Nigrescentia* och *Alpestria* (*Dovrensia*), på så sätt att vissa former af *Subvulgata* stå mycket nära en del former af de förra, hvaremot en del former af *Vulgata genuina* t. ex. vissa former af *H. anfractum* och beslägtade (dock i mindre grad) närma sig en del *Dovrensia*. Många former af *H. gothicum* närma sig i flera afseenden *Foliosa*.

Följande framställning (sid. 66) åskådliggör frändskapsförhållandena mellan gruppens former inbördes och till andra grupper. Artnamnen inom parentes utmärka beslägtade former af andra grupper.

Conspectus specierum.

A. *Involucra* glandulis sæpius parvis v. minutis nigris — lutescentibus ± densis — sat densis, pilis obscuris — dilutis frequentoribus v. numero æquantibus immixtis obtecta, rarissime — dense floccosa, floccis sæpe in marginibus magis congestis.

1. *Glandulæ* involucri densæ — sat densæ.

a. *Pili* densi — sat densi inter glandulas immixti. *Squamæ* dorso floccis sparsis — sat densis obsitæ ± late floccoso-limbatæ. *Folia* acute dentata basi interdum sparsim et profunde laciniata.

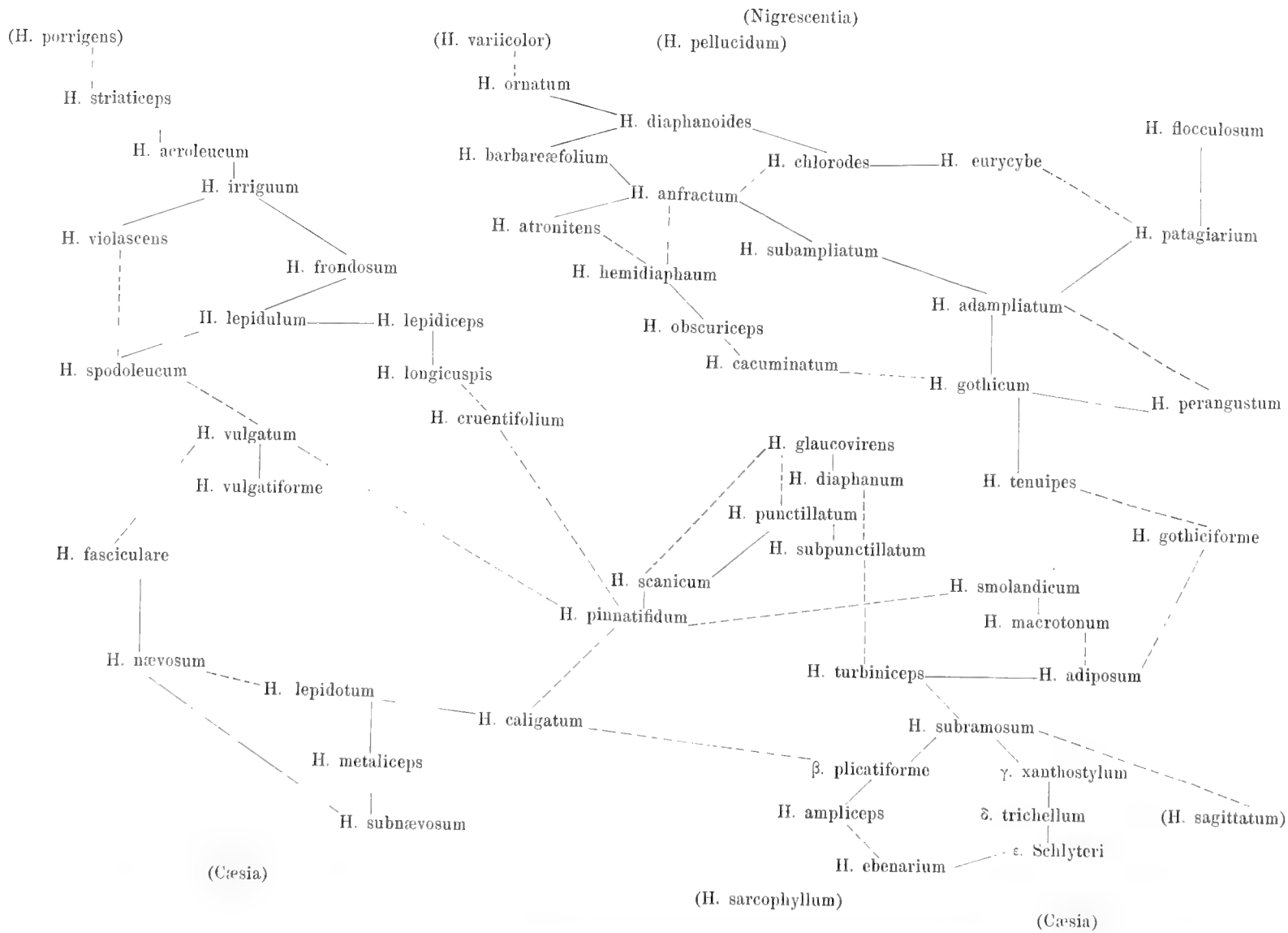
Folia læte — pallide viridia, densiuscule — sparsim et breviter dentata et rarius ad basin ± longe dentata — laciniata parum pilosa. *Squamæ* involucri ± gracili v. parvi ± angustæ lineares variegatæ, glandulis longis — brevibus ± densis obsitæ, marginibus latiuscule — late floccoso-limbatæ, dorso ± stellatæ.

H. acroleucum Stenstr.

Folia obscure viridia, subtus vulgo ± intense violascentia, sparsim longius et magis acute dentata, densiuscule — sat dense pilosa. *Squamæ* involucri crassiusculi et sæpe sat magni ± latæ triangulari-lanceolatæ — lanceolatæ glandulis sparsis — densiusculis (— densis, interdum parcis) et pilis mediocribus densiusculis — sat densis obsitæ, leviter — sat dense anguste — sat late floccoso-limbatæ, dorso rare — sparsim stellatæ.

H. vulgatum Fr.

b. *Pili* involucri densiusculi v. sat densi inter glandulas immixti. *Squamæ* dorso floccis subnullis — raris obsitæ, anguste floccoso-limbatæ v. totæ fere efloccosæ. *Folia* præsertim caulina longe dentata, sæpe 3—4 dentata — pinnato-laciniata (præcipue ad basin).


(Nigrescentia)
(H. porrigens)
(H. variicolor)
(H. pellucidum)
H. striaticeps
H. ornatum
H. diaphanoides
H. flocculosum
H. acroleucum
H. barbareæfolium
H. chlorodes
H. eurycybe
H. irriguum
H. anfractum
H. violascens
H. atronitens
H. patagiarium
H. subampliatum
H. frondosum
H. hemidiaphanum
H. adampliatum
H. lepidulum
H. lepidiceps
H. obscuriceps
H. spodoleucum
H. longicuspis
H. cacuminatum
H. gothicum
H. perangustum
H. cruentifolium
H. vulgatum
H. glaucovirens
H. tenuipes
H. diaphanum
H. vulgatiforme
H. punctillatum
H. gothiciforme
H. fasciculare
H. subpunctillatum
H. scanicum
H. smolandicum
H. pinnatifidum
H. macrotonum
H. nævosum
H. turbiniceps
H. adiposum
H. lepidotum
H. caligatum
H. subramosum
H. metaliceps
β. plicatiforme
γ. xanthostylum
H. ampliceps
δ. trichellum
(H. sagittatum)
H. subnævosum
ε. Schlyteri
H. ebenarium
(Cæsia)
(H. sarcophyllum)
(Cæsia)

Folia saturate gramineo-viridia, subtus pallidiora subglaucescentia; *basalia* lanceolata — ovato-lanceolata, rare et acute v. densius et sæpe inæqualiter dentata, interiora longe acuta — cuspidata; *caulina* sæpius ± longe pinnato-dentata. *Squamæ* involucri angustæ v. sat latæ ± lanceolatæ sparse — densiuscule glandulosæ densiuscule — sat dense pilis ± obscuris apice dilutis obsitæ, ad basin rare v. etiam in marginibus sparsim stellatæ.

H. macrotonum Dahlst.

Folia læte — obscure gramineo-viridia, subtus pallidiora; *basalia* ovato-lanceolata — oblonge lanceolata sat crebre et late dentata — longe pinnato-dentata; *caulina* vulgo saltim ad basin pinnato- v. laciniato-dentata. *Squamæ* sat angustæ — latæ triangulari-lanceolatæ — lanceolatæ v. fere lineares glandulis densiusculis — densis et pilis brevibus obscuris sparsis — densis (v. interdum raris — subnullis) obsitæ, efloccosæ v. sparsim — densius floccosæ (rarius marginibus magis stellatæ), sæpe microglandulosæ.

H. pinnatifidum Lönnr.

c. *Pili* involucri densi — sat densi inter glandulas immixti. *Squamæ* involucri efloccosæ v. marginibus floccosæ. *Folia* sparsim et breviter dentata — serrato-dentata.

H. turbiniceps Dahlst.

2. *Glandulæ* involucri sparsæ v. paucæ (— fere nullæ).

a. *Pili* densi diluti v. ± obscuri *glandulas* paucas v. solitarias sæpe occultantes. *Squamæ* dorso parum floccosæ v. subnudæ, marginibus ad basin solum sparse floccosæ v. dorso sparsim — frequentius stellatæ marginibus anguste floccosæ. *Folia* densius pilosa.

H. subramosum Lönnr.

b. *Pili* sparsi — densiusculi ± diluti; *glandulæ* paucæ sparsæ v. subnullæ. *Squamæ* dorso subnudæ v. ubique dense floccosæ, sæpe marginibus magis floccosæ. *Folia* sparsius pilosa — subglabra.

H. lepidotum Stenstr.

B. *Involucra* glandulis minutis — mediocribus nigris — lutescentibus sparsis — densis pilis obscuris — dilutis sparsis — paucis (rarioribus quam glandulæ) obsita v. solum glandulosa, efloccosa v. ubique ± floccosa; *squamæ* sæpe in marginibus ± floccoso-limbatæ.

a. *Folia* vulgo ± lata, haud maculata.

H. irriguum Fr.

b. *Folia* ± angusta, maculata.

H. cruentifolium Dahlst. & Lüb.

C. *Involucra* efloccosa, raro marginibus angustissime v. late floccoso-limbata, dense glandulosa v. interdum pilis obscuris paucis (— raris) immixtis etiam obsitæ.

a. *Involucra* solum glandulosa (rarius in una subsp. pilis tenellis sparsis immixtis). *Folia* caulina abrupte decrescentia; habitus *vulgatiformis*. *Squamæ* involucri pauciseriales.

1. *Styli* obscuri.

α. *Folia* glabriora. *Involucra* atra nitentia — sat viridia, glandulis brevibus crassis — gracilibus ad summum densiusculis obsita, raro pilis paucis obscuris inspersis, efloccosa v. basi leviter stellata. *Squamæ* in marginibus levissime — parce stellatæ.

H. anfractum Fr.

β. *Folia* ± dense pilosa. *Involucra* atra glandulis elongatis gracilibus — crassis densis — crebris obsita. *Squamæ* efloccosæ v. marginibus late floccosæ.

H. diaphanoides Lbg.

2. *Styli* lutei.

Involucra brevia fere efloccosa glandulis parvis crebris nigris obtecta.

H. diaphanum Fr.

b. *Involucra* glandulosa et haud raro etiam parce et obscure pilosa, atra efloccosa v. leviter floccosa. *Folia* caulina abrupte decrescentia plurima; habitus *subrigidi- v. rigidi-formis*. *Squamæ* involucri multiseriales.

H. gothicum Fr.

H. ACROLEUCUM (Stenstr.).

Caulis altus 2—8-folius, basi magis pilosus, superne leviter pilosus — subglaber, apice rare glandulosus ± floccosus. *Folia* læte viridia, exteriora sæpe subintegra, intermedia sparsim v. crebrius et acute dentata, interiora longe acuta — cuspidata profundius dentata, ovato-lanceolata — lanceolata basi ± descendente; *caulina* 2—8 abrupte v. sensim decrescentia vulgo longe protracta et ± acute dentata, infimum ± petiolatum, omnia supra subglabra — fere glabra, subtus sparsim pilosa. *Anthela* ± paniculata simplex v. sæpe valde composita — corymboso-paniculata sæpe indeterminata ramis pedicellisque gracilibus. *Involucra* sat elongata gracilia mediocria v. parva — minuta crassiora, ± variegata, squamis ± angustis linearibus sat dense — dense glandulis parvis obscuris v. minutis — minutissimis dilutioribus obsitis et pilis mediocribus — brevibus ± obscuris et ± densis obtectis, latiuscule — late præsertim apicem ± comatum versus floccoso-marginatæ, dorso rare — sparsim stellatæ. *Stylus* primo luteus deinde sæpe ± obscurascens.

De hit förda båda formerna äro synnerligen nära beslägtade, men stå för öfrigt temligen isolerade. De äro måhända aflägset beslägtade med *H. porrigens*, isynnerhet med former af *H. *reclinatiforme*, men hafva äfven några få likheter med hufvudformen. Möjligen är *H. *dissimile* Lbg. (= *H. floccifrons* Elfstr., Bot. Utfl.) nära beslägtad och att anse som en motsvarande *cæsium*-artadt utbildad form. Genom *H. *stipatum* Stenstr. förenas de med *H. *lepidiforme* och *H. *reclinatum*. Men liksom *H. porrigens* i flera karaktärer påminner om *H. anfracti* och *H. irrigui* formgrupper, så erinra äfven dessa former i ännu högre grad om de sistnämda, hvilka de äfven habituelt mera likna. Ganska märkvärdig och slående är likheten med *H. tridentatum*, isynnerhet med *H. *dædalum* Stenstr. (hvilken utan tvifvel är att anse som dennas underart), både i bladens utseende och anordningen af holkarnes indument. Denna i hög grad framträdande likhet häntyder måhända på slägtskap och gör tvifvelaktigt, huruvida icke *H. tridentatum* snarare är att räkna till *Subvulgata*. Till denna formgrupp och närmast beslägtad med *H. *acroleucum* hör äfven *H. *chloroleucum* Dahlst., Hier. exs., fasc. I, n:o 93 (H. Dahlst., De Hieraciis nonnullis scandinavicis in horto Bergiano cultis. Acta horti Bergiani. Band 1. N:o 7, 1891).

Conspectus subspecierum.

1. *Involucra* ± elongata. *Squamæ* e basi latiore ± lineares, anguste floccoso-limbatæ, glandulis atris sat longis ± gracilibus ± densis et pilis mediocribus obscuris ± densis obsitæ.

   1. *H. *acroleucum* Stenstr.

2. *Involucra* parva v. minuta. *Squamæ* angustæ lineares ± dense et late floccoso-limbatæ glandulis minutis — minutissimis ± densis et pilis obscuris brevibus densis — confertis obsitæ.

   2. *H. *striaticeps* Dahlst.

1. H. *acroleucum Stenstr.

H. *acroleucum Stenstr., Verml. Arch. 1889. — Dahlst., Hier. exs., fasc. II, n. 60; fasc. III, n. 46. — Dahlst., Herb. Hier. Scand., Cent. II, n. 75, 76.

Caulis 30—65 cmt. altus sat gracilis v. crassiusculus sæpe firmus et rigidus, inferne leviter — densiuscule et longe pilosus, superne rare (— sparsim) pilosus v. subglaber, inferiore parte leviter superne sparsim — densiuscule stellatus, apice interdum rare et minute nigro-glandulosus. *Folia rosularia* pauca vulgo 1—3, exteriora sub anthesi sæpe emarcida v. omnia ± ovali-oblonga — oblonga v. elliptica subintegra v. minute dentata obtusa — acutiuscula, intermedia ± ovato-lanceolata — lanceolata sparsim et acute interdum crebrius vulgo minute sæpe subirregulariter serrato- v. undulato-dentata ± acuta, intima v. omnia ± lanceolata sæpe angusta

± longe acuta v. cuspidata profundius dentata, omnia basi ± longe descendente v. cuneata; *caulina* nunc abrupte (in spec. paucifoliis) nunc sensim (in spec. multifoliis) in bracteas abeuntia ± ovato-lanceolata breviora — anguste lanceolata longiora apice ± acuto — longe cuspidato sparsim — crebrius subinæqualiter et sæpe patentim serrato-dentata margine sæpe leviter plicata, infimum sæpe petiolatum, reliqua sessilia; omnia læte viridia, supra subglabra, subtus parce in nervo dorsali petiolisque ± alatis levissime stellatis densius et longius pilosa, marginibus densiuscule ciliata. *Anthela* paniculata v. ramoso-paniculata sæpe indeterminata ± composita rarius subsimplex ramis ± gracilibus, inferioribus ± remotis erecto-patentibus sat rectis haud v. vix superantibus, superioribus sæpe multum patentibus approximatis, summis sæpe valde congestis, omnibus ± longe superantibus, pedicellis gracillimis mediocribus acladioque 10—25 mm. longo fusco-virescentibus sparsim et superne sat dense — dense canofloccosis glandulis atris inferne densiusculis superne densis — confertis et pilis nigris v. apice ± canescentibus mediocribus sparsis — densis hirtis. *Involucra* vulgo gracilia sat elongata e virescenti fusco-atra sat variegata basi ovato-rotundata postea rotundato-truncata. *Squamæ* sat angustæ e basi latiore sublineares in apicem acutiusculum v. obtusiusculum raro obtusum sensim attenuatæ, exteriores breves angustissimæ obtusæ, intimæ paucæ acutæ v. subulatæ, interiores apice sæpe falcato-curvatæ, dorso nigræ v. fusco-atræ marginibus ± obscure et ± anguste virescentibus inferne sparsius — densius apicem albido-comatum versus vulgo anguste floccis albis ± conspicue limbatæ, ceterum rare — sparsim stellatæ et glandulis atris ± longis sat gracilibus densis — sat confertis pilis nigris — obscuris mediocribus ± densis immixtis vestitæ. *Calathidium* saturate luteum ± radians. *Ligulæ* glabræ. *Stylus* vivus luteus v. fusco-hispidulus, siccus obscurascens.

Inv. $\frac{10—12}{4,5—6}$, D. 35—40, L. m. 2,5—3 mm.

Utmärkt af ljust gröna, fåtandade eller något vågiga rosettblad af elliptiskt aflång till lancettlik form och trubbade eller de inre skarpspetsade, oftast flerbladig stjelk, som vid basen är något långhårig och violett, för öfrigt nästan glatt och glest stjernluden med oftast småningom descrescerande, vanligen långspetsade, oftast glest, stundom tätare sågtandade, de öfre vanligen något ojemt bugttandade blad, af ibland hopdragen enkel men vanligen, isynnerhet upptill, mera utspärradt grenig, sammansatt och nedåt obegränsad, kvastlik inflorescens, af vanligen smala, mörka korgar, hvilka äro brokiga af löst stjernludd, hvilket bildar en m. l. m. smal, uppåt bredare, ljus rand i de temligen smala, från bredare bas nästan jembreda, mörka fjällens smalt gröna kanter, och hvilka för öfrigt liksom isynnerhet korgskaften äro klädda af täta, smala, mörka, ganska långa glandler och mörka m. l. m. hvitspetsade eller nästan helt och hållet svarta, medellånga, glesare eller tätare hår, samt slutligen af ganska glesa korgar och i början vanligen ljusa stift. Varierar rätt betydligt till habitus genom stjelkens olika bladrikedom. Former med få blad (stundom förekomma sådana med blott ett väl utbildadt stjelkblad) hafva vanligen helare och till större delen trubbiga rosettblad samt oftast det eller de nedre bladen skaftade och hafva härigenom en rätt väl utpräglad *vulgatum*-habitus. Däremot äro former med talrika stjelkblad mera

rigidum-lika och tillhöra *subrigidum*-typen. Vanligen äro hos dessa rosettbladen fåtaliga genom de yttres tidiga bortvissnande men äfven som det synes redan i första anlaget. Oftast äro bladen hos dessa former skarpare och tätare tandade eller sågade. Ibland (och isynnerhet rätt ofta hos de öfre bladen) blir tandningen mera ojemn och kortare samt bladkanten veckad och på ett karaktäristiskt sätt vågig. Ej sällan äro äfven rosettbladen, isynnerhet då de äro trubbade och mindre tandade, i kanten veckade och vågiga. Frodigare former få ofta större, gröfre och ojemnare tandade blad. Holkarne variera ljusare och mörkare genom olika riklig utbildning af stjernluddet och fjällens egen mörkare eller ljusare färg. Fjällen äro oftast mot spetsen ganska smala och vanligen trubbade; ej sällan äro de inre skärformigt krökta åt olika håll. Holkarna variera hos fåbladiga exemplar smala och långa med smalare, mera utdragna och spetsigare fjäll, eller hos rikbladiga former ej sällan tjockare med bredare, kortare och i spetsen ganska trubbiga fjäll. Äfven hårens och glandlernas absoluta riklighet liksom deras förhållande till hvarandra varierar, men som det synes utan samband med andra förändringar. Denna form är för öfrigt mycket konstant och ej att förvexla med någon annan utom möjligen med följande underart, med hvilken kortholkiga former med rikligare stjernludd och smärre glandler stundom i någon mån förete likheter, ehuru dessa alltid lätt skiljas på sina bredare fjäll, större holkar och sin gröfre växt m. m. Med denna är den utan tvifvel närmast beslägtad. Med *H.* **reclinatiforme* var. *subacroleucum* är den mindre nära, ehuru dock tydligt beslägtad genom följande varietet. Den ännu aflägsnare slägtskapen med *H.* **porrigens* framträder i den tydliga likheten till holkarne med dennes hårigare former.

Anträffad inom området i *Småland*, Rogberga s:n, Knifshult, Ingaryd och Tenhult (K. JOHANSSON): *Södermanland*, Vestermo s:n, Sofielund (O. G. BLOMBERG); Kila s:n, Garpsäter (S. ALMQUIST); Stora Malms s:n, Sörgölstugan, Östra Vingåkers s:n, Strångsjö (G. A:N MALME); *Nerike*, Kils s:n, Blacksta (A. CALLMÉ): *Upland*, Löfsta s:n, Fasenbo, Svartängen och Hebyåsen (C. A. E. LENSTRÖM); Tibble, Ramsjön (S. ALMQUIST); Dannemora ymnig (förf.); Stockholm, Djurgården m. fl. st. (förf.): *Vestmanland*, Frösåker i Rostock s:n; (A. E. LUHR); Kungsör, Ulfhäll (C. O. v. PORAT): *Vestergötland*, Toarps s:n, Nygård (A. O. OLSSON); Ymsjöholm och Åsöboda vid sjön Unden (A. CALLMÉ): *Vermland*, Gillberga och Bergviks s:r (K. O. E. STENSTRÖM,); Arvika s:n, Sund (E. HOLMGREN) och Sjöändan (B. M. BROSTRÖM); Nors s:n (E. VIKSTRÖM): *Dalsland*, Hasselskog i Dalskog (A. G. KELLGREN): *Bohuslän*, Morlanda, Skaftö (LAGERSTEDT). — *Norge* vid Kristiania flerestädes (förf.).

På Malmön vid Kristiania fann jag 1885 bland talrika exemplar af *H.* **gravastellum* och *H.** *acroleucum* tvenne individer, hvilka tydligen voro hybrider af dessa båda. De erinrade till holkarnes beklädnad och form mest om den sednare, till bladens färg och hårighet om den förra, till bladform och tandning om båda. Stiften voro redan från början mörka. Det ena exemplaret hade tvenne holkar närmade hvarandra och vid basen till en liten del sammanvuxna, såsom ofta är fallet hos en del former af *H.* **gravastellum*.

β dædalolepium nov. var. — DAHLST., Herb. Hier. Scand., Cent. II, n. 65.

Caulis 40—70 cmt. altus sat gracilis flexuosus v. sat strictus 2—4-folius, inferne ± violascens molliter et densiuscule longe-pilosus vix stellatus, superne pilis brevibus sparsis v. rudimentariis glandulisque solitariis scaber sat stellatus, sub anthela magis floccosus et pilis obscurioribus sparsis glandulisque raris obsitus. *Folia* læte viridia, subtus aliquantulum pallidiora sed viridia; *basalia* sub anthesi sæpius emarcida v. 2—3 interiora persistentia ± lanceolata acuta minute et argute paucidentata; *caulina* longe remota cito decrescentia, infimum petiolatum, superiora sessilia ± lanceolata cuspidata remote et argute dentata, omnia supra parce pilosa

— subglabra, subtus sparsim — densius pilosa, marginibus et in nervo dorsali crebrius longius et molliter pilosa, petiolis sat crebre et sæpe longissime villosula, vix v. non stellata. *Anthela* parva paniculata simplex oligo-(2—6-)cephala ramis ± erecto-patentibus superantibus acladio 10—15 m. m. longo pedicellisque brevibus fusco-virescentibus sat dense tomentosis glandulis mediocriter longis parvis immixtis sat dense — crebre (sub involucris) obtectis, ceterum pilis solitariis v. sparsis (interdum densioribus), præcipue v. solum in inferiore parte ramorum pedicellorumque haud raro etiam in acladio evolutis, obsitis. *Involucra* gracilia obscure canescenti-viridia basi ovata postea sæpe rotundata. *Squamæ* sat angustæ lanceolatæ sensim in apicem sat longum ± acutum attenuatæ, interiores fusco-viride marginatæ glandulis mediocriter longis nigris sparsis iisdem brevioribus sat densis et pilis obscuris brevibus raris v. hinc inde sparsis (præsertim in squamis basalibus evolutis) immixtis obsitæ, ceterum marginibus usque ad apices comatos vinose coloratos levissime v. superne densius stellatæ. *Calathidium* sat obscure luteum radians. *Stylus* badio-fuscus (siccitate).

Inv. $\frac{10—11}{(4\text{-}5)—6}$ D. c. 35, L. m. 2,5 mm.

Genom sina smala, vanligen lancettlika, skarpspetsade blad med gles och låg, ofta syllik eller glandellik tandning, sina nästan hårlösa eller betydligt mindre håriga holkar och äfven sparsammare håriga skaft samt genom det mindre utvecklade stjernluddet i holkfjällens kanter och genom mörkare blommor, äfvensom i lefvande tillstånd som det synes mörkare stift är denna form lätt att skilja från den som hufvudform uppställda, ehuru slägtskapen i såväl dess karaktärer som habitus är omisskänlig. Genom bladens form och ringare bredd samt derigenom, att de äro mera uppåtriktade, har denna form ett mera *rigidum*-likt utseende än hufvudformen och påminner härigenom habituelt mycket om sådana, flerbladiga former af *H. *reclinatum*, hvilka hafva mörkare holkar och något utdragna fjäll, men från hvilka den utan vidare skiljes genom mörkare grönska, smalare och längre fjäll och för öfrigt genom det afvikande indumentet. Den är intressant, emedan den genom sina i vissa afseenden intermediära karaktärer visar huru nära *H. *reclinatum* och *H. *acroleucum* äro beslägtade, så olikartade de än vid första påseendet må synas. Äfven med *H. *reclinatiforme* var. *subacroleucum* har den flera likheter i indumentet, men i motsats mot förhandenvarande form är denna mera af *vulgatum*-habitus och lätt skild genom sin afvikande bladform, svagare stjernhårighet på holkfjällen o. s. v. Denna synes förhålla sig till hufvudformen af *H. *reclinatiforme* som *H. *acroleucum* till förhandenvarande varietet. Denna sednare skulle lätt med afseende på holkarne kunna förväxlas dels med mera grönholkiga och smalbladiga former af *H diaphanum β pseudodiaphanum* dels med *H. *barbareæfolium*, i hvilkas sällskap den ibland anträffats, men skiljes från båda genom holkarnes och isynnerhet skaftens indument samt från den sednare äfven genom bladformen och tandningen.

Anträffad på *Gotland* i gräsrikare ängar vid Kyrkljufves i Vänge socken (K. JOHANSSON): *Småland*, Lannaskede (K. JOHANSSON).

Beslägtad med denna underart, ehuru mycket fristående och särdeles utmärkt såväl till habitus som holkarnes utseende och beklädnad, är *H. *chloroleucum* DAHLST. l. c. Framförallt skild genom ojemt skarptandade, spetsiga, ofvan oftast fläckiga blad och ljust gröngrå holkar med rikt ludd i kanterna men sparsammare på midten af fjällen,

hvilka äro temligen rikligt klädda af ljusa hår och sparsamma, små, gulaktiga glandler. Påminner till holkarne i någon mån om följande.

2. H. *striaticeps Dahlst.

H. *striaticeps Dahlst. (Stenstr. Verml. Archier. 1889.) — Dahlst., Hier. exs., fasc. II, n. 61.

Caulis 30—80 ctm. altus 2—8-folius gracilis v. crassiusculus sæpe firmus et rigidus simplex v. a medio sæpe a basi ramosus — ramosissimus, inferne rare — sparsim v. sat dense et longe pilosus, superne sparsim — densiuscule floccosus, apice magis pilosus et sæpe glandulis minutis obscuris ± raris obsitus. *Folia rosularia* 2—7, exteriora in specim. multifoliis sæpe emarcida in spec. paucifoliis vulgo persistentia, v. etiam plurima ± ovalia — ovali-oblonga obtusissima — brevissime acuta integerrima v. subintegra, intermedia ± ovata — elongate sæpe anguste lanceolata ± inæqualiter et obtuse præsertim ad basin undulato-dentata in apicem brevem obtusiusculum v. ± longe acutum attenuata, intima vulgo anguste lanceolata profundius et præcipue ad basin sparsim dentata in apicem longum — longissimum integrum acutum v. apice ipso obtusiusculum attenuata; *caulina* abrupte v. sensim decrescentia ± elongate lanceolata v. lanceolato-linearia sæpe longissima in apicem longum — longissimum ± integrum acutum angustata inferiore parte breviter et acute dentata v. crebre anguste et inæqualiter pinnatifido-dentata, infimum petiolatum, reliqua sessilia v. in specim. paucifoliis sæpe 1—2 infima petiolata sparsim angulato-dentata ± ovato-lanceolata, summum subsessile subintegrum, ± acuta; omnia ± læte gramineo-viridia, supra parce pilifera subglabra, subtus rare — sparsim in nervo dorsali parum stellato paullo densius et longius pilosa, marginibus sparsim v. densiuscule et breviter ciliata, petiolis fol. ros. et. inf. caul. ± alatis pilis densiusculis — sat densis hirtis. *Anthela* paniculata simplex — composita sæpe paniculato-ramosa ± indeterminata ± contracta parva v. laxa et magna ramis gracilibus, inferioribus sæpe multum distantibus ± erectis — erecto-patentibus ± rectis, superioribus magis approximatis sat patentibus interdum ± curvatis sæpe ± longe superantibus, pedicellis mediocribus gracillimis acladioque 10—30 mm. longo cano-virentibus et sat dense floccosis glandulis minutis — minutissimis obscuris inferne raris superne densiusculis — sat densis et pilis brevibus mollibus canescentibus densis — sat confertis pubescentibus. *Involucra* parva v. minuta humilia ± obscure — dilute viridi-canescentia pulchre variegata basi ± ovato-rotundata postea rotundata v. truncata. *Squamæ* angustæ lineares obtusiusculæ — subacutæ, intimæ paucæ subulatæ, exteriores angustissimæ breves ± obtusæ — obtusiusculæ, intermediæ v. intimæ plures ± falcato-curvatæ, omnes dorso ± angusto obscuriore ± late viridi-marginatæ, apice comatæ, marginibus usque ad apicem floccis albis densis ± late limbatæ, ceterum rare v. superne sparsim stellatæ et pilis brevibus — brevissimis obscuris apice ± canescentibus densis — confertis glandulisque minutis — minutissimis ± obscuris densiusculis — densis hirtæ. *Calathidium* ±

obscure luteum sat plenum. *Ligulæ* apice glabro. *Stylus* luteus v. livescens, siccus sæpe obscurus.

Inv. $\frac{8-10}{4-5}$, D. c. 30, L. m. 2—2,5 mm.

En bland de utmärktaste och lättast igenkänliga former, framförallt genom sina karaktäristiska holkar. Vanligen högväxt med oftast flerbladig, styf, i toppen eller ända från basen grenad stjelk, mera sällan lägre och fåbladig, oftast med decrescerande, smala och långa, till midten kort och ej serdeles tätt tandade eller mot basen temligen långt och smalt fliktandade stjelkblad, få till flera, helbräddade till fåtandade, ibland bugtigt tandade rosettblad, alla af mörkare eller ljusare, stundom gulaktigt gräsgrön färg, enkel eller sammansatt, smalare eller vidare, kvastlik inflorescens med fina grenar, af hvilka de nedre äro mera upprätta och m. l. m. skilda, de öfre närmade och stundom rätt utspärrade, ej sällan krökta, små, vackert gråbrokiga holkar med smala m. l. m. gröna fjäll med smal mörkare rygg, klädda i kanterna, isynnerhet mot den hårtofsade spetsen, af en m. l. m. bred rand af rikligt stjernludd och för öfrigt liksom skaften fint korthåriga af mörka, ljusspetsade eller vanligen ljusa, m. l. m. täta hår och inblandade, ytterst små, något mindre talrika, mörka glandler samt små korgar och från början gula eller något livescenta stift. Varierar knappast till holkarnes utseende och beklädnad utan endast något till fjällens och hårens mörkare eller ljusare färg. Deremot varierar den betydligt till habitus till följd af stjelkens vexlande bladrikedom, bladens tandning m. m. Hos exemplar med fåbladig stjelk, hos hvilka stundom endast ett blad kan vara utbildadt, äro rosettbladen oftast flere och äfven de yttre vid blomningen qvarsittande, isynnerhet hos exemplar från öppna lokaler med glest växttäcke. Hos dylika individ äro rosettbladen gerna glest och obetydligt tandade eller t. o. m. helbräddade, vanligen bredare än eljest, af m. l. m. oval till aflång form, stundom bredast ofvan midten och de flesta trubbade. Närmast dessa stå exemplar af *vulgatum*-habitus med 2—3-bladig stjelk med ofta ett par nedre blad skaftade af m. l. m. äggrundt-lancettlik form och vanligen kort och glest, något vinkligt tandade. Från dessa finnes en hel serie former till sådana med *rigidum*-lik habitus med flerbladig ända till 8-bladig stjelk och med smala, m. l. m. lancettlika, fliktandade stjelkblad samt m. l. m. bredt till smalt lancettlika, få rosettblad (genom de yttres tidiga bortvissnande). Vanligen äro dylika frodiga exemplar rikgreniga ända till basen. På ett dylik vid Kristiania insamladt individ uppgick sammanlagda antalet holkar från såväl sjelfva inflorescensen som grenarne till omkring 100, oberäknade alla illa utbildade eller aborterade holkar. Den motsatta ytterligheten var ett litet sida vid sida stående individ med blott en holk. Stjelkens bas och bladskaften äro oftast liftigt violetta och ofta äfven undersidan af de yttre bladen. Jemte föregående har den en märkvärdig likhet i holkarnes beklädnad med *H. tridentatum*, isynnerhet med underarten *H. *dædalum* Stenstr. Det är ej osannolikt, att den på något sätt är beslägtad med denna form; åtminstone tyda ett antal än i ett än i ett annat afseende intermediära men sjelfständiga former från Torpen och Valders (hvilka komma att beskrifvas på annat ställe) härpå. Redan E. Fries ansåg (i Symb.) gränserna mellan *H. tridentatum* och *Vulgata* obestämda och dunkla och tvekade, huruvida denna form ej borde föras till sistnämda grupp.

Inom området anträffad i *Östergötland*, Rinna s:n, Stortorp (förf.); Qvillinge s:n, Thyrstorp (P. OLSSON): *Småland* vid Sommens jernvägsstation (förf.). Utom området anträffad i *Ångermanland*, Själevads s:n, Lungånger (A. V. HOLM): *Vermland* rikligt i Gillberga och Borgviks socknar (K. O. E. STENSTRÖM); Jernskogs s:n, Koppom och Täckmarks s:n (O. JUEL); Arvika, Ö. Sund (E. HOLMGREN): *Dalsland*, Örs s:n, Storön i Örsjön (A. FRYXELL); Hesselskog (N. G. KELLGREN): *Bohuslän*, Uddevalla (S. ALMQUIST); Stora Koster (A. W. BOLANDER): *Västergötland*, Mörkeklef (A. FRYXELL). — *Norge* på Ulvön och Malmön samt vid Bækkelaget vid Kristiania (förf.).

H. VULGATUM Fr. *p. minore parte.*

Caulis ± altus — elatus, inferne ± dense et longe pilosus rubescens, superne parcius pilosus ± ramosus, 2—8-folius. *Folia* basalia obscure viridia, exteriora breviter et obtuse dentata — subintegra, intermedia sparsim et acute dentata, interiora longius (præsertim ad basin) dentata ± acuta; *caulina* cito v. sensim decrescentia magis acute dentata — sat longe 2—4-dentata ± acuta, omnia supra sparsim — densiuscule subtus densius pilosa et sæpe ± violascentia. *Anthela* ± paniculata parva et simplex v. sat magna et composita ± contracta v. laxa determinata — sat indeterminata ramis pedicellis crassiusculis ± tomentosis ± rectis v. leviter curvatis. *Involucra* brevia mediocria v. magna crassiuscula — crassa haud multum variegata, squamis latis triangulari-lanceolatis — lanceolatis ± acutis — obtusis pilis crassis brevibus — mediocribus densiusculis — sat densis et glandulis brevibus obscuris sparsis — densiusculis raro subnullis obsitis, anguste — sat late sed haud dense floccoso-limbatis, dorso rare — sparsim stellatis. *Stylus* luteus — ferrugineus v. sat fuscescens.

Hithörande tvenne former stå, liksom förhållandet är med föregående, temligen isolerade och visa föga slägtskap med andra former, men äro sinsemellan så närstående, att de måste anses ha utvecklats ur samma form, *H. *vulgatum* mera enligt den efter densamma benämda *vulgatum*-typen och *H. *vulgatiforme* mera i öfverensstämmelse med *subrigidum*-typen. De enda formgrupper, till hvilka *H. vulgatum* ansluter sig, äro *H. irriguum*, inom hvilken *H. *violascens* står den närmast, och *H. pinnatifidum*, med hvars hufvudform den har flera öfverensstämmelser i örtståndet, samt *H. subramosum*, hvilken den något liknar till habitus och beklädnad, men den är likväl ej nära beslägtad med någon af dem.

Conspectus subspecierum.

1. *Caulis* 2—3-folius. *Folia caulina* abrupte decrescentia, latiora basi magis inæqualiter et densius dentata. *Involucra* mediocria squamis ± ovato-triangularibus — ovato-lanceolatis ± acuminatis — acutis. *Pedicelli* rare — sparsim glandulosi.
   1. *H. *vulgatum* (Fr. p. p.) ALMQU.

2. *Caulis* 4—8-folius. *Folia caulina* sensim decrescentia, angustiora et sparsius dentata. *Involucra* sat magna squamis triangularibus — triangulari-lanceolatis ± obtusis. *Pedicelli* eglandulosi v. glandulis solitariis obsiti.
   2. *H. *vulgatiforme* DAHLST.

1. **H. *vulgatum** (Fr. p. p.) Almqu.

H. vulgatum Fr. Nov. ed. 1 et ed. 2 p. 258. p. minore p. — *H. vulgatum* Fr. — nemorosum Fr. Symb. p. 117 p. p. (exclus. syn. plurimis) — H. vulgatum Fr. Epicr. p. 98. p. minore parte — H. vulgatum *α* latifolium Fr., H. N. II. 8. p. maxima parte.[1] — H. vulgatum Fr., Almqu. in Thed. Fl. p. 361. — H. vulgatum Fr. *β* latifolium Lbg. in Blytt, Norges Flora p. 661. p. p. — H. vulgatum Fr. *β* latifolium Lbg., Hn. Fl. ed. 11, p. 47. p. p. — H. vulgatum Fr. v. nemorosum Fr. in Lbg. Hier. Scand. exs. n. 74. p. p.[2] — H. vulgatum (Fr. p. p.) Almqu. Stud. öfver sl. Hier. p. XXIV. — H. vulgatum Fr., Stenstr. Verml. Archier 1889. — Dahlst., Hier. exs., fasc. II, n. 92. — Dahlst., Herb. Hier. Scand., Cent. II, n. 89, 90. — H. triviale Norrl. Bidr. till Skand. Halföns Hier.-fl., p. 104 et Herb. Mus. Fenn.[3]

Caulis 40—60 cm. altus gracilis — crassiusculus (1—)2—3(—4)-folius, inferiore parte ± obscure — dilute livido-rubens dense et ± longe pilosus, medio densiuscule — sparsim pilosus, superne pilis ± longis raris — densiusculis obsitus, inferne rare — sparsim stellatus, superne sparsim — densiuscule floccosus — subtomentellus. *Folia* obscure viridia mollia, supra breviter et sat dense — densiuscule v. sparsim pilosa, subtus pallidiora lutescenti- v. glauculo-viridia densiuscule — sat dense pilosa leviter stellata, in nervo mediano dense et longe pilosa ± dense stellata — floccosa, in petiolis pilis longis ± densis obtecta, marginibus densiuscule — sat dense ciliata; *basalia* 3—5 rarius sub anthesi emarcida, exteriora ± oblonga obtusa subintegra — rare et obtuse denticulata, intermedia ± ovato-oblonga v. oblongo-lanceolata breviter acuta crebrius et ± acute denticulata — dentata, interiora ± late — anguste lanceolata argute et æqualiter v. interdum sat inæqualiter denticulata — dentata ± acuta, omnia v. exteriora subtus et interdum supra apicem versus ± intense hepatico-violascentia; *caulina* ± late anguste lanceolata v. interdum anguste v. late (intermedia) ovato-lanceolata acuta — sat cuspidata argute et inæqualiter præsertim ad basin denticulata — dentata haud rare ad basin anguste laciniato-dentata dentibus omnibus ± arrecto-patentibus v. arrectis, omnia longe remota cito v. abrupte decrescentia, subtus densius pilosa et stellata sæpe violascentia. *Anthela* simplex v. composita

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[1] Riksmuseets i Stockholm exemplar af Herb. Norm. innehåller under detta nummer endast här beskrifna form. Då denna form först af alla utdelats af Fries under namn af *H. vulgatum* och då den tillika hos oss af de former, Fries sedermera inbegrep under detta namn, onekligen i hela södra Sverige är den allmännaste (äfven i Småland allmännare än de öfriga) samt såsom S. Almquist påpekar (i Stud. öfver Sl. Hier. p. XXIV) bäst passar in på originalbeskrifningen i Fries' Nov. ed. 1 (ehuru arten nog äfven der är kollektiv), så kan den »med säkerhet anses åtminstone hafva ingått i Fries' ursprungliga vulgatum» (S. Almquist anf. st.), hvarföre jag i likhet med Almquist anser att namnet bör fästas vid denna form. I Fr. Symb. blef dock typen för arten en annan nämligen till större delen den, jag kallat *H. cruentifolium* (H. N. II: 9), hvarjemte äfven andra former såsom *H. *stipatum* Stenstr. (H. N. XIII. 92) fördes hit.

[2] I en del exemplar af Lbg:s exs. förekommer jemte förhandenvarande form äfven en annan, hvilken synes mig vara *H. *chlorodes mihi* eller möjligen *H. vulgatum* Fr. *v. umbrosum* Lbg., Hier. Scand. exs. n. 73.

[3] Enligt skriftligt meddelande af professor J. P. Norrlin äro exemplaren i mina Hieracia exsiccata, fasc. II, n 92. identiska med den af honom såsom *H. triviale* betecknade finska formen, hvilket namn arten bör bära, ifall namnet »vulgatum» på grund af den kollektiva användning, Fries gaf detsamma, möjligen skulle befinnas nödigt att strykas.

paniculata parva v. sat ampla, ramis inferioribus sæpe ± remotis, superioribus vulgo ± approximatis superantibus erecto-patentibus v. sat patentibus ± arcuatis sat gracilibus tomentellis — tomentosis pilis brevibus — sat longis tenuibus solitariis — raris et glandulis nigris ± longis gracilibus solitariis obsitis, pedicellis brevibus gracilibus acladioque 5—20 mm. longo ± tomentosis pilis basi crassa nigra apice tenui albido raris, sparsis — densiusculis et glandulis solitariis, raris — sparsis (v. subnullis) parvis — sat longis inæqualiter mixtis ± obscuris obtectis. *Involucra* ± obscure — dilute canescenti-viridia — atroviridia basi rotundata postea obtusa. *Squamæ* subregulariter imbricatæ ± latæ apice leviter comatæ exteriores ± lineares ± obtusæ, intermediæ ± ovato-triangulares obtusiusculæ, intimæ ± ovato-lanceolatæ cito in apicem breviorem v. sat elongatum obtusiusculum — acutiusculum acuminatæ, intimæ ± acutæ, interiores ± viridi-marginatæ v. fere totæ virescentes apice ipso ± fusco, reliquæ ± obscuræ pilis e basi crassa nigra canescentibus brevibus v. mediocribus sparsis — sat densis glandulis parvis (v. minutis vix conspicuis) — longioribus sparsis — densiusculis obtectæ, ceterum dorso sparsim — densiuscule marginibus densius sed vulgo sat adpresse stellatæ. *Calathidium* sat obscure luteum sat radians — subradians. *Ligulæ* apice glabræ. *Stylus* luteus v. leviter virescens fuscohispidulus postremo luteus, ferrugineus — sat fuscescens.

Inv. $\frac{8—11}{5—6}$, D. 35—40., L. m. 2,5—3.

Är såväl inom området som i hela södra Sverige ett bland de allmännaste och mest spridda Hieracier, hvilket är föga nogräknadt angående lokalen och derföre ofta uppträder ensamt, der andra Hieracier saknas. I samband härmed är denna form såväl i ganska hög grad individuelt varierande som splittrad i en mängd, visserligen ej mycket, men dock märkbart skiljaktiga, lokala modifikationer och raser, hvilka dock omärkligt öfvergå i hvarandra, hvarföre de ej kunna betecknas med serskilda namn. Utmärkande för alla är den nedtill, åtminstone till nedersta stjelkbladet eller längre upp, mörkt eller ljust brun- eller purpurröda stjelken, hvilken nedtill är rikt, upptill glesare hårig men här mera stjernluden, de mjuka men ganska tjocka, mörkgröna och ganska rikhåriga bladen, hvilka undertill äro något blekare gulaktigt eller blåaktigt grågröna och isynnerhet på medelnerven stjernludna samt ofta (de yttre basalbladen nästan alltid) m. l. m. djupt violetta till lefverfärgade, m. l. m. aflånga, trubbiga, yttre basalblad med grund, bred, gles till medeltät tandning och m. l. m. lancettlika, spetsiga, inre basalblad och stjelkblad med skarpare, ofta ojemnare, medeltät, vanligen ej djup tandning (utom stundom vid basen), vanligen ganska närmade, m. l. m. utstående, något böjda, öfverskjutande, kvastlikt ställda inflorescensgrenar och korta, böjda skaft, hvilka äro m. l. m. gråa af tätt ludd, glest till rikligare håriga och klädda af enstaka eller spridda glandler, samt korta, vanligen ej stora, mörkt grågröna holkar med breda triangulära till triangulärt- eller smalt äggrundt- lancettlika, hastigt afsmalnande, trubbiga till smalt trubbspetsade eller något spetsiga fjäll med m. l. m. talrika, tjockt svartfotade hår och glesare, vanligen små glandler samt på ryggen jemt fördeladt, i kanterna något tätare stjernludd. Fördelningen af hår, glandler och stjernludd är i allmänhet på holkfjällen temligen likformig och intetdera slaget är synnerligen framträdande framför de öfriga, men förhållandet mellan de olika hårslagen varierar på en del orter dock rätt

mycket, serdeles glandlernas och stjernluddets riklighet. Dessa variationer i förening med fjällens grönare eller mörkare färg ge ofta holkarne ett ganska olikartadt utseende. De båda motsatserna äro holkar med mörka fjäll, mörka, glesare hår, rikligare, större glandler och mera spridt samt tilltryckt stjernludd å ena sidan och å andra sidan holkar med grönare fjäll, gråare, längre och rikligare hår, svagare till knappt märkbara, små glandler och tätare, lösare och gröfre stjernludd. Dessa modifikationer, hvilka öfvergå utan gräns i hvarandra, synas mången gång vara alldeles oberoende af ståndorten. Dock synas håren bli längre, gråare och tätare på starkt soliga och torra lokaler äfvensom i torr skugga, hvaremot glandlerna bli rikligare, större och mörkare på kallare, friska eller fuktiga såväl öppna som beskuggade lokaler. I stark skugga blir stjernluddet gröfre och lösare och derigenom mera synligt, hvaremot det blir sparsammare på friska, mera öppna ställen. I stark sol blir det tätare och mera tilltryckt. På trakter eller lokaler, der större temperaturvexlingar råda, synas fjällen bli mörkare färgade. Bladen variera till hårighetens riklighet såsom vanligt efter lokalens beskaffenhet, men derjemte till formen, stjelkbladen från smalt lancettlika till bredare, de mellersta t. o. m. äggrundt lancettlika och basalbladen från äggrundt-aflånga (sällan) till smalt aflånga eller tunglika (vanligen dock aflånga). Ofta äro stjelkbladen, isynnerhet de mellersta, både större och bredare än de nedre och basalbladen. Dessa kunna t. ex. vara smalt aflånga, de förra bredt äggrundt-lancettlika. Detta inträffar oftast på gräsrikare lokaler. Stundom är deremot förhållandet motsatt, såsom på föga gräsbevuxen eller denuderad mark. Bladbasen är vanligen m. l. m. vigglik, på basalbladen vanligen småningom nedlöpande på det bredt vingade skaftet, men blir stundom hos dessa sednare hastigt hopdragen (oftast hos de mellersta) eller får hos de öfre stjelkbladen stundom bred, nästan rundad bas (på näringsrika ställen). Tandningen är hos basalbladen, isynnerhet de yttre, jembred och trubbig men varierar glesare eller tätare och stundom nästan felande. Hos stjelkbladen är den mera spetsig och tänderna smalare, olika långa och mera oregelbundet vexlande och de längre stundom krökta. Den varierar för öfrigt kortare eller längre, vid basen stundom något flikad och är ibland olika på båda bladsidorna; vanligen går tandningen öfver bladets midt och är oftast framåtrigtad, sällan utstående. Stjelkbladen sitta långt aflägsnade från hvarandra, på soliga ställen uppåtrigtade och kölade, på skuggiga ställen mera utstående och platta. Då stjelkbladen äro få (1—2), äro de vanligen långt utdragna i spetsen. Stiftet varierar mycket till färgen, som det synes ofta traktvis, än i alla stadier rent gult eller slutligen rostbrunt, än från början mera grönaktigt eller försedt med mörka hårpapiller och slutligen m. l. m. brunsvart eller temligen svart. Holkskaften variera med nästan endast glandelhår till nästan blott håriga, och fjällen bli hos en del former smalare samt temligen långt öfverskjutande. Är säkerligen en äldre, sedan lång tid tillbaka differentierad art och synes derföre vara mera isolerad från andra formgrupper, inom hvilka formerna stå tätare och hvilka äro m. l. m. sammanbundna genom mellanformer. Genom sin svagare differentiering med afseende på indumentets mindre utpräglade dekorativa anordning och mera likformiga fördelning synes den stå närmast den grundform, hvarifrån inom gruppen *Vulgata* och närstående de olika formerna utgrenat sig, och likheter kunna derföre uppletas med än den ena än den andra bland dem. Dock synes den mest närma sig å ena sidan sådana former inom *H. irriguum* som *H. *violascens*, *H. *spodoleucum* och närmast stående, å andra sidan *H. subramosi* och *H. pinnatifidi* formgrupper. Måhända är

*H. *sagittatum* att anse som dess motsvarande form inom *Silvatica* liksom följande tydligen är dess *rigidum*-artadt utbildade och närmast beslägtade paralellform.

Inom området är den anträffad på en mängd lokaler bland hvilka må nämnas: *Östergötland*, S:t Annæ s:n, Herrborum (N. C. KINDBERG); Norrköping, Hult (P. OLSSON); Linköping på flera ställen mycket allmän i många modifikationer; S:t Lars s:n, Ekkällan, Djurgården, Walla och Tannefors samt Smedstad och Widingsjö (här en glest, men starkare glandelhårig modifikation) m. fl. st.; Wist s:n, Sturefors och Sundsbro (bred- och smalbladiga skuggformer, hvaribland en tydligt härmande *H. cæsiomurorum*, bland hvilken den växte) samt Hamra; Kärna s:n, Malmskogen m. fl. st.; Wreta s:n, Berg och Stjernorp (bland andra en modifikation till bladform och bladens flikighet mycket lik H. *pinnatifidum); Wånga s:n, Gränsholmen m. fl. st.; Wäderstad s:n, Bossgård, Skållerud och Trehörna s:n, Slangeryd, allmän äfven i mång- och bredbladiga former men äfven i smalbladiga hedformer; Svanshals s:n, Kullen, smalbladiga hedformer; Omberg, öfverallt allmän i barrskogen och ängarne, vid Stocklycke i torr skugga under bokar en mycket lång- och rikhårig modifikation; Åtvids s:n, Åtvidaberg, Adelsnäs, Slefvinge, Karstorp m. fl. st. i en mängd, delvis rätt egendomliga, mångbladiga och fliktandade modifikationer med gula eller mörka stift o. s. v. och en form, till karaktärer påminnande något om H. *spodoleucum;[1] Oppeby s:n, Drabo, en modifikation med breda basalblad och ovanligt sparsamt beklädda, naknare holkar samt habituelt erinrande om en i samma afseenden utmärkt form af *H. *galbanum*, bland hvilken den växte; Sunds s:n, Sunds Norrgård och Södergård, Sandbäckstorp, Oppeby, Broby, Ukreda, Löfåsa, Österby mo, Graby, Äng, Sundsö och Forsnäs i många modifikationer till bladens bredd och tandning, holkarnes hårighet och stiftens färg (rent gula eller mörka); N. Vi s:n, Rökulla, Siggemåla m. fl. st., företrädesvis modifikationer med mycket obetydligt glandelhåriga holkar och skaft; V. Ryds s:n, Tunarp och Krämarbo m. fl. st., bred- och mångbladiga, rikhåriga modifikationer (förf.); Asby s:n, Bätterarp, med långa holkfjäll (A. MOLIN): *Småland*, Sommens jernvägsstation (förf.); Grenna, en rikare glandelhårig form (V. ANDERSSON) och en anmärkningsvärdt grof och storholkig form jemte andra modifikationer (F. HAGSTRÖM, A. W. LUND); Askeryds s:n, Bordsjö m. fl. st. i våta ängar i former med stora och mörka holkar (förf.); Jönköping (C. O. v. PORAT); Rogberga s:n, Tenhult i skogsängar, en späd form med smala, sparsamt klädda holkar, Klefarp, en glattare form med mörkare holkar och smalare fjäll = H. carinatum LÖNNR. in sched.; Öggestorps s:n, Ljungarp m. fl. st. (K. JOHANSSON); Eksjö s:n, Brevik m. fl. st. (förf.); Westervikstrakten och Almvik (förf.); Örö utanför Westervik med små, glest och kort håriga och sparsamt glandelhåriga holkar (E. ADLERZ); Gladhammars s:n, Thorsfall; Målilla s:n, Målilla m. fl. st.; Mörlunda s:n, Haddetorp m. fl. st.; Högsby s:n, Lillsjödal; Fagerhults s:n, Fagerhult och Eskebäck m. fl. st. (K. J. LÖNNROTH); Oskarshamn (A. W. LUND); Kråksmåla s:n, Grönskära (K. J. LÖNNROTH); Madesjö s:n, Mellan-Örsjö, Orrebäck, Ellebäck och Brånahult i många modifikationer; Dörby s:n, mellan Fröskelås och Askaremåla (K. J. LÖNNROTH); Ulfsbergs park (M. LÖNNROTH); Femsjö (E. FRIES och TH. M. FRIES); Östra Thorsås s:n, Sjölycka, Sunnansjö, en forma *stenocephala* med ovanligt smala, små och ljusgröna holkar samt en modif. med ovanligt tjocka holkar (C. J. JOHANSSON); Drefs s:n, Braås (G. E. HYLTÉN-CAVALLIUS): *Gotland*, Bunge s:n, Fårösund m. fl. st.; Rute s:n, Gerungs och Risungs; Hangvars s:n, Flenvik, Kapellshamn m. fl. st. (K. J. LÖNNROTH); Bro s:n; Visby flerestädes (S. ALMQUIST, K. JOHANSSON m. fl.); Sanda s:n, Westergarn; Klinte s:n, Walla, Klintehamn m. fl. st. (K. J. LÖNNROTH); Hejde s:n (FR. E. AHLFVENGREN); Fröjels s:n, Stenstorp, Gamnarfve m. fl. st. (K. J. LÖNNROTH).

Utom området anträffad allmänt i södra Sverige såsom i *Blekinge*, Holmsjö och Wärö (H. G. LÜBECK); Ronneby (C. G. WESTERLUND): *Skåne*, flerestädes allmän ehuru ej så vanlig som *H. *pinnatifidium* och *H. *cruentifolium* (enl. K. O. E. STENSTRÖM och G. A:N MALME), serdeles långhåriga modifikationer vid Össjö s:n, Össjö, Munka-Ljungby s:n och Skillinge (B. LIDFORS) samt Brunnby s:n vid Arild (R. WALLENGREN): *Västergötland*, flerestädes såsom i Toarps s:n m. fl. st. (A. O. OLSON); Hunneberg, Nygård (G. ELIASSON); Kinnekulle (J. KARLSSON m. fl.); Karlsborg, Töreboda m. fl. st. (A. CALLMÉ): *Bohuslän*, Uddevalla på Koön, Elgön m. fl. st. bland annat en form med rikligare, stjernludna holkar, påminnande om *H. *spodoleucum*, samt en ovanligt glatt modifikation (S. ALMQUIST, FR. LÖNNKVIST); Gustafsberg (A. S. TROLANDER); Skaftö och Fiskebäckskil m. fl. st. (S. ALMQUIST): *Dalsland*, allmän såsom i Örs s:n, Ör, Berga m. fl. st.; Lockerud (A. FRYXELL): *Vermland*, södra delen allmän såsom i Gillberga och Borgvik, bland andra mycket glandelhåriga modifikationer och former,

[1] Sådana former äro äfven anträffade i Skottland.

påminnande om *H.* **spodoleucum* (K. O. E. STENSTRÖM); Arvikatrakten (E. HOLMGREN); Björneborg (C. M. BROSTRÖM): *Vestmanland*, Sätra, mera glandelhårig (E. ALMQUIST); Frösåker i Rostock (A. E. LUHR); Kung Karls s:n, Kungsör m. fl. st. (C. O. v. PORAT, K. J. LÖNNROTH): *Dalarne*, Johannesholm, med utdragna fjäll, långhårig och gulstiftig (K. P. HÄGERSTRÖM): *Södermanland*, Stora Malms s:n, Björkvik och Östra Vingåkers s:n, allmän (G. A:N MALME); Kila s:n, Ålberga; Brännkyrka s:n, Jakobsberg (S. ALMQUIST); Stafsjö bruk, Tullinge m. fl. (E. ALMQUIST); Söderteljetrakten (M. FLODERUS); Råby s:n, Hällsäter och Örstorp (K. J. LÖNNROTH); Stockholmstrakten jemte H. *basifolium och H. *læticolor allmännast af alla Hieracier och med dem ofta bildande bestånd med uteslutande af andra former (förf. och S. ALMQUIST); på öarne i Skärgården såsom på Djurö, Skarpö m. fl. (S. ALMQUIST): *Upland*, flerestädes allmän såsom på Ljusterö (förf. och S. ALMQUIST); vid Upsala, Tibble m. fl. st. (FR. AHLBERG, M. FLODERUS och S. ALMQUIST) ofta i mångbladiga modifikationer med *rigidum*-habitus; Dannemora, här bildande bestånd med *H.* **basifolium*, *H.* **læticolor* och *H.* **acroleucum* men sparsammare än dessa (förf.): *Helsingland*, Söderhamn, flerestädes allmän, och i skärgården, Branthäll (A. MAGNUSSON); Hedvigsfors bruk (N. WESTBERG): *Ångermanland*, Nätra s:n, Bjösta (V. F. HOLM). — Utom Sverige funnen i *Norge* vid Kristiania och på öarne i Kristianiafjorden här och der; Torpen vid Presterud, Kinngårdarne, Hugelien, Engen och Bränna, på dessa ställen ofta späd, blekbladig och ofta habituelt lik en form af *H. dovrense*, bland hvilken den växte (förf.); Etnedalen vid Espelien, Bruflat och på Tonsåsen sparsam (förf.); Öxendalen (FR. AHLBERG). — *Finland*, på Åland och i södra delen till norra Karelen i öster vanlig, enligt J. P. NORRLIN i Bidr. etc. och Herb. Mus. Fenn. (»H. triviale»). — *Danmark*, Sjælland, Sorgenfri (FR. LÖNNKVIST). — *Tyskland*, Thüringen, Waldau (C. HAUSSKNECHT). — *Skottland*, East Lothian, Aberdeen m. fl. st. (W. F. MILLER), här endast afvikande från den skandinaviska genom smalare och längre öfverskjutande holkfjäll.

En mera afvikande modifikation, hvilken förtjenar ett serskildt omnämnande, är den i mina Hier. exs., fasc. I, n. 92 utdelade, ehuru den ej är af den konstans att den förtjenar ett eget namn. Habituelt liknar den mycket följande genom sin flerbladiga stjelk, hvilken stundom blir ända till 6-bladig. Bladen äro dock jemförelsevis bredare med kortare spets och på sidorna längre upp tandade samt mera närsittande; inflorescensen är mera hopträngd med kortare grenar, holkarne mindre samt fjällen klädda af tätare stjernludd och rikligare hår och derföre ganska grågröna, men hafva färre och mycket små glandelhår. Skaften äro ljusgrå af mycket tätt stjernludd och gan ka rikligt korthåriga, men nästan alldeles utan eller helt och hållet saknande glandelhår. Dessutom har den alltid rent gula stift. Den är att anse som en rigidum-artadt utbildad modifikation, hvilken utan gräns öfvergår i andra modifikationer, ehuru den på en och annan lokal är öfvervägande och nästan har karaktär af ras. I Wist s:n vid Hamra, der jag påträffat den i större massor, öfvergick den tydligt i fåtaliga, bland densamma växande individ af vanligt utseende. Intressant var, att på samma lokaler, en lundartad, bergig, torrare äng, äfven andra former såsom H. *basifolium och H. *smolandicum samt H. *porrigens och H. *cæsiomurorum, de sednare dock i mindre grad, till sin öfvervägande individmassa uppträdde i analoga, rigidum-artadt utbildade former, hvilket synes tyda på, att någon serskild beskaffenhet hos lokalen orsakat denna utveckling. Emellertid synes som om äfven en begynnande rasolikhet hos ofvannämda form gjorde sig gällande, då äfven på andra trakter här och der rigidum-artadt utbildade former anträffats, men hvilka med afseende på indumentet gått i en motsatt rigtning, nemligen ega rikligt utbildade glandler och svagt stjernludd samt sparsammare hår. Speciella undersökningar i hithörande frågor böra, som jag tror, kunna lemna vigtiga bidrag till belysning af artbildningen, hvarföre jag vid denna art, som synes mig ånyo börja differentieras, liksom för öfrigt vid flera andra ansett mig böra påpeka dessa förhållanden. Från följande, hvilken är en redan fullt differentierad paralellform med ännu mera utpräglad rigidum-habitus, äro alla i denna rigtning varierande former af H. *vulgatum skilda bland annat genom sin tätare och ojemnare tandning och sina spetsigare fjäll, hvilka från bred bas äro hastigt tillspetsade samt triangulära till triangulärt lancettlika. Ofvannämda modifikation är funnen på flera andra ställen, men jemförelsevis sparsammare än hufvudformen, såsom i Östergötland vid Linköping m. fl. st. och i Vermland i Gillberga och Borgviks socknar (K. O. E. STENSTRÖM). På sistnämda lokaler blir den dessutom gerna mikrocefal.

2. **H. *vulgatiforme** n. subsp.

DAHLST. Hier. exs., fasc. II, n. 93. — DAHLST., Herb. Hier. Scand., Cent. II, n. 91, 92; Cent. V, n. 62.

Caulis 50—100 cm. altus v. elatior plerumque crassus et rigidus strictus v. subflexuosus 4—8-folius, inferne (v. pro majore parte) ± obscure — dilute rubro-violaceus, vulgo ad medium v. supra ± dense et longe pilosus leviter — densiuscule stellatus, superne minus pilosus densiuscule — sat dense floccosus. *Folia* obscure viridia, subtus pallidiora lutescenti- v. glauculo-viridia sparsim — densiuscule pilosa sparsim stellata, in nervo dorsali longe et densiuscule pilosa ± dense floccosa, in petiolis pilis longis mollibus ± crebre vestita, marginibus breviter — mediocriter et densiuscule — sat dense ciliata, supra rare — sparsim et breviter pilosa floccis nullis v. raris adspersa; *basalia* 2—3 v. sub anthesi vulgo emarcida, exteriora parva ovali-oblonga — oblonga rare denticulata — fere integra ± obtusa, interiora oblongo-lanceolata angusta (— sat lata) rare dentata ± acuta sensim decrescentia; *caulina* inferiora sat approximata basi ± cuneata descendentia late — anguste lanceolata sparsim et acute dentata — sat longe 3—4-dentata (vulgo regulariter, interdum irregulariter dentata) dentibus rectis v. curvatis ± erectis — patentibus, superiora ± anguste raro late lanceolata basi ± descendente v. e basi subrotundata latiore ± ovato-lanceolata sparsim et breviter v. longe 2—3(—4)-dentata dentibus æqualibus regulariter v. inæqualibus partim sat longis ± irregulariter dispositis, omnia in apicem ± longum — longissimum integrum acutum — cuspidatum protracta sessilia v. infimum interdum alate et breviter petiolatum. *Anthela* paniculata parva simplex ± contracta — laxa v. sat composita et sæpe ampla determinata v. sat indeterminata, ramis inferioribus sæpe ± remotis, superioribus magis magisque approximatis sat patentibus — sat erectis sæpe subarcuatis ± superantibus densiuscule — sat dense floccosis epilosis v. rare — sparsim pilosis, pedicellis apice ± incrassatis squamiferis sat gracilibus brevibus — mediocribus acladioque (3—)5—15(—35) mm. longo densiuscule floccosis — dense cano-tomentosis, epilosis v. pilis longis mollibus sparsis — densiusculis (sub involucris) obtectis, eglandulosis v. glandulis solitariis præsertim superne obsitis. *Involucra* mediocria magna sat crassa ± obscure — dilute viridi-canescentia v. sat canescenti-atroviridia basi rotundato-ovata postea ± obtusa — truncata. *Squamæ* sat imbricatæ ± latæ, exteriores lineares (extimæ laxæ sæpe in petiolo descendentes) obtusæ, intermediæ ± triangulares obtusæ, interiores sat late virescenti-marginatæ triangulari-lanceolatæ sensim in apicem ± obtusum latiusculum — latum contractæ, intimæ paucæ acutæ pro majore parte virides, omnes apice vulgo obscuræ v. piceæ levissime comatæ, dorso floccis solitariis v. raris — sparsis obsitæ, marginibus sparsim — densiuscule stellatæ v. floccosæ, ceterum pilis ± crassis brevibus et mediocribus basi nigricante apice breviter v. sat longe albido sparsis, densiusculis v. sat densis et glandulis nigris brevioribus et longioribus sparsis — sat

densiusculis v. raris obtectæ. *Calathidium* sat obscure luteum subradians. *Ligulæ* apice glabræ. *Stylus* subluteus — ferrugineus ± fuscohispidulus postremo sæpe sat fuscescens.

Står mycket nära föregående, till hvilken den är en motsvarande *subrigidum*-artadt utbildad paralellform. Från densamma är den ofta rätt svår att skilja, isynnerhet som ganska ofta habituelt liknande former finnas af båda. Några verkliga mellanformer har jag likväl ej funnit. I allmänhet skiljes den lätt genom sin mera *subrigidum*-artade habitus (hvilken isynnerhet framträder hos former från solöppna lokaler), d. v. s. genom sin mångbladiga stjelk med tätt sittande blad, vanligen med gles och skarp tandning, hvilken är framåtrigtad, triangulära bladtänder med vanligen raka sidor, få eller inga rosettblad, vanligen fåblomstrigare inflorescens med rakare grenar och skaft, hvilka oftast äro rikt stjernludna men hafva få eller enstaka eller endast under holkarne talrikare hår samt sakna glandler utom upptill, der de någon gång uppträda enstaka, genom gröfre, större och mångfjälligare holkar med bredare men längre och ej så tydligt triangulära, trubbade och ofta med mycket bred och rundad spets försedda fjäll, hvilka i de bredare och tydligare grönaktiga kanterna emot spetsarne ega en m. l. m. bred, sällan tät stjernluddsrand, som småningom öfvergår i det föga glesare luddet på fjällens ryggar, samt äro klädda af sparsammare till rikligare hår, men ega få och föga framträdande glandler. Korgarne äro något tätare, mörkare gula än hos föregående samt ligulæ något bredare. Vanligen är inflorescensen enkel och fåblomstrig men varierar äfven rikblomstrig hos kraftiga exemplar, hvilka ej sällan äro rikt förgrenade ända till basen. Bladen variera smala med glesare tänder och breda med tätare och isynnerhet vid basen mera ojemn tandning. Stjelkbladen sitta vanligen temligen tätt och äro merändels något längre än internodierna. Hos en del former, isynnerhet flerbladiga, ega de öfre bladen bred och ibland nästan rundad bas. Stjelken är vanligen starkare hårig än hos föregående. Blir stundom mycket grof och storväxt.

Inom området anträffad i *Östergötland*, Gårdeby s:n, Örsby (H. STRÖMFELT); Norrköping nära Åby (P. OLSSON); Linköping; Wist s:n, Hamra (förf.); Omberg, Borghamn (N. C. KINDBERG); Åtvids s:n, Åtvidaberg m. fl. st. rikligt (förf.): *Gotland*, Fleringe s:n, Hau; Bunge s:n, Fårösund (S. ALMQUIST, K. JOHANSSON); Boge s:n, Tjelders (K. J. LÖNNROTH); Vestkinde s:n, Skäggs (K. JOHANSSON); Bro s:n (F. J. ÖFVERBERG); Lokrume (S. ALMQUIST); Eskelhems s:n (F. J. ÖFVERBERG); Mästerby s:n (FR. E. AHLFVENGREN): *Öland*, Borghamn (E. NORDSTRÖM): *Småland*, Visingsö mellan Stegby och Näs (J. E. ZETTERSTEDT); Grenna (K. FR. HAGSTRÖM); Rogberga s:n, Ingaryd (K. JOHANSSON); Eksjö s:n, Brevik (förf.); Gärdserums s:n, Bossgård (förf.); Westervik, Örö (E. ADLERZ); Almvik (förf.); Målilla s:n, jernvägsstationen (K. J. LÖNNROTH); Madesjö s:n, Mellan-Örsjö och Orrebäck (K. J. LÖNNROTH).

Utom området funnen i *Bohuslän*, Marstrand, Fiskebäckskil, Kristineberg m. fl. st. (S. ALMQUIST); Uddevalla (E. ALMQUIST): *Vestergötland*, Toarps s:n, Kulla (A. O. OLSSON): *Vermland*, Gillberga och Borgviks s:r (K. O. E. STENSTRÖM): *Vestmanland*, Kungsör (C. O. v. PORAT): *Södermanland*, Söderteljetrakten (M. FLODERUS); Stockholmstrakten såsom på Djurgården ymnig (förf.): *Upland*, Tibble s:n (?), Häggesta, Vreta udde (E. ALMQUIST): *Gestrikland*, Ockelbo (S. ALMQUIST): *Helsingland*, Söderhamn (A. MAGNUSSON). — *Norge*, Ladegårdsön vid Kristiania (förf.).

H. MACROTONUM *n. sp.*

Caulis altus — elatus, inferne ± longe et dense floccosus, superne rare pilosus ± stellatus apice sat dense floccosus 3—12-folius. *Folia* ± saturate viridia, basalia in rosulam conferta v. pauca ± remota, subtus et præsertim in petiolis ± longe et dense pilosa, ovato-lanceolata — lanceolata ± irregulariter et crebrius v. sparsim et magis æqualiter dentata ± acuta; *caulina* ± sensim decrescentia crebrius et magis irregulariter dentata sæpe ad basin pinnato-dentata v. sparsim et regulariter sæpe ± longe 3—5-dentata ± acuta, omnia basi ± descendentia. *Anthela* ± paniculata laxa ramis ± longis gracilibus v. corymboso-paniculata ramis validioribus ± indeterminata. *Involucra* mediocria — magna gracilia — valida ± elongata, squamis angustis — sat latis in apicem acutum — obtusum ± longe protractis, basi ± contracta turbinata — ovato-turbinata, glandulis sparsis — sat densis et pilis obscuris brevibus —sat longis densiusculis — sat densis obsita, fere nuda v. ad basin et in marginibus levissime stellata. *Stylus* luteus.

De tvenne hithörande formerna äro sinsemellan ytterst nära beslägtade och stundom rätt svåra att skilja från hvarandra; de äro utan tvifvel tvänne från samma grundform utvecklade paralellarter, af hvilka den första genom rikligare bladrosett, färre stjelkblad, bredare blad med tätare och jemnare tandning samt smalare och smärre holkar, hvilka jemte skaften äro tätare glandelhåriga, faller inom *vulgatum*-typen, men den andra deremot genom sina fåtaligare basalblad, talrika stjelkblad, jemnare, glesare och stelare tandning samt gröfre holkar, hvilka liksom skaften äro sparsammare glandelhåriga, tillhör *subrigidum*-typen. De äro båda fullt analoga med underarterna af föregående art. Sina närmaste slägtingar ega de utan tvifvel i *H. pinnatifidum* och en del former af *H. subramosum*.

Conspectus subspecierum.

1. *Caulis* 3—6 folius; *folia caulina* citius decrescentia cum basalibus in rosulam sæpius multifoliam congestis crebrius profundius et magis irregulariter dentata, latiora. *Involucra* gracilia mediocria cum pedicellis crebrius glandulosa, squamis angustis.

   1. *H. *smolandicum* Almqu.

2. *Caulis* 6—12-folius; *folia caulina* sensim decrescentia cum basalibus paucis plerumque ± remotis sparsius minus profunde et magis regulariter dentata, angustiora. *Involucra* elongata valida cum pedicellis sparsius glandulosa, squamis sat latis.

   2. *H. *macrotonum* Dahlst.

1. **H. *smolandicum** Almqu. in litt. *n. subsp.*

Dahlst., Hier. exs., fasc. II, n. 97.

Caulis 30—65 cm. altus gracilis subflexuosus 3—6-folius scaber, inferne (v. pro majore parte) ± obscure violaceus pilis mollibus longis sat dense — dense obtectus sparsim stellatus, medio sparsim — densiuscule pilosus sat stellatus, apice subglaber v. rare pilosus sat dense floccosus. *Folia* saturate gramineo-viridia, subtus pallida subglaucescentia sparsim v. densiuscule et breviter pilosa sparsim — densiuscule stellata, in nervo dorsali sat dense floccoso densius et longius pilosa, in petiolis sat dense — dense hirsuta, marginibus pilis mediocribus ± dense ciliata, supra rare et breviter pilosa rare stellata; *basalia* 3—5 in rosulam conferta sat magna, exteriora subtus ± violascentia ovalia — elliptica obtusa — breviter acuta subintegra — sparsim et late brevi-dentata (interdum argutius et crebrius dentata), intermedia ± late lanceolata sparsim — densius ± anguste et inæqualiter dentata acuta, interiora ± anguste lanceolata angustius et ± longe dentata ad basin sæpe subpinnato-dentata dentibus inæquilongis acutis sæpe antrorsum curvatis, in apicem ± longum integrum — rare denticulatum cuspidata, omnia basi cuneata ± angusta sat longe et anguste petiolata; *caulina* ± approximata — sat remota cito (v. raro sensim) in bracteas decrescentia ± lanceolata et (sæpe) ± longe cuspidata, summa linearia, infimum sat petiolatum, superiora basi cuneata anguste sessilia sparsius — densius et ± irregulariter subulate — longe (præsertim ad basin) pinnato-dentata dentibus angustis acutis arrectis — sat patentibus inferioribus sæpe curvatis, supra medium denticulata v. fere integra, subtus densius quam in basalibus stellata, supra rare — sparsim stellata. *Anthela* ± contracta — sat laxa paniculata v. furcato-paniculata simplex — composita, ramis mediocribus — longis v. longissimis sæpe longe superantibus erectis — erecto-patentibus basi curvatis, inferioribus remotis, superioribus approximatis, summis interdum subumbellatis sparsim — densiuscule stellatis eglandulosis et fere epilosis, ramulis et pedicellis gracilibus mediocribus — brevibus acladioque 10—40 mm. longo dense floccosis — tomentosis pilis mediocribus — sat longis inferne solitariis — raris superne et præsertim in acladio sparsis — densiusculis obsitis et sub involucra glandulis nigris sparsis — densiusculis obtectis. *Involucra* mediocria gracilia canescenti-atroviridia basi in petiolum apice ± incrassatum squamiferum attenuata ± ovato-turbinata postea ± ovata — ovato-obtusa. *Squamæ* angustæ — angustissimæ lineari-lanceolatæ inæqualiter imbricatæ e basi latiore (c. 1 m. m.) sensim attenuatæ, exteriores obtusæ — obtusiusculæ, interiores ± acutæ — subulatæ et ± viridi-marginatæ longe protractæ flores juniores superantes et incumbentes, pilis brevibus basi longa nigricante densiusculis v. ± densis et glandulis nigris parvis sat densis — densis obtectæ, ceterum rare vel in marginibus sparsim stellatæ. *Calathidium* luteum parvum radians. *Ligulæ* apice glabræ. *Stylus* mere luteus.

Inv. $\frac{10—11}{4—5}$, D. 30—35, L. m. 2 mm.

En synnerligen vacker form, utmärkt af sina ofvantill mörkgröna, under blågrå, tunna och fasta, bredare till smalare lancettlika, skarp- och långspetsade blad, af hvilka basalbladen äro skarpt och kort tandade, stjelkbladen vanligen vid basen m. l. m. fliktandade, af sin smala, höga, mångbladiga stjelk, af sin uppåtrigtadt eller något utspärradt kvastlika inflorescens med raka, blott vid basen böjda, fina, öfverskjutande grenar, af de smala och långa holkarne med smala, öfverskjutande och på yngre holkar öfver blommorna hopslutna, spetsiga fjäll samt temligen små korgar med smala ligulæ och rent gula stift. Basalbladen äro vanligen samlade i en ganska rik rosett af elliptiska till lancettlika blad med temligen smala, brunvioletta skaft och skarp, någon gång lång, medeltät tandning af mera utstående och ej sällan böjda, något oliklånga tänder. Stjelkbladen variera färre eller talrikare med vid basen glesare eller tätare, kortare eller längre tänder eller äro oftare fliktandade med krökta, smala och sylspetsade tänder. Former med flera stjelkblad hafva ofta smalare blad och mera *subrigidum*-habitus samt hopdragen korgsamling genom mera upprätta grenar eller ej sällan liten, kortgrenig och trång inflorescens. Fåbladigare former få mera *cæsium*- eller *vulgatum*-habitus genom glesare sittande, bredare stjelkblad och mera utspärrad, ibland kvastlikt gaffelgrenad inflorescens. I flera af sina karaktärer, såsom holkens byggnad, isynnerhet med afseende på dess form, och till habitus, erinrar den något om *H.* **turbiniceps* och äfven rätt mycket om flera af *H. subramosi* former, isynnerhet de smalfjälliga, såsom hufvudformen och *γ xanthostylum*. Med dessa former är den utan tvifvel nära beslägtad. I några karaktärer, såsom de spetsiga öfverskjutande holkfjällen, bladens tendens att bli glaucescenta (undertill) och till en liten del äfven i habitus, erinrar den om *H.* **caligatum* och närstående. Den är likväl utan allt tvifvel närmast beslägtad med följande, till hvilken den utgör en paralellform med mera pulmonariskt utseende, hvaremot den nyssnämnda är i hög grad accipitrinskt utbildad. Med denna sednare har den mången gång en ytterst stor habituel likhet men skiljes från densamma genom sina öfvervägande bredare blad med tätare och mindre stel tandning, i genomsnitt färre stjelkblad, väl utbildad bladrosett, under sjelfva holkarne rikligare glandulösa skaft, smärre holkar med betydligt smalare fjäll och rikligare glandelhår, mindre korgar med smalare och ljusare ligulæ och slutligen öfverallt finare och mjukare hårighet, eller i allmänhet genom sådana karaktärer, som eljest pläga skilja en typ med fåbladigare stjelk från en med flerbladigare.

Båda formerna har jag på flera lokaler sett i riklig mängd, och det har alltid varit mig lätt att igenkänna dem, men jag har ännu ej sett dem växande tillsammans, hvarför det ser ut, som om de på sina respektive lokaler skulle alldeles utesluta hvarandra. De synas häri förhålla sig annorlunda än t. ex. *H.* **punctillatum* och *H.* **subpunctillatum*, hvilka äro liknande paralellformer, men hvilka jag på några ställen sett växande i riklig mängd tillsammans.

Inom området anträffad i *Östergötland*, Wist s:n, Hamra, ymnigt (förf.): *Småland*, Öggestorps s:n, Högåsen, Torp och Ljungarp; Näfvelsjö s:n (K. Johansson); Wallsjö s:n, Uppåkra (G. E. Hyltén-Cavallius): *Gotland*, Fleringe s:n, något afvikande i samma rigtning som gotlandsformer af flera andra arter genom något längre och rikare hårighet, mera utpräglad *subrigidum*-habitus m. m., häri påminnande om följande (K. Johansson).

2. **H. *macrotonum** n. subsp.

DAHLST., Hier. exs., fasc. II, n. 98, 99. — DAHLST., Herb. Hier. scand., Cent. IV, n. 54. — H. rigidum var. crinita LÖNNR.; En bot. resa i Smål. och på Gotl. p. 90.

Caulis elatus 50—105 cm. altus rectus v. leviter flexuosus ± robustus 6—12-folius, inferiore parte v. sæpius totus ± obscure purpureo-violaceus ± longe et molliter pilosus, basi pilis ± densis medio densiusculis et apicem versus magis magisque sparsis obsitus, inferne rare superne magis magisque dense stellatus, sub inflorescentiam sat tomentellus. *Folia* saturate viridia, subtus pallidiora subglaucescentia pilis brevibus densiuscule — sat dense obtecta sparsim — densiuscule stellata, in nervo dorsali pilis longioribus ± dense hirsuta et sat dense stellata, marginibus ± dense ciliata, in petiolis ± longe et dense pilosa, supra sparsim — rare et breviter pilosa sparsim — sat densiuscule et minute stellata; *basalia* vulgo remota et sub anthesi plerumque emarcida raro 2—3 rosulam laxam formantia, exteriora ± elliptica rare denticulata ± acuta, interiora magis lanceolata sparsim et subulate denticulata — dentata ± longe acuta; *caulina* ± late — anguste lanceolata v. lineari-lanceolata pleraque in apicem ± longum ± integrum cuspidatum protracta basi ± longe et anguste cuneata integra v. subulate denticulata, ceterum ad medium dentibus ± angustis subulatis triangularibus patentibus (interdum subrecurvatis) — arrectis raris, sparsis — sat densiusculis usque supra medium v. ad medium instructa, sæpius solum 3—5-dentata, superiora sæpe pinnato-dentata, omnia sensim in bracteas decrescentia, inferiora vulgo quam internodia longiora, superiora quam eadem longiora v. ea æquantia, infimum late et plerumque breve petiolatum, reliqua basi angusta sessilia, inferiora et basalia v. omnia subtus partim v. toto violascentia. *Anthela* corymboso-paniculata vulgo parva simplex v. ± composita ± indeterminata, ramis erecto-patentibus crassiusculis, inferioribus ± remotis magis erectis bracteis foliaceis suffultis, superioribus approximatis sæpe sat congestis et magis patentibus, omnibus paullo v. multum superantibus ± stellatis rare piliferis, ramulis et pedicellis ± brevibus acladioque 5—15 mm. longo ± dense tomentosis inferne subglabris superne sparsim — densiuscule et valide pilosis eglandulosis v. sub involucris glandulis crassis raris — sparsis obsitis. *Involucra* cylindrica magna sat valida ± atro-viridia basi ovato-conica in petiolum apice incrassatum et squamosum descendentia postea ± rotundato-obtusa. *Squamæ* sat latæ (circa 1,5 mm.) irregulariter imbricatæ ± lanceolatæ in apicem obtusum v. rotundato-obtusum ± sensim attenuatæ, exteriores ± lineares — triangulares in bracteas pedicelli abeuntes, interiores late virescenti-marginatæ, pilis mediocribus — sat longis validis basi crassa nigricante ± densiuscule — sat dense obtectæ et glandulis sparsis (— densiusculis) crassis parvis — mediocribus obsitæ, ceterum nudæ v. ad basin præsertim rare stellatæ. *Calathidium* sat magnum saturate luteum subradians. *Ligulæ* apice glabræ. *Stylus* mere luteus — subferrugineus.

Inv. $\frac{12—14}{5—7}$, D. 35—40, L. m. 2,5 mm.

Denna vackra, redan genom sitt blotta utseende i ögonen fallande form utmärker sig genom sin höga, vid sjelfva basen oftast alldeles eller nästan bladlösa stjelk, klädd af tätt sittande, m. l. m. men vanligen smalt lancettlika, långspetsade blad, hvilka oftast äro glest och skarpt tandade, mestadels 3—4-tandade, genom nedåt obestämd, vanligen föga utspärrad, kvastlik inflorescens med ganska grofva grenar och hvitludna, glest håriga eller hårlösa, knappt glandelhåriga skaft, långa men på samma gång grofva holkar, hvilka i början äga bredt konisk, i det förtjockade och upptill fjälliga skaftet öfvergående bas, som sedan blir rundad eller tvär, samt breda trubbade och ofta i spetsen m. l. m. rundade fjäll, hvilka föga eller ej öfverskjuta de unga blommorna, utom i deras yngsta stadium, och äro beklädda af grofva, glesare eller tätare, långt svartfotade hår jemte inblandade, sparsamma till ganska talrika, m. l. m. tjocka, små eller medelstora glandler, och slutligen temligen stora korgar med gula eller gulbruna stift. Skiljaktigheterna från föregående äro redan till en del angifna. Bland andra må serskildt framhållas, att bladen äro betydligt mera tättsittande, än hos föregående, smalare och mera långspetsade samt m. l. m. upprätta. Härigenom få äfven fåbladiga exemplar ett betydligt mera framträdande *subrigidum*-utseende, än flerbladiga former af *H.* **smolandicum*. Inflorescensen är vanligen också mera hopträngd med mera upprätta grenar. Holkarne äro alltid större och mera bredfjälliga, än hos föregående. Stjelken varierar än långt och tätt hårig nästan ända till de nedre inflorescensgrenarne, än upptill mera glatt. Vanligen är den långt upp brunviolett, liksom oftast flere eller färre af bladen på undersidan. I stark sol och på torra lokaler blir hela växten intensivt violettfärgad. Såsom hos en stor del *subrigidum*-artadt utbildade former bli ofta ett par af bladen på stjelkens midt nästan eller alldeles motsatta.

Former med glesare och stelare tandning och mest *subrigidum*-artadt utseende sakna nästan eller helt och hållet glandler på skaften och hafva mycket sparsammare glandelhår på holkarne, än former med tätare och mera flikad tandning, hvilka kunna ha rätt talrika glandler både på holkar och skaft och sålunda häri och i habitus något likna föregående. Men aldrig blir glandelhårigheten så riklig som hos denna. Håren på holkskaften variera längre och kortare, glesare eller tätare eller alldeles felande. På bladen är stjernluddet på båda sidorna betydligt rikare, än hos föregående, isynnerhet på undersidan af de öfre, hvilka stundom bli nästan grågröna eller gråa.

Inom området anträffad i *Östergötland*, Krokeks s:n, Marmorbruket (Hj. Mosén); S:t Johannes s:n, Häradsviken vid Ensjön (J. Hulting); Krigsbergs s:n, Skrukorp (K. F. Dusén); Medhamra vid Vadstena (C. J. Lindeberg); Värna s:n vid kyrkan (N. C. Kindberg); Wårdsbergs s:n, Rosenlund (A. R. Dahlgren); Törnevalla s:n, Klinttorp (N. C. Kindberg); Wist s:n, Sturefors, Hamra (förf.), Stafsäter (N. C. Kindberg); St. Åby s:n, Vestergården (G. A:n Malme); Wäderstad s:n, Lindekullen; Rinna s:n, Stortorp; Trehörna s:n, Slangeryd; V. Ryds s:n, Tunarp och Krämarbo; N. Vi s:n, Kärremåla (förf.); Asby s:n, Aspa (A. Molin); Sunds s:n, Bestorp (K. F. Dusén); Åtvids s:n, Adelsnäs, Karstorp och Slefringe m. fl. st. (förf.): *Småland*, Gärdserums s:n, Bossgård (förf.); Jönköping, Rosenlunds branter (J. E. Zetterstedt); Rogberga s:n, Knifshult; Öggestorps s:n, Romelsjö (K. Johansson); Ingatorps s:n (förf.); Almvik vid Vestervik (förf.); Gladhammars s:n, Thorsfall och Verkebäck; Mörlunda s:n, Haddetorp; Fagerhults s:n, Fagerhults herrgård och nära Eskebäck (K. J. Lönnroth); Drefs s:n, Böksholm (G. E. Hyltén-Cavallius).

Utom området funnen i *Södermanland*, Stora Malms s:n, Brännkärr, Sörgölsstugan och Sörgölet (G. A:n Malme).

H. PINNATIFIDUM (Lönnr.).

Caulis sat altus, inferne ± violascens longe — longissime et molliter ± dense pilosus, superne sparsius et sæpe longe pilosus v. subglaber sparsim stellatus, apice ± tomentosus, 2—7-folius. *Folia* ± gramineo-viridia, subtus sæpe glaucescentia v. saltim pallidiora et vulgo ± violascentia, supra subglabra — densiuscule pilosa, subtus præsertim in nervis densius et longe pilosa; *basalia* in rosulam 2—3-foliam congesta v. pauca ± remota ± lata — angusta ad basin sæpe crebrius pinnato-dentata v. sparsius et minute dentata — subintegra; *caulina* vulgo ± remota abrupte decrescentia rarius sensim in bracteas abeuntia latiora v. angustiora ad basin ± pinnato-dentata incisa v. crebre et acute dentata rarius sparsim dentata ± acuta. *Anthela* ± paniculata ± composita sat contracta — laxa interdum ± indeterminata. *Involucra* mediocria ± obscura glandulosa et rare pilosa v. etiam ± dense glandulosa et pilosa, efloccosa v. sparsim — densius floccosa, sæpe microglandulosa, squamis angustis linearibus — lanceolatis ± acutis v. latis ± triangularibus — triangulari-lanceolatis obtusiusculis — obtusis. *Styli* lutei.

Af hithörande former äro 2 och 2 sinsemellan närmare beslägtade. De utmärka sig alla genom sina gula stift, sin rikliga beklädnad af korta glandler, hos en del med inblandade mikroglandler, och korta, mörka, glesare till tätare hår. *H. *scanicum* och *H. *pinnatifidum* stå hvarandra mycket nära och äro beslägtade dels med *H. diaphanum* och närstående dels med *H. vulgatum*. *H. *punctillatum* och *H. *subpunctillatum* äro ytterst nära beslägtade med hvarandra och stå i samma förhållande sinsemellan, som underarterna af *H. vulgatum* eller *H. macrotonum*, d. v. s. den förra är utbildad efter *vulgatum*-, den senare efter *subrigidum*-typen. *H. *punctillatum* står äfven i en del former ganska nära *H. *pinnatifidum*, men synes å andra sidan mycket närma sig *H. *glaucovirens*.

Conspectus subspecierum.

1. *Involucra* efloccosa, glandulosa et rare — densiuscule pilosa.

   Squamæ angustæ ± lineares ± acutæ glandulis brevibus densis — confertis et pilis raris — sparsis v. nullis obsitæ. *Involucra* parva crassiuscula.

   1. *H. *scanicum* Dahlst.

   Squamæ e basi latiore ± lineari-lanceolatæ ± acutæ glandulis brevibus densis et pilis brevibus obscuris densiusculis — densis obtectæ. *Involucra* mediocria sat gracilia.

   2. *H. *pinnatifidum* Lönnr.

2. *Involucra* sparsim — densius floccosa, ± dense glandulosa et sparsim — densiuscule pilosa, microglandulosa.

Involucra parva squamis latis subtriangularibus — triangulari-lanceolatis obtusis — obtusiusculis, sæpe densius floccosis, sparsim pilosis. *Folia caulina* 2—3 magis remota et abrupte decrescentia, basi crebrius et magis irregulariter dentata, latiora.

3. *H. *punctillatum* ALMQU.

Involucra sat magna squamis latis triangularibus — triangulari-lanceolatis ± obtusis, rare — sparsim stellatis, sparsim — densiuscule pilosis. *Folia caulina* 3—7 magis approximata sensim decrescentia, basi minus crebre et magis regulariter dentata, angustiora.

4. *H. *subpunctillatum* DAHLST.

1. **H. *scanicum** *n. subsp.*

DAHLST., Hier. exs., fasc. II, n. 73, 74 et n. 75 (forma),

Caulis 40—60 ctm. altus gracilis ± flexuosus, 2—5-folius, inferne intense violascens v. fusco-violascens dense — sat dense longissime et molliter pilosus et rare stellatus, superne sparsius sed longe pilosus et sat stellatus, apice pilis brevioribus densiusculis vestitus et sat dense stellatus. *Folia* amoene gramineo-viridia, subtus multo pallidiora; *basalia* pauca 2—3, exteriora sub anthesi sæpe emarcida sed, quum adsunt, rotundato-ovalia subintegra obtusa, intermedia elliptica v. ovata sæpe ± ovato-oblonga, interiora ± elliptica — oblongo-lanceolata v. lanceolata ± acuta minute denticulata — sat dentata dentibus triangularibus acutis — subulatis ± latis — angustis et sat crebris antrorsum versis prædita (v. interdum ad basin sat grosse et irregulariter inciso-dentata); *caulina* longe remota cito decrescentia, superiora sessilia, infimum ± petiolatum, ± ovata ± ovato-lanceolata v. lanceolata sat crebre æqualiter et ± argute dentata (v. ad basin interdum ± incisa) acuminata — acuta; omnia supra sparsim — densiuscule pilosa, subtus pilis densioribus obtecta, in nervo dorsali petiolisque longe et dense pilosa, marginibus sat crebre ciliata, ceterum rare v. (in caulinis) sparsim in nervo dorsali densiuscule stellata. *Anthela* paniculata subsimplex — sat composita, ramis inferioribus ± distantibus, superioribus ± approximatis, omnibus erecto-patentibus basi leviter curvatis ± superantibus cum acladio 10—15 mm. longo pedicellisque sat brevibus ± gracilibus dense canofloccosis glandulis nigris plerumque parvis densis — confertis sub involucris etiam creberrimis et pilis mediocriter longis v. brevibus tenellis mollibus albidis v. subobscuris sparsis — sat frequentibus vestitis. *Involucra* mediocria v. parva subcrassiuscula ± obscure fusco-virentia basi ± rotundata. *Squamæ* angustæ lineari-lanceolatæ — lineares obtusæ — obtusiusculæ vulgo anguste interdum late viridi-marginatæ glandulis ± brevibus densis — confertis et pilis nullis v. raris — sparsis obscuris obtectæ, nudæ v. ad basin squamarum exteriorum levis-

sime stellatæ. *Calathidium* obscure luteum parvum subradians. *Stylus* vivus luteus — subluteus, siccus interdum fuscescens.

Inv. $\frac{8—10}{4—6}$, D. 30—35, Lm. 2,5—3 mm.

Utmärkt af sin isynnerhet nedtill lång- och finhåriga, vid basen röd- eller brunvioletta stjelk, sina ljust och vackert gröna blad, hvilka isynnerhet på medelnerven och på skaften äro långt och tätt, i kanterna något kortare och glesare finhåriga samt vanligen jemt och fint, stundom något groft, och vanligen tätt tandade, sina medelstora, brunsvarta eller brungröna holkar med temligen smala, jembreda och trubbade fjäll med mycket tät och kort glandelhårighet (ibland med flera eller färre inblandade, mörka, enkla hår), och hvilka för öfrigt vanligen äro alldeles nakna, vidare de fina och mjuka håren på de oftast tätt glandulösa holkskaften och grenarne samt slutligen gula stift. Holkfjällen variera (i skugga) med breda gröna kanter. Hår saknas vanligen bland holkarnes glandler, men i skugga, isynnerhet hos former från Östergötland (hvilka kanske bilda en svagare, något skild variation), blifva de ofta temligen talrika. Dessa sednare former hafva vanligen glesare beklädnad af glandler och hår på holkskaften och äro på stjelk och blad mindre håriga men ofta mera stjernludna. De tendera, isynnerhet då bladformen blir mera aflång, ej så litet åt *H. *obscuriceps*, med hvilken denna form utan tvifvel är i någon mån beslägtad. Bladen variera för öfrigt mera utdraget lancettlika, m. l. m. aflånga eller stundom smalt lancettlika. Ofta äga former från Östergötland mera flikad bladbas. Basalbladen äro undertill ofta mörkt violetta såsom hos *H. *vulgatum* eller *H. *pinnatifidum*. De påminna till form och tandning om bladen hos dessa båda. Med den sistnämda är ifrågavarande form tydligen närmast beslägtad, men har äfven till de mera jembreda fjällen och de brunaktiga holkarne med sin täta glandelbeklädnad vissa likheter både med *H. *punctillatum* och *H. *glaucovirens*. Med *H. diaphanoides* är den måhända mera beslägtad än sednast omnämda trenne former.

Anträffad i *Östergötland*, Linköpings Trädgårdsförening på gräsplaner (förf.) med färre eller inga hår på skaft och grenar; Norra Vi s:n, Kärremåla (förf.), en något afvikande lund- och skuggform; Åtvids s:n, Adelsnäs, Slefringe och Karstorp (förf.): *Småland*, Fagerhults s:n, Fagerhults herrgård (K. J. LÖNNROTH). Utom området funnen flerestädes i *Skåne* såsom vid Skillinge (B. LIDFORS m. fl.) ymnigt, äfven en form med lancettlika blad; Brunnby s:n, Röstånga (R. WALLENGREN, K. O. E. STENSTRÖM): *Bohuslän*, Koön vid Uddevalla (FR. LÖNNKVIST). Den är dessutom funnen i *Danmark*, Sjælland, Sorgenfri (FR. LÖNNKVIST). Närstående former äro dessutom anträffade i *Tyskland*, Thüringen (CARL ANGELRODT och C. HAUSSKNECHT).

2. H. *pinnatifidum LÖNNR. in sched.

DAHLST., Hier. exs., fasc. I, n. 84, 85. — DAHLST., Herb. Hier. Scand., Cent. II, n. 86. — H. vulgatum Fr. v. nemorosum LBG., Hier. Scand. exs., fasc. II, n. 74.

Caulis 60—90 ctm. altus gracilis — sat crassus flexuosus 3—5-folius, inferne ± intense violascens pilis longis mollibus sat densis obtectus, superne sparsius et brevius pilosus rare stellatus, apice pilis rigidioribus raris — sparsis obsitus et

sparsim — densiuscule stellatus. *Folia* saturate viridia, subtus pallidiora; *basalia* sub anthesi pauca 2—3 sæpe ± remota rarius in rosulam magis congesta, exteriora ± ovalia late et breviter dentata — subintegra obtusa, intermedia ± ovali-oblonga — ovali-lanceolata v. ovato-lanceolata et intima ± lanceolato-oblonga — lanceolata ± acuta v. acuminata sparsim — crebrius et late dentata v. ± longe pinnatodentata dentibus brevibus acutis iisdem v. laciniis longis regulariter alternantibus (interdum omnia fere subintegra); caulina longe distantia, superiora sessilia, infimum ± petiolatum, sæpe magna præsertim inferiora ± ovato-lanceolata — lanceolata et sæpius in apicem longum integrum cuspidata, ceterum ± pinnatifido-dentata et præsertim ad basin dentibus v. laciniis longis errecto-patentibus — patentibus rectis v. curvatis dentibus minutis subulatis ± æqualiter alternantibus prædita v. plurima solum humiliter dentata, rarius denticulata — subintegra, omnia v. solum basalia subtus ± et sæpe intense violascentia sat dense — dense pilosa, in nervo dorsali et in marginibus petiolisque ± crebre et longe pilosa, ceterum in nervo dorsali dense in pagina sat dense stellata, supra densiuscule — sparsim pilosa. *Anthela* plerumque ampla et laxa paniculata, ramis inferioribus remotis, superioribus approximatis ± erecto — divaricato-patentibus basi ± arcuatis sæpe valde superantibus (et inæqualiter longis) cum acladio 5—20(—40) mm. longo pedicellisque sat brevibus dense canofloccosis et pilis ± obscuris crassiusculis et firmis inferne raris — sparsis superne magis magisque densis — confertis et glandulis nigris inferne solitariis superne sparsis — densiusculis brevibus et sat longis obtectis. *Involucra* mediocria ± fusco-atroviridia sat gracilia basi ± rotundata. *Squamæ* e basi latiore ± lineari-lanceolatæ, exteriores breves obtusiusculæ, interiores ± viridi-marginatæ in apicem sæpe piceum ± longum acutum nudum et epilosum protractæ, ceterum efloccosæ v. ima basi exteriorum levissime stellatæ et glandulis nigris plerumque brevibus ± densis pilis vulgo obscuris firmis brevibus sparsis — densis obtectæ. *Calathidium* saturate croceo-luteum subradians. *Stylus* in vivo luteus v. fuscescens, siccitate interdum sat obscurus, vulgo luteus.

Inv. $\frac{10-12}{5-6}$, D. 35—40, L. m. 2,5—3 mm.

Denna framstående form utmärker sig framför allt genom sin mörka och rena bladfärg, den högväxta, till nedre delen intensivt violetta och långt finhåriga stjelken, de oftast långt parflikadt tandade stjelk- och inre basalbladen, hvilka sednare oftast nndertill äro intensivt violetta eller lefverfärgade, den vida, glesa, utspärrade inflorescensen, hvars grenar äro långt öfverskjutande akladiet och vid sin bas vanligen äro bågböjda (de öfre ofta vinkelrätt utstående och sedan böjda) samt äro temligen tätt korthåriga, spridt glandelhåriga och tätt hvitludna, genom de brun- eller svartgröna. nakna holkarne, hvilka äro klädda af täta glandler och vanligen äfven täta, oftast mörka, korta hår, men för öfrigt utom vid de yttres bas äro alldeles nakna ända ut i den långspetsade och oftast mörkfärgade, sällan eller aldrig (åtminstone ej märkbart) hårtofsade spetsen, samt genom i de flesta fall rent gula stift och alltid mycket mörkt gula, nästan rödgula korgar. Inflorescensen är ofta mycket rikblomstrig med i spetsen af de långa grenarne till följd af de ej serdeles långa korgskaften ganska tätt samlade holkar. Akladiet är ofta hos dylika individ mycket kort, hvarvid

de öfre grenarne utgå mycket nära hvarandra och tendera att bli flocklikt anordnade. Ju fåblomstrigare inflorescensen är, desto längre är vanligen akladiet. Varierar äfven mycket till bladens tandning. I allmänhet äro bladen såsom ofvan angifvits mycket djupt tandade eller parflikade. Tänderna äro på de mest flikade bladen m. l. m. utstående och ofta krökta. Dylika exemplar hafva oftare än andra till större antal kvarsittande basalblad och tillhöra till sin morfologiska utbildning *vulgatum*-typen. Hos andra exemplar äro basalbladen ensamt eller alla bladen mera likformigt korttandade med raka och mera framåtrigtade tänder och stjelkbladen vanligen talrikare och smalare. Dylika exemplar få ibland rätt tydlig *subrigidum*-habitus. En annan modifikation, hvilken liksom de nyssnämda äfven synes vara utan nämnvärd konstans, har basalbladen nästan alldeles helbräddade och stjelkbladen kort- och fintandade. Den förekommer med såväl *vulgatum*- som *subrigidum*-habitus. Den synes dels vara en individuel modifikation, förekommande bland de andra och med mellanformer förbunden med dem, dels en lokal modifikation, hvilken ställvis liksom hvar och en af de öfriga ensam kan vara herrskande (*H. pinnatifidum* Lönnr. *β vivarium* Lönnr., Dahlst., Herb. Hier. Scand., Cent. II, n. 87, 88). Denna form synes vara en mera sydlig ras. Med afseende på sina slägtskapsförhållanden är tydligen ifrågavarande form beslägtad med föregående. Med *H. *smolandicum* och närstående är den sannolikt äfven, ehuru mera aflägset, beslägtad liksom med *H. *vulgatum*, hvilken den stundom kan bli ganska lik såväl habituelt som till bladform, men den skiljes från denna genom sina nakna, smalare och spetsigare fjäll med rikare glandelhårighet samt sina mörkt gula korgar. Till holkarne har den mycket likhet med *H. *cruentifolium*, genom hvilken den på sätt och vis förbindes med de *anfractum*-artade formerna. Slutligen påminna späda exemplar med smalare blad och små holkar i ej ringa grad om *H. *punctillatum*. Men denna sednare form ansluter sig nära till *H. diaphani* formkrets, hvilken dock alldeles gränsar intill den, till hvilken närvarande form hör.

Inom området anträffad i Gårdeby s:n, Örsby (H. Strömfelt); Kärna s:n, Malmskogen (förf.); Motala, Hålberget (A. E. Holmgren); Omberg flerestädes mycket allmän (förf.); Väderstads s:n, Lindekullen m. fl. st. (förf.); Sunds s:n, Sundbomo (förf.); Norra Vi s:n, Urberget; Asby s:n, Glansås (K. F. Dusén); Oppeby s:n, Drabo (förf.); Åtvids s:n, Adelsnäs m. fl. st. (förf.): *Småland*, Sommens jernvägsstation (förf.); Askeryds s:n, Bordsjö (förf.); Grenna flerestädes allmän (J. A. Lewin, F. Hagström); Jönköping, Sanna vid Vettern (J. E. Zetterstedt); Rogberga s:n, Tenhult; Öggestorps s:n, Högåsen (K. Johansson); Eksjö s:n, Brevik (förf.); Gärdserums s:n, Bossgård (förf.); Burseryds s:n, Mölneberg (K. A. Th. Seth); Virserums s:n, Hassmo; Järeda s:n vid Sällevarån (K. J. Lönnroth); Målilla s:n (K. J. Lönnroth); Fagerhult s:n, Eskebäcks och Fagerhults herrgård (K. J. Lönnroth); Oskarshamns jernvägsstation (K. J. Lönnroth); Kråksmåla s:n, Barkebo och mellan Fröskelås och Askaremåla (K. J. Lönnroth); Madesjö s:n, Nybro, Orrebäck och Mellan-Örsjö (K. J. Lönnroth); Halltorps s:n, Värnanäs (M. Lönnroth); Östra Thorsås s:n, Sjölyckorna (C. J. Johansson); Drefs s:n, Braås; Skatelöfs s:n, Vrankunge (G. E. Hyltén-Cavallius); Femsjö s:n, Lilla Valshult m. fl. st. (Th. M. Fries): *Gotland*, Visby, Vibble (K. Johansson); Tofta s:n, Krokstäde (K. Johansson), *β* vivarium; Sanda s:n, Klintehamn (K. J. Lönnroth) f. primaria: *Öland*, Algutsrums s:n, St. Kalfholmen (Sillén). Utom området funnen i *Blekinge*, Karlskrona, Ringö (C. O. Schlyter och H. Falk); Vämö, Rödeby (H. G. Lübeck); Ronneby (C. O. Schlyter) m. fl. st.; Thorshagen (F. Svanlund): *Skåne*, som det synes flerestädes mycket allmän, mest såsom *β* vivarium såsom i Brunnby s:n, Arild, Kullaberg (R. Wallengren); V. Vrams s:n, Linderödsåsen; Ignaberga kalkbrott (G. A:n Malme): *Bohuslän*, Uddevalla (Fr. Lönnkvist); Kristinedal i Oroust; Morlanda (K Fr. Thedenius): *Vestergötland*, Sandhem (O. Nordstedt): *Vestmanland*, Sätra brunn (O. Almquist); Kungsör (C. O. v. Porat); Stockholmstrakten, Djurgården (förf. och K. J. Lönnroth): *Upland*, Holmbyboda, (M. Flo-

DERUS); Tibble s:n (E. ALMQUIST). — *Danmark*, Sjælland, Sorgenfri (FR. LÖNNKVIST). — En nästan alldeles med *β vivarium* identisk form är funnen i *England* (N. Anglia, N. W. Yorkshire af J. PERCIVAL).

3. **H. *punctillatum** ALMQU. in litt. *n. subsp.*

DAHLST., Hier. exs., fasc. I, a. 90; fasc. II, n. 96. — DAHLST., Herb. Hier. Scand., Cent. II, n. 64; Cent. IV, n. 36.

Caulis 40—60 ctm. altus gracilis flexuosus 2—3(—4)-folius, inferne violascens pilis mediocribus ± dense pilosus parce stellatus, superne parcius at magis magisque stellatus, apice ± dense floccosus pilis raris v. solitariis obsitus et haud raro parce glandulosus. *Folia* saturate gramineo-viridia, subtus pallidiora et vulgo ± violascentia; *basalia* sub anthesi 1—3, exteriora ovalia obtusissima ± late et crebre crenulato-dentata, intermedia ± oblonga v. oblongo-lanceolata ± crebre et sat late dentata obtusa — obtusiuscula, intimum sæpe longum lanceolatum in apicem longissimum ± integrum acutatum minus crebre sed acutius dentatum; *caulina* 2—4 cito decrescentia longe distantia, duo infima majora longissima suberecta anguste v. ovato-lanceolata in apicem longum integrum acutum protracta argute sed non crebre dentata, dentibus sæpe inæqualiter longis patentibus et curvatis sæpe cum laciniis alternantibus, subpetiolata, superiora angustiora sæpe sublinearia inæqualiter dentata — denticulata v. subintegra, omnia fere glabra — sparsim pilosa, in nervo dorsali magis pilosa et sat floccosa, ceterum sparsim stellata, in marginibus sat crebre ciliata. *Anthela* vulgo ampla laxa sat polycephala et ± composita v. subsimplex oligocephala nunc paniculata ramis inferioribus distantibus et acladio brevi 5—10 mm. longo nunc subumbellata ramis magis patentibus longissimis acladioque sæpe longissimo ad 70 mm. longo, ramis ± dense floccosis sparsim — densius pilosis et glandulosis, pedicellis vulgo brevibus dense tomentosis et glandulis fuscis v. nigris vulgo parvis v. minutis sat densis et pilis brevibus obscuris densiusculis — sat densis v. sparsis obsitis. *Involucra* parva subcrassiuscula badio-fusca v. fusco-virescentia basi ± ovato-obtusa. *Squamæ* fuscæ inæquilongæ latæ, exteriores breves subtriangulares obtusæ v. truncatæ, intermediæ triangulari-lanceolatæ in apicem obtusum — obtusiusculum ± attenuatæ parum marginatæ, intimæ acutæ — subulatæ sat viridi-marginatæ, sparsim — densius floccosæ et luteole microglandulosæ, ceterum glandulis brevibus et longioribus fuscis v. luridis ± densis sæpe cum pilis brevibus obscuris sparsis (— densiusculis) mixtis obtectæ. *Calathidium* sat obscure luteum, subplenum. *Stylus* vivus luteus (v. ferrugineus), siccus interdum fuscescens.

Inv. $\frac{10—11}{4,5—5}$, D. 30—35, L. m. 2,5—3 mm.

Ifrågavarande form är en af sydöstra Sveriges mera egendomliga former, hvars systematiska ställning är svår att afgöra. I många afseenden, isynnerhet med afseende på holkarne, erinrar den om *H. *frondosum*, men å andra sidan synes den sluta sig nära intill *H. *pinnatifidum* och närbeslägtade. Mest utmärkande för densamma äro de små,

bruna holkarne med sin egendomliga beklädnad af spridda stjernhår och gulaktiga, glänsande mikroglandler, öfver hvilka höjer sig en temligen tät beklädnad af brunaktiga, längre eller kortare glandelhår, vanligen med gulaktiga knappar och stundom blandade med mer eller mindre talrika, mörka, korta och tjockbasiga samt kort hvitspetsade hår. För öfrigt får den genom den vackert gräsgröna färgen på bladens öfversida och deras blekare, något blåaktiga undersida, hvilken ofta äfven till större eller mindre del är violettfärgad, ett ganska karaktäristiskt utseende. Stjelkens nedre del och rosettbladens skaft hafva oftast en lysande violett färg. De yttre basalbladen äro oftast breda och trubbade eller i spetsen afhuggna och afbryta skarpt mot de innersta långa, vanligen 2—3 gånger längre men knappt så breda, ofta utdraget lancettlika långspetsade bladen, hvilkas öfre hälft eller tredjedel oftast är alldeles helbräddad. De nedersta stjelkbladen likna de inre rosettbladen till form och tandning, men äro oftast större och stundom bredare. Stjelkbladen aftaga för öfrigt hastigt i storlek och bredd uppåt. Ganska karaktäristisk är de långa stjelkbladens upprätta ställning. Tandningen hos de yttre bladen är bred, tät och grof, men stundom blir kanten alldeles helbräddad, hvarvid bladformen oftast blir omvändt äggrund. Tänderna bli allt glesare, ojemnare och skarpare på de inre basalbladen och stjelkbladen. Ofta utskjuta 2—3 par af stjelkbladens tänder längre än de öfriga. Vanligen äro de något framåtrigtade, men ej sällan rätt utstående och stundom äro en del af dem bakåtkrökta. Ofta äro äfven tänderna, isynnerhet de längre vid basen sittande, krökta. Såsom framhållits, äro isynnerhet de inre basalbladen och stjelkbladen smala och långspetsade. Detta inträffar framförallt hos individ med fåbladig stjelk, hvilka äfven bäst motsvara *vulgatum*-typen. Traktvis men ibland enstaka bland nyssnämda modifikation träffas individ med *subrigidum*-habitus, hvilka hafva 4—5- eller ibland ända till 7-bladig stjelk. Hos dessa äro stjelkbladen kortare och bredare, tätare tandade och mera tättsittande samt hafva oftast kortare spets. Dylika modifikationer öfvergå dock utan gräns i förut omnämda modifikation. Märkligt är likväl att inflorescensen hos fåbladigare individ, isynnerhet om den är mera rikblomstrig, visar stark tendens att bli flocklik med långa grenar och långt akladium, hvaremot den hos mångbladigare individ blir mera kvastlik och ej så sällan kortgrenig samt nedåt mer eller mindre obestämd. Här framträda sålunda hos samma art tvänne ytterlighetsmodifikationer, hvilka hvar för sig äga en viss analogi med typer sådana som *silvaticum*- och *subrigidum*-typen, ehuru de i förhållande till hvarandra äro mindre differentierade än dessa. Sådana förhållanden kunna emellertid iakttagas hos ett flertal andra, ehuru ej alltid så i ögonen fallande som hos denna, och de äro af ett visst intresse, emedan de mer eller mindre häntyda på, att de morfologiska typerna måhända uppstått oberoende af slägtskap och snarare torde ha sin grund i biologiska förhållanden.

För öfrigt äger denna sin fullt motsvarande *subrigidum*-artadt utbildade form i följande, med hvilken den är ytterst närbeslägtad. Båda hafva sannolikt i en senare tid uppstått genom klyfning af en och samma grundform.

Inom området är ifrågavarande form funnen i *Östergötland*, St. Åby s:n, Frösäng (G. A:N MALME); Väderstads s:n, Lindekullen; Rinna s:n, Stortorp; Sunds s:n, Sunds Södergård, Graby, Sandbäckstorp, Löfåsa och Rökulla (förf.): V. Ryds s:n, Krämarbo m. fl. st. (förf.); Norra Vi s:n, Kärremåla (förf.); Åtvids s:n, Adelsnäs, Karstorp m. fl. st. (förf.): *Småland*, Askeryds s:n, Bordsjö; Gärdserums s:n, Bossgård; Ekesjö s:n, Brevik m. fl. st. (förf.); Rogberga s:n, Heljaryd, Ingaryd, Tenhult och Månsarp m. fl. st.; Öggestorps s:n, Sjöberg; Forserums

s:n, Horsarp (allt enligt K. JOHANSSON); Dref (G. E. HYLTÉN-CAVALLIUS). Utom området funnen i *Södermanland*, St. Malms s:n, Brännkärr (G. A:N MALME); Stockholmstrakten (S. ALMQUIST).

4. **H. *subpunctillatum** n. subsp.

DAHLST., Hier. exs. fasc. II, n. 94, 95.

Caulis 40—75 ctm altus gracilis v. crassus firmus 3—7-folius, inferne ± obscure purpureus ± dense longe et molliter pilosus parum stellatus, supra medium sparsius pilosus v. subglaber et magis magisque stellatus, apice ± tomentosus sparsim pilosus et vix glandulosus. *Folia* saturate gramineo-viridia, subtus paullulum pallidiora; *basalia* sub anthesi vulgo emarcida v. 1—2 inter se ± remota, extimum ± obovatum v. oboblongum remote denticulatum ± obtusum, intimum ± oblongum obtusiusculum — subacutum remote et acute denticulatum — dentatum; *caulina* imo ± petiolato excepto sessilia, intermedia v. supiora etiam basi subdilatata sessilia, inferiora sæpe longissima ± oblongo-lanceolata — anguste lanceolata suberecta intermediis vulgo longiora et vulgo ad medium remote et acute dentata v. dentibus 2—3 præsertim ad basin sæpe longis v. etiam longissimis patentibus minimis alternantibus instructa, superiora magis distantia et cito decrescentia ex ovata basi lanceolata remote et longe dentata v. inæqualiter laciniato-dentata, summa sæpius integriora lineari-lanceolata minima, omnia præsertim inferiora in apicem longum v. longissimum acutum subintegrum plerumque protracta, supra subglabra — rare pilosa, subtus sparsim in nervo dorsali ± stellato densius et longius pilosa, ceterum parce stellata et in marginibus sat dense ciliata. *Anthela* simplex v. sat composita polycephala deorsum sæpe indeterminata paniculata et sat laxa, ramis inferioribus ± remotis erecto-patentibus haud superantibus, superioribus approximatis magis patentibus et sæpe subarcuatis, summis interdum ± umbellatis ± superantibus ± dense stellatis, pedicellis brevibus dense tomentosis cum acladio 10—20 mm. longo pilis brevibus sparsis — sat densis et glandulis subluridis parvis sparsis v. sub involucris densiusculis obtectis. *Involucra* sat magna crassa fusco-nigra v. fusco-virescentia basi ovata in pedicello superne incrassato squamifero abeuntia postea rotundata-truncata. *Squamæ* multiseriales latæ, exteriores breves — brevissimæ triangulares obtusæ v. truncatæ in pedicello descendentes, intermediæ triangulari-lanceolatæ obtusæ, interiores magis elongatæ obtusiusculæ — subacutæ, intimæ paucæ acutæ et viridi-marginatæ, omnes apice fuscæ v. piceæ, rare v. sparsim stellatæ et microglandulosæ, ceterum glandulis fuscis v. luridis parvis v. longioribus densis et pilis crassis obscuris sparsis — densioribus obsitæ. *Calathidium* obscure luteum sat plenum. *Stylus* vivus luteus v. ferrugineus, interdum fuscus.

Inv. $\frac{11—12}{5—6}$, D. 30—35. L. m. 2,5—3 mm.

Denna form står ytterst nära föregående, till hvilken den är en *subrigidum*-artadt utbildad paralellform. Från densamma är den dock skild genom i allmänhet flera utbildade stjelkblad, vid blomningen vanligen vissnade basalblad, hvilka om de kvarsitta äro få till

antalet och aldrig bilda rosett utan äro skilda genom korta men tydliga internodier (häri liknande Accipitrina), glesare, skarpare bladtänder med rakare sidor, större och gröfre och isynnerhet hos frodiga exemplar tydligare mångfjälliga holkar med bredare och i allmänhet trubbigare fjäll, af hvilka de nedre äro löst tilltryckta och ofta nedstiga på det gröfre och upptill förtjockade skaftet, tätare, mörkare korgar, vid sitt fäste bredare och ibland något utvidgade stjelkblad, af hvilka endast det nedre är något men bredt vingskaftadt samt slutligen gröfre och mera *subrigidum*-artadt utbildad växt. Lågväxta, fåbladiga och fåblomstriga individ, hvilka likna föregående, skiljas lätt från dess olika former, äfven de högväxtare och flerbladigare, genom sin robustare stjelk, de afvissnade eller få och glesa basalbladen, stjelkbladens bredare fäste och den glesa, raka tandningen samt de gröfre holkarne med betydligt bredare fjäll. Hos små och magra individer bli holkarne fåfjälliga, men i stället bli fjällen oftast bredare och till ett större antal än vanligt trubbiga eller i spetsen afhuggna. Liksom föregående varierar den med långt utdragna, helbräddade bladspetsar eller med kortare och mindre långspetsade blad. Dessa sitta alltid tätare än hos föregåendes mångbladigare former, isynnerhet på stjelkens nedre del, der de hos grofväxta och frodiga exemplar ofta bli dubbelt eller tredubbelt längre än mellanlederna. Basalbladen synas omedelbart utgå ur öfvervintrande, fåfjälliga knoppar utan förmedling af en hel serie lågblad som hos Accipitrina, hvilka den på grund häraf oaktadt sin habituella likhet ej visar sig tillhöra. Basalbladen och stundom äfven stjelkbladen äro såsom hos föregående m. l. m. purpur- eller lefverfärgade och likaledes äro stjelkens nedre del och bladskaften ofta lysande purpurfärgade.

I Åtvids socken i Östergötland, der denna och föregående i talrik mängd växte blandade, kunde de redan genom sin habitus, sina korgars olika täthet, holkarnes storlek och bladens tandning samt stjelkens olika bladighet på längre håll igenkännas. Deremot hade närvarande form stor habituell likhet med på samma ställen växande *H. gothicum* Fr. **ampliatum mihi* och var ofta rätt svår att skilja från denna på blotta utseendet.

Hittills inom området endast funnen i *Östergötland* i Eksjö s:n, Brevik och i Åtvids s:n, Adelsnäs, Karstorp och Slefringe m. fl. st., men på de sednare ställena på många lokaler ytterst ymnig, vidare i *Småland*, Gärdserums s:n, Bossgård, rätt ymnig på hårda ängsbackar (förf.) samt i Forserums s:n, Horsarp, äfven der i sällskap med föregående (K. JOHANSSON).

H. TURBINICEPS n. sp.

Caulis ± altus gracilis flexuosus 1—(3—)7-folius, inferne ± fusco-violaceus sat dense — dense et longe pilosus, superne sparsius pilosus eglandulosus v. glandulis solitariis obsitus rare — sparsim stellatus, apice sat floccosus — tomentellus. *Folia* saturate graminea — subprasino-viridia, subtus et in petiolis ± dense pilosa; *caulina* pauca remota abrupte decrescentia v. plurima sensim decrescentia sparsim et argute dentata — densius serrato-dentata; *basalia* in rosulam 3—5-foliam congesta sparsim denticulata — dentata v. crebre serrato-dentata et ad basin sæpe profundius et irregulariter dentata, basi ± descendente. *Anthela* angusta elongata sæpe indeterminata ± composita — subsimplex paniculata, ramis erectis brevioribus

v. laxa — subcontracta ramis ± erecto-patentibus longioribus. *Involucra* parva v. minuta plerumque nigra basi turbinata squamis ± triangulari-lanceolatis acutis — obtusiusculis breviter et conferte glandulosis ± dense et breviter pilosis fere efloccosis v. majora sat valida atroviridia basi ± turbinata squamis ± lineari-lanceolatis ± obtusis breviter — mediocriter sat dense pilosis densiuscule — sat dense glandulosis marginibus floccis raris — sparsis ± limbatis. *Styli* lutei.

De båda hitförda formerna ha mycket gemensamt i habitus och holkarnes form samt delvis i dessas beklädnad men synas ej vara nära beslägtade utan divergera i olika riktningar. Den första bildar på visst sätt en mellanlänk mellan *H. subramosum*, *H. *punctillatum* och *H. *glaucovirens*, den andra synes intaga en medelställning mellan *H. *pinnatifidum*, *H. *subramosum γ xanthostylum* och *H. *chlorodes*.

Conspectus subspecierum.

Caulis 3—7-folius, foliis sensim decrescentibus, omnibus etiam basalibus ± crebre serrato-dentatis, supra ± maculatis. *Involucra* vulgo minuta obscura fere efloccosa conferte glandulosa et breviter et dense pilosa, *squamis* acutis — obtusiusculis.

1. *H. *turbiniceps* Dahlst.

Caulis 1—3-folius, foliis abrupte decrescentibus, omnibus etiam basalibus sparsim dentatis, supra numquam maculatis. *Involucra* sat magna dilutiora densiuscule — sat dense pilosa, *squamis* ± obtusis marginibus ± floccosis.

2. *H. *adiposum* Dahlst.

1. **H. *turbiniceps** *n. subsp.*

Dahlst., Hier. exs., fasc. IV, n. 80. — Dahlst., Herb. Hier. Scand., Cent. II, n. 56, 57; Cent. V, n. 61. — *H. turbinatum* Lönnr. in sched.

Caulis 35—70 ctm. altus gracilis flexuosus sat firmus 3—7-folius, inferne ± fusco-violaceus sat dense et longe pilosus vix stellatus, ceterum sparsim pilosus v. fere glaber et rare stellatus, apice pilis crassis obscuris glandulis solitariis et floccis sparsis — sat densiusculis obsitus. *Folia* saturate gramineo-viridia, supra sæpe purpureo-maculata, subtus pallidiora et sæpe subglaucescentia; *basalia* sub anthesi 3—5 in rosulam haud multum confertam approximata, exteriora minora ovalia — elliptica subintegra v. minute denticulata obtusiuscula, intermedia anguste oblonga obtusiuscula v. oblongo-lanceolata ± acuta crebrius serrato-dentata, intimum longissimum angustum ± lanceolatum longe acutum serrato-dentatum v. inæqualiter dentatum; *caulina* ± remota sensim in bracteas decrescentia oblongo-lanceolata — elliptico-lanceolata v. anguste lanceolata sæpe supra medium paginæ latiora ± acuta apice brevi

subintegra, superiora ± anguste lanceolata — linearia acutiora ± dense et argute serrato-dentata v. inæqualiter et longius dentata dentibus omnibus ut plurimum apicem versus directis rarius patentibus, supra opaca sparsim et breviter pilosa, subtus densius pilosa, in nervo mediano ± floccosa pilis longioribus sat densis obsita, in marginibus petiolisque brevibus alatis ± dense ciliata, exteriora subtus parum violascentia. *Anthela* angusta elongata deorsum sæpe indeterminata polycephala ± composita v. simplex oligocephala paniculata, ramis ± erectis gracilibus, inferioribus ± remotis strictis magis erectis, superioribus magis magisque approximatis basi leviter curvatis et magis magisque sed haud multum patentibus ± superantibus densiuscule — sat dense floccosis et pilis brevibus basi crassa nigricante apiceque tenui diluto sparsis — densiusculis glandulis brevibus nigris v. fuscis densioribus obtectis, pedicellis brevibus tenuibus acladioque 3—10 mm. longo sat tomentosis dense et breviter pilosis et glandulis parvis v. minutis confertis obtectis. *Involucra* parva v. minuta nigro- v. viridi-fuscescentia basi turbinata eximia. *Squamæ* exteriores angustæ lineares v. etiam latæ triangulares brevissimæ obtusiusculæ — subacutæ sæpe in pedicello superne ± incrassato descendentes, reliquæ intermediis paucis obtusis brevioribus exceptis subæquilongæ ± latæ triangulari-lanceolatæ obtusiusculæ — subacutæ, intimæ pauciores acutæ, vix nisi ad basin exteriorum stellatæ sed minutissime glandulosæ ceterumque pilis brevibus — brevissimis obscuris basi ± crassa nigricante sat densis — densis et glandulis brevibus v. minutis fuscis v. subluridis confertis obtectæ. *Calathidium* saturate luteum subvitellinum parvum ± radians. *Stylus* vivus ferrugineus — fusco-ater.

Inv. $\frac{8—10}{4—5}$, D. 25—30, L. m. 2—2,5 mm.

En i hög grad distinkt form, hvars ställning likväl ännu är mig oklar. Dock torde den, såsom holkarnes beklädnad isynnerhet med afseende på glandelhårens utseende och förekomsten af mikroglandler samt det deraf föranledda egendomliga utseendet antyder, i flera afseenden närma sig föregående grupp, inom hvilken då *H. *punctillatum* skulle stå den närmast. Jemför man hårigare holkar af den sednare med hårfattigare af förhandenvarande form, framträder likheten mera än eljest. Å andra sidan visar den i hårighetens fördelning, bladens tandning och hela habitus en så påfallande likhet med smal- och småholkiga former af *H. *subramosum β plicatiforme* eller kanske ännu mera med den sednares nordliga paralellform eller paralellras *H. *kuusamoënse* Wainio,[1] att den med all sannolikhet är att räkna till de sistnämdas formområde, ehuru den tydligen i förhållande till dem är en serdeles väl differentierad form. Märkvärdig är äfven den likhet i beklädnad och flera andra karaktärer, som förefinnes mellan denna och *H. *philanthrax* Stenstr. Måhända skall vid fortsatta undersökningar visa sig att den är den sednares efter *vulgatum*-typen utbildade paralellform.

Framförallt är ifrågavarande form utmärkt af sin smala, oftast rikblomstriga och långa korgställning, hvars grenar äro starkt uppåtrigtade och isynnerhet i inflorescensens nedre del bilda mer än vanligt skarp vinkel mot stjelken, de vanligen små eller medelstora holkarne, hvilka äro smala, snurrlikt nedlöpande på skaften samt klädda af täta, korta

[1] Se Herbarium Musei Fennici I. Plantæ vasculares, pag. 148.

hår och mycket täta, brunsvarta eller m. l. m. gulknappiga, små glandler och mikroglandler, vidare den spensliga, höga, flerbladiga stjelken, hvilken i likhet med de inre rosettbladen har de lancettlika till elliptiskt lancettlika bladen skarpt men ej långt spetsade och vanligen tätt och hvasst samt framåtrigtadt sågtandade. Hos frodigare individ, isynnerhet från fuktigare och skuggigare lokaler, bli bladen stora, slappa och bredare än vanligt med ojemn och vid basen ofta långtandad kant, hvarvid stundom 2—3 par tänder kunna bli betydligt långa, men på öppnare lokaler behålla bladen sin karaktäristiska tandning. På mycket torr, öppen mark äro de oftare än eljest purpurfläckade på öfversidan. I skugga försvinna fläckarne deremot alldeles. Holkarne variera ej så litet till storlek, äro små på öppna ställen och hos mångblomstriga exemplar, större deremot i skugga och på friskare mark. Minst synes de vara hos exemplar från centrum af formens område nämligen i Vestmanland. Bladen äga en lifligt och vackert gräsgrön färg, som på undersidan är blekare och ofta skiftar något i blåaktigt. Exemplaren från Östergötland äga ofta äfven på bladens öfversida en blåaktig anstrykning och äro glattare på örtståndet. Stiftets färg vexlar från brunsvart och då vanligen med ganska tydliga hårpapiller, genom hvilkas färg den mörka färgen till hufvudsaklig del torde framkallas, till rent gul, hvilken jag funnit hos exemplar från Östergötland. Korgarne äro ovanligt små i jemförelse såväl med närbeslägtade som med områdets Archieracier i allmänhet och derjemte ganska glesa och fåblomstriga.

Denna form synes ha sitt centrum i *Vestmanland*, der den i Kung Karls s:n såsom vid Skillinge och i trakten af Kungsör först af K. J. LÖNNROTH och S. ALMQUIST och sedermera af C. O. v. PORAT påträffats rikligt och på vissa ställen sällskapligt i större massor. Vidare är den funnen i *Nerike* (E. ADLERZ): *Upland*, vid Gottsunda och Dannemora (förf.): *Helsingland*, Söderhamn (A. MAGNUSSON).

Inom området har jag träffat den i *Östergötland*, V. Ryds s:n, Tunarp.

2. **H. *adiposum** n. subsp.

Caulis gracilis flexuosus 30—70 ctm. altus 1—3-folius, inferne obscure fusco-violaceus sat dense — dense longe et molliter pilosus rare stellatus, superne sparsim — densiuscule pilosus magis stellatus, apice sparsius pilosus sat floccosus — tomentellus. *Folia* saturate subprasino-viridia, subtus pallidiora subglaucescentia sparsim et sat longe pilosa rare — sparsim stellata, in nervo mediano densiuscule — sat dense stellato petiolisque pilis longioribus densiusculis — sat densis obtecta, marginibus sparsim — densiuscule et sat longe ciliata, supra sparsim — densiuscule et sat longe pilifera sæpe adipose nitentia; *basalia* sub anthesi persistentia 3—4 in rosulam approximata longe et anguste petiolata, exteriora anguste oblonga — lingulata obtusa irregulariter et subulate ± sparsim denticulata sæpe undulata subtus violascentia, intermedia ± oblongo-lanceolata obtusiuscula longe mucronata sparsim et late dentata v. glanduloso-dentata et intima ± lanceolata sparsim et angustius dentata — glanduloso-denticulata ± longe acuta, omnia basi ± angusta cuneata suboblique decurrentia, dentibus arrectis — patentibus v. recurvatis anguste — late triangularibus longe — longissime mucronatis v. solum subulatis; *caulina* longe remota abrupte v. cito decrescentia ± late (rhomboideo-) — anguste lanceolata, infimum sat (longe)

petiolatum, reliqua sessilia sparsim et argute dentata, superiora supra medium ± inæqualiter subulate longidentata, dentibus anguste triangularibus acutioribus patentibus et apice subulato sæpe recurvatis, omnia basi ± longa cuneata integra, subtus sat dense stellata. *Inflorescentia* paniculata laxa — subcontracta simplex — subcomposita, ramis inferioribus ± remotis, superioribus magis approximatis erecto-patentibus basi ± curvatis ± superantibus densiuscule stellatis et pilis longis tenellis crispulis raris glandulisque raris v. solitariis obsitis, pedicellis mediocribus — sat longis basi curvatis acladioque 5—35 mm. longo ± dense tomentellis pilis longis tenellis sparsis — sat densis et glandulis nigris gracilibus mediocribus sparsis — densiusculis sub involucris sat densis obtectis. *Involucra* sat longa valida ± atro-viridia subvariegata basi ± ovato-turbinata in petiolo apice incrassato 1—2-squamoso sensim descendente postea ± ovato-rotundata. *Squamæ* sat latæ e basi latiore lineari-lanceolatæ irregulariter imbricatæ, omnes apice ipso rotundato-obtusæ comosæ v. intimæ paucæ acutæ, omnes marginibus (præsertim interiorum) late viridi-marginatæ, exteriores marginibus floccis ± raris v. sparsis limbatæ, interiores ad apicem modo rare floccoso-limbatæ, ceterum passim rare — sparsim stellatæ et pilis mediocribus v. brevibus albidis basi ipsa nigricante crassa inferne sat dense — dense superne sparsius obtectæ glandulisque gracilibus parvis — mediocribus densiuscule v. ± dense obsitæ. *Calathidium* ± saturate luteum sat radians. *Ligulæ* glabræ v. interiores subciliatæ. *Stylus* luteus.

Inv. $\frac{12—13}{6—7}$, D. 35—40, L. m. 2,5 mm.

En synnerligen egendomlig form, hvars ställning och slägtskapsförhållanden äro svåra att angifva. Den utmärker sig framförallt genom sina ofvan fettglänsande, lång- och skarpspetsade blad, hvilkas tandning är gles af triangulära, bredare eller smalare tänder, hvilka äro längst hos stjelkbladen och vanligen utstående samt försedda med serdeles lång (af lika längd som tänderna sjelfva) ytterst smal, trådlik eller sylhvass glandeludd, som ofta liksom understundom tänderna är bakåtböjd, gles inflorescens med m. l. m. upprätta, vid sjelfva basen böjda grenar och skaft, vanligen ganska långa holkar, hvilkas bas i yngre stadier är snurrlik och öfvergående i det upptill vidgade, fjälliga holkskaftet, rundtrubbade och hårtofsade, bredt grönkantade holkfjäll samt rent gula stift. Basalbladen äro vanligen samlade i en 4—5-bladig rosett, smal- och långskaftade, de yttre undertill mörkt lefverbruna, de inre af öfvervägande lancettlik form, långa och skarpspetsade. Stjelkbladen äro få, glest sittande, det nedre vanligen skaftadt, de öfre oskaftade, undertill ofta mycket starkt stjernludna. Tänderna äro, som ofvan sagts, glesa men variera ibland hos basalbladen tätare och då ofta bredare. Ibland äro alla reducerade till långa, syllika glandeluddar, ibland och isynnerhet hos stjelkbladen omvexla dessa med vanliga tänder. Hos stjelkbladen äro tänderna längre och smalare, ofta oliklånga. Vanligen äro 3—4 tänder utbildade på hvardera sidan till öfver bladets midt eller blott 1—2 nära bladbasen. Denna är smalt vigglik, nedlöpande på skaftet och vanligen liksom den långa bladspetsen helbräddad. Till habitus, holkarnes beklädnad och holkbasen har denna form en viss likhet med *H.* **turbiniceps* men påminner äfven om *H.* **subramosum γ xanthostylum*. Från båda dessa är den dock skild genom sina bredt rundtrubbade holkfjäll och bladens egendomliga tandning. Sannolikt kan den

betraktas såsom en med *H. *pinnatifidum* analog mellanlänk mellan *H. *subramosum* och *H. diaphanoidis* formgrupp, inom hvilken den torde vara närmast beslägtad med *H. *chlorodes*. Med denna har den gemensamt bland annat de bredt och klart grönkantade och rundtrubbade fjällen. Dessa bli stundom, liksom hos former af *H. *subramosum*, i spetsen skärformigt krökta. Då jag först insamlade denna form, förvexlade jag den, ehuru jag snart märkte olikheten, dels med en skuggform af *H. *scanicum* dels med en helbladigare form af *H. *pinnatifidum*, hvilket visar att dessa former i vissa afseenden stå i närheten af hvarandra

Hittills blott anträffad i *Östergötland*, Wist s:n, Sturefors bland *H. *subramosum β plicatiforme* sparsamt och i *Småland* vid Sommens jernvägsstation, växande i ett tjugutal individ jemte *H. *pinnatifidum* (förf.)

H. SUBRAMOSUM (Lönnr.).

Caulis ± altus gracilis — crassus 1—5-folius, inferne ± dense longe et molliter pilosus, superne pilis parcioribus instructus et magis magisque dense stellatus, apice tomentellus — tomentosus. *Folia* ± pallide — saturate viridia sæpe sublutescentia — subprasina et subtus sæpe subglauco-viridia undique ± dense v. subtus saltim dense — densiuscule pilosa, ± dense — sparsim sed ad basin vulgo profundius et irregulariter sæpe longe dentata — incisa; *basalia* in rosulam 2—5-foliam conferta angustiuscula — lata; *caulina* ± remota cito et abrupte decrescentia, rarius magis sensim decrescentia. *Anthela* contracta ramis brevibus et sæpe brevissimis subarcuatis v. laxa ramis strictis longis et ± patentibus. *Involucra* parva — mediocria subgracilia — crassa vulgo brevia, squamis latis — sat angustis vulgo linearilanceolatis, pilis obscuris crassis v. dilutis tenellis et longioribus sat dense — dense obtectis et glandulis solitariis — raris vulgo brevissimis et parum conspicuis obsitis fere efloccosis — ubique æqualiter et densiuscule floccosis raro marginibus magis conspicue sed angustissime floccoso-limbatis. *Styli* rarius obscuri — nigri, vulgo ± lutei.

En mycket naturlig komplex af närstående, ofta från hvarandra temligen svagt differentierade former och derföre svårskilda, alla utmärkta af m. l. m. rikligt hårigt örtstånd och rikligt håriga men föga glandelhåriga holkar. Den första underarten *H. *subramosum* innefattar flera former, af hvilka ytterligheterna äro väl begränsade och lätt skilda, men hvilka genom de öfriga formerna äro på mångfaldigt sätt förenade med hvarandra. De till denna hörande formerna tillhöra morfologiskt dels *cæsium*- dels *vulgatum*-dels *subrigidum*-typen, ehuru ingendera af dessa typer är väl utpräglad eller ensamt förekommer hos någon af dem. *H. *ebenarium* är mera fristående och oftast utbildad efter *cæsium*-typen. Med afseende på sina frändskapsförhållanden ansluta de sig å ena sidan till *H. turbiniceps*, å andra sidan till en del former af *H. lepidotum*, men de sammanhänga äfven mycket nära med den grupp af nordliga, *cæsium*-artadt utbildade former, till hvilken *H. impressum* Norrl., *H. constrictum* Norrl. och *H. gravastellum* Dahlst. höra såsom de bäst utpräglade representanterna, äfvensom med *H. orarium* Lbg. För öfrigt äro de m. l. m. nära beslägtade med *H. sagittati* och ännu mera med *H. sarcophylli* formgrupper.

Följande framställning är endast att anse såsom provisorisk. Utan tvifvel skola flera af *H. *subramosi* varieteter vid närmare studium visa sig vara goda underarter.

Conspectus subspecierum.

1. *Folia* angustiora; habitus subrigidiformis v. vulgatiformis rarius cæsiiformis. *Squamæ* raro latiusculæ vulgo ± angustæ. *Caulis* (2—)3—5-folius.
   1. *H. *subramosum* Lönnr.

2. *Folia* latiora; habitus vulgo cæsiiformis. *Squamæ* latæ. *Caulis* 1—3-folius.
   2. *H. *ebenarium* K. Johanss.

1. H. *subramosum Lönnr.

H. subramosum Lönnr., Resa i Smål. och på Gotl. (Öfversigt af Kgl. Vet. Akad. Förh. 1882, n. 4, pag. 86.)

Caulis 50—70 ctm. altus subflexuosus, apice v. sæpe a medio interdum usque a basi ramosus, 3—4(—5)-folius, basi pilis sat longis ± densis hirsutus, medio sat dense pilosus, apice pilis sparsis instructus, inferne sparsim superne magis magisque dense stellatus, ima basi obscure purpurascens. *Folia* firma, supra pallide viridia, subtus subglauco-viridia, margine subtusque pilis ± densis v. densiusculis hirta, in nervo dorsali petiolisque densius hirsuta, supra sparsius pilosa; *basalia* 2—3(—5) in rosulam conferta v. sub anthesi emarcida brevius petiolata (lamina petiolo duplo v. triplo longiore), exteriora elliptica subintegra obtusa, interiora lanceolato-ovalia v. lanceolata grosse paucidentata dentibus brevibus v. minutis mucronatis alternis in petiolum alatum ± decrescentia ± longe acuta mucronata; *caulina* distantia decrescentia, inferiora magis approximata in petiolum brevissimum barbatum angustata, superiora magis magisque remota basi cuneata sessilia haud amplexicaulia sæpe in axillis ramigera, omnia basalibus conformia v. præsertim superiora magis ovato-lanceolata sæpe grossius dentata — inciso-dentata dentibus 3—5, acuta v. cuspidata. *Anthela* diffuse paniculata subcomposita sæpe subindeterminata, ramis elongatis strictis distantibus (summis autem vulgo magis approximatis) patentibus superantibus pilis raris — densiusculis albis mollibus ± obtectis cum pedicellis brevibus acladioque 15—30 mm. longo sub involucris pilis albis ± densis hirtis glandulisque solitariis minutissimis obsitis ± dense albotomentosis. *Involucra* obscure cano-virescentia sat lata majuscula basi rotundato-ovata postea subtruncata. *Squamæ* subimbricatæ, infimæ angustæ lineares obtusæ in pedicellum squamulosum superne incrassatum decurrentes, intermediæ ± obtusiusculæ et intimæ subacutæ ± anguste lanceolatæ v. fere lineares sat extractæ, pleræque viridi-obscurascentes dorso usque ad apicem obscuræ, intimæ marginibus pallide virides, pilis mediocribus — sat longis totis v. basi nigro excepto albis crispulis ± dense hirsutæ glandulis minutis solitariis v. raris hinc inde in-

spersis obtectæ marginibusque usque ad apicem comosum sat dense — densiuscule floccis anguste limbatæ. *Calathidium* sat radians luteum, ligulis interioribus præsertim subciliatis. *Styli* primo concolores postremo vulgo fuscescentes.

Inv. $\frac{11—12}{6—7}$, D. 35—40., L. m. 2—2,5 mm.

α genuinum.

Är en mycket utmärkt form, hittills likväl endast funnen på en lokal. Med *H. orarium* Lbg. har den habituelt en ej ringa likhet. Med denna, hvilken bildar ändpunkten i en annan serie, är den både beslägtad och analog. Från densamma, hvilken har flerbladigare stjelk, vanligen tidigt afvissnande basalblad, spetsigare stjelkblad med stelare och smalare, mera spridda och likformigare tänder, hvarigenom den får ett mera *rigidum*-artadt utseende, gröfre holkar med mörkare, mera enfärgade, bredare och trubbigare fjäll, täckta af tätare hårbeklädnad men med nästan total brist på glandelhår och saknad eller i det närmaste brist på stjernludd i kanterna samt redan från början mörka, sedan nästan svarta stift, skiljes den för öfrigt lätt genom oftare kvarsittande basalblad, fåbladigare stjelk med bredare och mera ojemt och tätt inskuret tandade blad, af hvilka flera af de nedre äro kortskaftade och de öfre sessila, men ej som hos nyssnämda form ofta med tendens att med den den utvidgade basen bli omfattande, smala fjäll, till större delen med blekare och stjernludna kanter samt ljusare, i början nästan gula sedan något mörknande stift och märken. Från följande former skiljes den bland annat genom sin flerbladigare stjelk, hvarigenom den blir något *rigidum*-lik, ehuru ej i så hög grad som *H. orarium* Lbg. Till hårighet och bladens tandning liknar den mest *β plicatiforme*, till holkarnes form och färg samt de smalare fjällen erinrar den mera om *γ xanthostylum*.

Ifrågavarande form bildar den *subrigidum*-artadt utbildade slutformen i en serie, hvilken genom följande former på olika sätt synes förbundna med sådana former som *H. *sagittatum* och *H. *arrosum* bland *Subvulgata*. Den synes äfven genom *H. *gravastellum* Dahlst. (= *H. cæsium* Fr. var. *alpestre* Lbg. exs.) vara förbunden med *H. *expallidiforme* Dahlst. och närstående. *H. orarium* deremot bildar ändpunkten i en annan serie, som går genom *H. *kuusamoënse* Wainio (Herb. Mus. Fenn.) och *H. *impressum* Norrl. till *H. *expallidum* Norrl., och till hvilka *H. *lugubre* G. Anderss. synes ha största slägtskap. *H. *kuusamoënse* Wainio tangerar alldeles *β plicatiforme* och sammanhänger måhända på bådas gränsområden med den sednare.

Med *H. *exaltatum* Dahlst., skulle den kunna förvexlas, isynnerhet med dess gotländska form (Dahlst., Hier. exs., fasc. IV, n. 68), men är lätt skild genom sin rikligare hårighet på örtståndet, bladens dunklare, mera grågröna färg, fjällens form, stjernluddet i deras kanter m. m. Liknar äfven *H. *variabile* Lönnr. *α genuinum*, hvilken har gråare holkar med mera utbredt ludd, bredare basalblad och blekare bladfärg m. m., och någon gång äfven former af *H. *galbanifolium*, hvilken lätt skiljes genom sina glesare håriga, breda, bredtandade, mörkt gulgröna blad, trubbiga, breda fjäll etc.

Hittills endast anträffad, ehuru temligen rikligt, i *Småland*, Madesjö s:n vid Ellebäck och Orrebäck (K. J. Lönnroth).

β plicatiforme n. var.

Dahlst., Hier. exs., fasc. I, n. 82, 83. — Dahlst., Herb. Hier. Scand., Cent. II, n. 53, 54, 55.

Caulis 30—50 ctm. altus flexuosus gracilis — crassiusculus 1—3-folius, inferne ± obscure — dilute vinosus pilis longis densis apicem versus paullo sparsioribus mollibus patentibus hirsutus, inferne parum superne magis magisque stellatus, apicem versus usque floccoso-tomentosus. *Folia* læte gramineo-viridia sublutescentia, subtus pallidiora, in nervo dorsali sparsim v. rare stellata et dense in nervo dorsali marginibusque densius longe et molliter pilosa, supra densiuscule — sparsim pilifera, in petiolis longe et densissime villosa; *basalia* sub anthesi vulgo persistentia 3—5 in rosulam congesta mediocriter — sat longe petiolata, exteriora elliptica — oblonga obtusa subintegra — undulate et late dentata, interiora ± lanceolata v. subovate lanceolata — oblongo-lanceolata sparsim et breviter et late ± inæqualiter ad basin irregulariter et densius dentata breviter acuta basi ± abrupte v. sensim in petiolo alato cum nervo dorsali sæpe pulchre vinose colorato decurrentia; *caulina* distantia cito et abrupte decrescentia, infimum v. infima breviter — sat longe petiolata ± lanceolata — ovato- v. obovato-lanceolata (— subrhomboidea) sparsim — densius et præsertim ad basin irregulariter dentata, dentibus latiusculis parvis v. longioribus arrectis — patentibus iisdem minutis alternantibus, basi longe cuneata, superiora sessilia lanceolato-elliptica — ovato-lanceolata basi sæpe subamplectentia et haud raro longe 2—3-dentata apice ± longo integro acuta. *Anthela* paniculata subcomposita divaricata v. sæpe simplex contracta involucris binis approximatis v. subcoalitis, ramis vulgo brevibus, infimis longioribus suberectis remotis, summis sæpe valde approximatis patentibus et subcurvatis ± dense et sat longe pilosis glandulis solitariis obsitis tomentellis, pedicellis acladioque (0—)3—10(—15) mm. longo dense et longe hirsuto-pilosis, tomentosis et glandulis minutis v. parvis raris — sat densiusculis v. subnullis obsitis. *Involucra* obscure cano-virescentia v. atro-viridia vulgo crassa, summa interdum graciliora basi rotundata postea truncata. *Squamæ* vulgo obscuræ atrovirides, intimæ ± virescenti-marginatæ latiusculæ, exteriores sublineares obtusæ, reliquæ e basi latiore in apicem obtusiusculum — subacutum ± attenuatæ inæqualiter imbricatæ parum v. vix stellatæ v. floccis sparsis in marginibus et versus apices leviter comatos obsitæ, ceterum præsertim ad basin dense et molliter albido-pilosæ et glandulis minutis raris — solitariis parum conspicuis obsitæ. *Calathidium* radians minus quam in præcedente magis saturate luteum. *Ligulæ* intimæ apice conspicue ciliatæ, marginales subciliatæ. *Styli* primo fusco-virescentes postremo et in sicco sæpius fere coracini.

Inv. $\frac{10—12}{(4—)5—7}$, D. 30—35, L. m. 2—2,5 mm.

Ehuru habituelt mycket utmärkt och lätt igenkänlig är ifrågavarande form svår att med bestämda karaktärer skilja från föregående och följande. Till den rikliga hårigheten på blad och stjelk liknar den mest föregående äfvensom till bladens tätare, ojemnare,

bredare och vinkligare tandning, men skiljes genom sin fåbladiga, mera vågiga stjelk med glesare sittande, ofta smalare och spetsigare stjelkblad, de mörkare korgarne med bredare, mera triangulärt lancettlika fjäll, hvilka, isynnerhet de yttre, äro rikligare håriga, men nästan sakna eller endast äga (ojemt) spridda stjernhår i kanterna och glesa hårtofsar i spetsarne, samt nästan svarta stift. Från följande är den skild genom sina korgar och stift samt sin öfverallt rikligare hårighet, isynnerhet på bladen, hvilkas undersida derjemte är sparsammare stjernluden. Framförallt utmärker den sig genom sin egendomliga inflorescens. Inflorescensgrenarne äro nämligen korta och sammanträngda, de yttre äro sällan utspärrade och de öfre sitta vanligen nära toppholken på krökta skaft. Ofta blir akladiet nästan omärkligt, i det den öfversta sidoholken med sitt korta skaft utgår omedelbart vid toppholkens bas. Mycket ofta sammanväxa de båda öfre holkarne helt eller delvis med hvarandra. Sammanväxningen blir ofta så fullständig, att den nästan endast kan spåras af holkens ovanliga bredd eller sneda bas eller derigenom, att holkens olika hälfter utslå oliktidigt. Stundom sammanväxa äfven grenarnes toppholkar med närmast under sittande. Då tvenne holkar äro tätt närmade hvarandra men ej sammanvuxna, äro de oftast betydligt mindre och smalare än vanligt. Alldeles analoga förhållanden möta hos den sannolikt beslägtade *H. *gravastellum* DAHLST. Hos båda dessa arter äga formerna med närmade holkar rikligare hårighet på holkskaften men sparsammare glandelhårighet, hvaremot hos former med utspärrad, rikare inflorescens och mera långskaftade holkar förhållandet vanligen är motsatt. Ifrågavarande forms modifikationer med mera långgrenig inflorescens likna något följande form genom smalare fjäll och rikligare glandler på holkskaften m. m. äfvensom i habitus och torde kunna uppfattas som mellanformer till både föregående och följande. Såsom jag förut yttrat (under hufvudformen) är *H. *kuusamoënse* WAINIO alldeles närstående och torde ej ens vara skild från förhandenvarande form eller ock vara en nordlig modifikation af densamma. För afgörandet af denna fråga erfordras dock rikligare material från nordliga Skandinavien, än hvaröfver jag för närvarande förfogar.

Inom området anträffad i *Östergötland*, Vreta s:n, Berg och Stjernorp; Kärna s:n, Malmskogen (förf.); Wårdsbergs s:n, Wimarka (A. R. DAHLGREN); S:t Lars s:n, Rosenkälla, Djurgården och Walla (förf.); Wist s:n, Sturefors och Wessentorp (förf.); Wäderstads s:n, Lindekullen; Svanshals s:n, Stora Kullen; Rinna s:n, Torpa; Sunds s:n, Sunds Norrgård, Äng, Ed, Sundsö m. fl. st. (förf.); Åtvids s:n, Åtvidaberg (N. C. KINDBERG): *Småland*, Askeryds s:n, Bordsjö flerestädes (förf.); Burseruds s:n, Mölneberg (K. A. TH. SETH).

Utom området funnen i *Södermanland*, Kila s:n, Ålberga (S. ALMQUIST); Stora Malms s:n, Markstugan (G. A:N MALME); Österhaninge s:n, Gålö (S. ALMQUIST); Stockholm, Djurgården, Gröndal, Skarpö i skärgården (S. ALMQUIST): *Nerike*, Glanshammar (A. RINGSELLE); Askersund, Stenboda (A. S. TROLANDER): *Upland*, V. Löfsta s:n, Åhlboåsen, Fasenbo (C. A. E. LENSTRÖM).

Former, hvilka likna denna men dock torde tillhöra *H. *kuusamoënse* WAINIO, äro anträffade i *Ångermanland*, Själevads s:n (V. F. HOLM) och i *Vesterbotten*, Skellefteå (C. MELANDER).

γ xanthostylum n. var.

H. *subramosum v. plicatiforme DAHLST., Hier. exs., fasc. II, n. 91.[1]

[1] Under *H. subramosum* LÖNNR. var. omnämner K. O. E. STENSTRÖM i sina Värmländska Archieracier, 1889, en form med mörkare, starkt glandulösa holkar etc., hvilken närmast tillhör närvarande varietet och möjligen är identisk med den längre fram omnämda formen från *Etnedalen* i Norge.

Caulis plerumque crassus firmus strictus v. parum flexuosus 1—2(—3)-folius sæpe ad basin ramosus, inferne badio-violacens — pulchre vinosus sparsim — sat dense pilosus, medio breviter sparsim — densiuscule pilosus, superne pilis magis magisque sparsis obsitus, usque a basi densiuscule ad apicem sat dense stellatus. *Folia* magna tenuia sat firma lutescenti-viridia, subtus parum pallidiora rare — sparsim, in nervo dorsali marginibusque sparsim — densiuscule pilosa, ceterum sparsim in caulinis et præcipue in nervo sat dense stellata, supra fere glabra v. rare pilosa subnitentia, nervis præsertim nervo mediano pallidis v. albidis pulchre conspicuis; *basalia* in rosulam conferta 4—6 magna breve — brevissime petiolata sub anthesi omnia sæpissime persistentia, exteriora ± ovalia — oblonga obtusa subintegra v. dentibus sparsis latis instructa, intermedia ± late oblonga — lanceolata v. elliptico — ovato-lanceolata longius dentata acuta, interiora ± late lanceolata cuspidata ad basin vulgo longe et anguste 2—3-dentata, ceterum ad medium ± sed sparsim dentata basi cuneata dentibus ± angustis in petiolo late alato decurrentia; *caulina* longe distantia, infimum sæpe solum vulgo magnum infra medium v. supra medium affixum basi cuneata subpetiolatum v. sessile, superiora sessilia parva ima basi v. ad medium longe et anguste nunc dense nunc sparsim 2—4-dentata, petiolo brevi folii infimi late alato dentibus parvis crebrioribus sæpe instructo, supra medium integra v. subintegra in apicem longum cuspidatum protracta, lanceolata — lanceolato-elliptica v. anguste ovato-lanceolata. *Anthela* ampla laxa divaricata paniculata composita ramis longe superantibus, inferioribus longis remotis erecto-patentibus, superioribus magis magisque approximatis et magis patentibus, summis duobus sæpe subopppositis, rare v. sparsim pilosis tomentellis, pedicellis mediocribus v. brevibus acladioque 20 – 40 mm. longo densiuscule — sat dense v. sub involucris dense albidopilosis et glandulis sparsis — densiusculis superne sat densis minutis — mediocribus obtectis, tomentosis. *Involucra* lata atroviridia canescentia obscuriora v. dilutiora basi rotundata postea truncata. *Squamæ* angustæ sublineares subimbricatæ, exteriores obtusæ, interiores obtusiusculæ — subacutæ omnes dorso obscuro margine præsertim interiores anguste — sat late pallido-virescentes et sparsim — densiuscule stria angusta stellatæ, ceterum rare stelligeræ, pilis albis brevibus v. mediocriter longis densiusculis — densis et glandulis sparsis — sat densiusculis sæpe parum conspicuis obsitæ. *Calathidium* saturate luteum sat radians. *Ligulæ* interiores apice sat conspicue ciliatæ. exteriores subciliatæ v. subglabræ. *Styli* primo concolores sæpe fusco-hispiduli postremo ± obscure ferruginei v. etiam concolores.

Inv. $\frac{10—12}{5—7}$, D. 30—40, L. m. 2—2,5 mm.

Ehuru denna form på grund af den svårighet, som någongång möter att skilja den från vissa modifikationer af föregående, här upptages som varietet, äger den dock i allmänhet så utmärkande karaktärer och en så distinkt habitus, att jag, om jag ej sett de under föregående form anmärkta mellanformerna, ej skulle tvekat att upptaga den som egen underart. Mest utmärkande för densamma, och hvarigenom den i naturen lätt skiljes från föregående, är den vida, utspärrade och långgreniga inflorescensen med öfverskjutande grenar och äfven temligen långt eller långt akladium, de talrika, stora rosettbladen och få stjelkbladen,

den sparsammare hårigheten på örtståndet, de undertill rikligare stjernludna bladen samt de från början gula stiften och de smala, i kanten m. l. m. stjernhåriga holkfjällen. Bladen äro tunna men af temligen fast konsistens, mera gulgröna än hos föregående samt ofvan nästan glatta och svagt glänsande. De inre rosettbladen och nedre stjelkbladen hafva närmare basen några, vanligen 2—3, långa och smala, nästan jembreda, något framåtkrökta tänder, äro för öfrigt på den vigglika basen kort och ojemt men ofta tätare tandade och för öfrigt glest korttandade till midten men derefter helbräddade eller med små uddtänder samt utdragna i en lång och skarp spets. Sällan äro bladen korttandade med smala tänder eller långt fliktandade vid basen. Ibland äga stjelkbladen blott vid sjelfva basen ett par långa fliktänder men äro för öfrigt i kanten alldeles hela. Stjelkbladen sitta ytterst glest, vanligen är blott det understa väl utbildadt och stort samt är då oftast fästadt vid eller ofvan stjelkens midt, hvarvid det öfre blir nästan brakte-liknande, ehuru ofta vid basen fint och smalt tandadt. Sällan äro ända till 3 stjelkblad utvecklade och någon enda gång 4. Bladen gulna lätt vid torkning, och då framträda isynnerhet både medelnerven och sidonerverna väl på öfversidan och bli tydligt iögonfallande genom sin halmgula eller hvitaktiga färg. Stiften, från början gula, äro vanligen försedda med mörkare hårpapiller och bli slutligen rostbruna, någon gång svartaktiga genom hårpapillernas starkare utveckling, ej genom den öfriga cellväfnadens mörkfärgning.

Är nära beslägtad med hufvudformen och med följande, från hvilken den skiljes genom den rikligare glandelhårigheten på skaft och holkar, bladens glesare, längre och smalare tandning, hvilken är framåtrigtad eller utspärrad, deras kraftigare utveckling och glesare hårighet, den robustare växten m. m. Former med större glandler på skaft och holkar och smalare blad med tätare tandning påminna något om *H. *smolandicum*, hvilken tydligen gränsar till *H. *subramosi* formgrupp. Genom sina stora, gles- och långtandade blad, de få stjelkbladen, den glesa, långgreniga inflorescensen, hvilken derjemte stundom är obegränsad nedtill genom grenar från de öfre eller alla bladvecken, och den grofva växten får ifrågavarande form framför andra former af närvarande art ett utseende, som i hög grad närmar sig *cæsium*-typen.

Är inom området anträffad i *Östergötland*, Stocklycke på Omberg rikligt (förf.) och vid Dagsmosse; Ödes högs s:n, Orrnäs (G. A:N MALME); St. Åby s:n, vid kyrkan (G. A:N MALME); Svanshals s:n, Stora Kullen (förf.); Trehörna s:n, Slangeryd (förf.); V. Ryds s:n, Krämarbo och Tunarp (förf.); Sunds s:n. Sunds Södergård m. fl. st. (förf.); S:t Lars s:n, Rosenkälla (förf.): *Småland*, Grenna flerestädes rikligt (FR. HAGSTRÖM); Jönköping, Sanna (J. E. ZETTERSTEDT); Öggestorps s:n, Romelsjö, Månsarp och Ljungarp; Rogberga s:n, Tenhult; Forserums s:n, Rumseryd (K. JOHANSSON); Burseryds s:n, Ö (K. A. TH. SETH); Drefs s:n och Uppåkra i Wallsjö s:n (G. E. HYLTÉN-CAVALLIUS).

Utom området funnen i *Södermanland*, St. Malms s:n, Sörgölsstugan (G. A:N MALME): *Nerike* vid Hjelmarens södra strand (A. CALLMÉ): *Vermland*, Gillberga s:n m. fl. st. (K. O. E. STENSTRÖM); Jernskogs s:n, Koppom (O. JUEL); Gerdsberg nära Kristinehamn (C. M. BROSTRÖM); Äng i Nynäs s:n (N. G. W. LAGERSTEDT); Trossnäs nära Karlstad: *Dalarne*, Ulfshyttan (FR. LÖNNKVIST). — *Norge*, Malmön vid Kristiania rikligt och på Ladegårdsön (förf.). — En hithörande form med kortare hårighet och snart mörknande stift är funnen i *Norge*, Etnedalen vid Espelien (förf.), en smalbladig modifikation af denna sednare formen i Torpen vid Kinn (förf.) och en ungefär liknande form i *Östergötland*, Asby s:n, Aspa (ALB. MOLIN).

δ trichellum n. var.

H. **subramosum* Lönnr., var., Stenstr., Verml. Archier. 1889. — Dahlst., Hier. exs. fasc. III, n. 51.

Caulis gracilis — crassiusculus apice paniculatus v. a basi ± ramosus 20—40 ctm altus, inferne ± læte — obscure vinose coloratus sparsim — sat dense et molliter pilosus, medio sparsius pilosus, superne pilis rarioribus obsitus — subglaber, basi leviter superne magis magisque stellatus et sub inflorescentiam ± tomentosus, 1—3-folius. *Folia* dilute gramineo-viridia, subtus pallida subglaucescentia pilis sparsis mollibus in nervo mediano ± denso floccoso et in petiolis densiusculis — sat densis longis obsita, in marginibus pilis mediocribus sat dense ciliata, supra rare pilosa — subglabra; *basalia* in rosulam 4—5-foliam ± congesta, exteriora ± anguste oblonga ± crebre et late sat acute subruncinato-dentata obtusa, intermedia ± late — anguste elliptico-lanceolata crebrius dentata acuta, intima ± lanceolata — anguste lanceolata ad basin præsertim argute et longius dentata cuspidata dentibus basalibus sæpe subrecurvatis et in petiolis alatis ± descendentibus sat crebris et irregulariter dispositis, omnia breve petiolata et basi longe decurrentia cuneata; *caulina* longe remota cito v. abrupte decrescentia, infimum sæpe unicum prope basin affixum petiolatum v. subsessile late — anguste lanceolatum irregulariter dense et longe et acute ± anguste ad basin longe cuneatam dentata, ceterum supra v. ad medium sparsius dentata dentibus sæpe recurvatis v. patentibus haud raro subulatis, superiora angustiora — linearia sæpius irregulariter et crebre subulato-dentata, omnia in apicem sæpe usque a medio folii integrum — subintegrum cuspidatum protracta et sæpe patentia v. retroflexa, subtus vulgo dense stellata. *Anthela* ± simplex subcontracta v. laxa subdivaricata et subfurcata, non raro sat composita subindeterminata, ramis parum v. sat longe superantibus ± erecto-patentibus sat strictis v. summis ± curvatis, infimis ± remotis, superioribus sat approximatis ± tomentosis rare pilosis, pedicellis brevibus v. mediocribus acladioque (2—)5—15 mm. longo sat dense — dense tomentosis pilis sparsis — densiusculis albis tenellis rectis et glandulis nullis v. sub involucris solitariis minutissimis obsitis. *Involucra* parva — mediocria crassiuscula ± obscure — dilute olivacea — oleraceo-virescentia basi ovato-rotundata postea subtruncata. *Squamæ* angustæ sublineares dorso angusto obscuro marginibus late virescentibus olivaceis tenuibus oleoso-subpellucidis et superne sæpe ± stellatis — nudiusculis, ceterum floccis ± raris — sparsis v. præsertim ad basin densiusculis obsitis et pilis longis mollibus tenellis et dilutis inferne ± dense superne densiuscule — sparsim obtectæ, glandulis minutissimis vix conspicuis solitariis obsitæ, exteriores obtusiusculæ sat breves, intermediæ acutiusculæ et intimæ sat acutæ et ± longæ flores juniores ± superantes. *Calathidium* ± saturate luteum. *Stylus* luteus post exsiccationem sæpe ferrugineus.

En ganska intressant och anmärkningsvärd form, hvilken bildar en mellanlänk mellan föregående och följande, liknande än den ena än den andra i habitus och karaktärer. Dock kommer den närmast *γ xanthostylum*, hvilken den äfven habituelt mest liknar och

från hvilken den, om hänsyn blott tages till det allmänna utseendet, ofta är rätt svår att serskilja. I sina typiska former kan den dock i allmänhet lätt skiljas genom sina ej så långtandade men oftare med bredare men spetsiga tänder försedda basalblad, den tätare, ojemnare men spetsigare och smalare tandningen på den långa vigglika i de bredvingade skaften nedlöpande bladbasen och de ofta på skaften långt nedstigande, syllika och fria tänderna, hvarigenom bladen få en viss likhet med bladformerna hos vissa smalbladiga *Silvatica* (t. ex. *H. *arrosum*, *H. *maculosum* m. fl.), de vanligen smalare och mindre ofta utböjda stjelkbladen, hvilka vid basen äro syllikt pinntandade af tätt sittande, olikstora tänder, hvilka nedstiga på den smalt vigglika basen ända till bladfästet (stundom sitta likväl de öfre bladen med bredare bas), den något rikligare liksom bladskaften och undersidans medelnerv fin- och långhåriga nedre delen af stjelken, det rikligare stjernluddet, isynnerhet på stjelkbladens undersida, samt de vid basen tätt lång- och finhåriga holkarne, hvilka äro gråaktigt blekgröna med de föga eller obetydligt mörkryggiga fjällens öfre delar oljigt genomskinliga, tunna och nästan nakna eller i kanten fint stjernluddiga och för öfrigt spridt och bland de mjuka håren tätare stjernhåriga vid holkens bas, hvilken derföre ofta med en egendomligt ljusgrå färg afbryter mot den blekgröna, öfre delen. Fjällen äro ofta smala, nästan jembreda, dock något bredare vid basen, i spetsen ofta, såsom ibland hos föregående, skärformigt krökta. Stiften bibehålla sin gula färg bättre än föregående. Bladen äro vanligen ljust gröna, ofta stötande något i gulaktigt liksom hos föregående form, oftast nästan glatta och med tydligt framträdande, hvitaktiga till halmgula nerver (isynnerhet hufvudnerven). Stjelkens nedre del, bladskaften och äfven undersidan af bladens medelnerv äro oftast lysande vin- eller purpurfärgade, mera sällan purpurbruna. Äfven stjelkens öfre del är ofta helt och hållet eller fläckvis vinröd. De yttre bladens undersidor liksom fläckvis de inres, isynnerhet mot spetsarne, äro ofta mer eller mindre ljust lefverfärgade. Har oftast *cæsium*-habitus genom den samlade bladrosetten vid basen, ett enda utbildadt stjelkblad, hvilket stundom stöder en gren, den långt ned grenade inflorescensen med något utspärrade och raka skaft samt temligen stora holkar, men får ofta äfven *vulgatum*-habitus med flera ända till 3 eller 4 småningom decrescerande stjelkblad och mera hopträngd inflorescens med något böjda skaft och smärre holkar. Från följande är den bättre skild i habitus och bladform samt tandning men påminner om densamma till de finhåriga holkarne och deras färg. Synes vara ganska nära beslägtad med *H. *arrosum* STENSTR., hvilken torde vara att anse som dess motsvarande *silvaticum*-form.

Inom området är denna form anträffad i *Småland* vid Grenna (F. HAGSTRÖM), flerestädes på Grennaberget, växande blandad med γ *xanthostylum*, från hvilken den der är lätt skld.

Utom området funnen i *Vermland*, Sjöändan (C. M. BROSTRÖM) samt i Gillberga och Borgviks socknar m. fl. andra ställen allmän; Vermskogs s:n, Väckelsön (K. O. E. STENSTRÖM). Här synas dock former förekomma, som äro intermediära till föregående, hvilken mera sparsamt anträffats på samma ställen (enl. explr. från K. O. E. STENSTRÖM). — Ett enda exemplar, insamladt bland talrika ex. af γ *xanthostylum* i *Norge* vid Kristiania, Malmön (förf.), hör som det synes äfven hit.

ε *Schlyteri* Lbg. in sched. [1]

Dahlst., Hier. exs. fasc. II, n. 90. — Dahlst., Herb. Hier. Scand., Cent. IV, n. 33.

Caulis 45—65 ctm altus ± gracilis v. crassiusculus rectus v. subflexuosus, (1—)2—3(—4)-folius, inferne ± longe et obscure purpureo-violaceus pilis sparsis obsitus efloccosus, superne rare — sparsim pilosus sparsim stellatus, apice magis floccosus leviter et breve pilosus. *Folia* tenuia firmula subprasine gramineo-viridia sublutescentia, subtus pallidiora, exteriora vulgo obscure hepatico-violascentia sparsim — densiuscule et breve pilosa, rare sparsim — subdensiuscule stellata, in nervo mediano sat dense floccoso et in petiolis pilis densiusculis — densis longioribus hirta, margine leviter — mediocriter pilis brevibus — brevissimis ciliata, supra glabra (v. subglabra); *basalia* (2—)3—5 in rosulam laxam approximata, exteriora 2(—3) sub anthesi vulgo emarcida mediocriter — longe petiolata, extima parva ovalia obtusa, intermedia ± oblonga — lingulata dentibus sparsis latis triangularibus dentata v. undulata sæpe modo denticulata — subintegra ± obtusa, interiora ± late — anguste lanceolata v. lineari-lanceolata sparsim et acute præsertim ad basin longe cuneatam in petiolum alatum decurrentem longe et sparsim pinnato-dentata dentibus basalibus sæpe curvatis et in petiolo liberis descendentibus in apicem integrum acutum ± longe attenuata; *caulina* longissime remota cito et vulgo abrupte decrescentia, inferiora (1—2) magna, summa parva bracteolata, infimum vulgo ± longe petiolatum v. in petiolo brevi alato sensim contractum, reliqua sessilia, inferiora ± elliptico — lineari-lanceolata sparsim v. ad basin densius et inæqualiter dentata, sæpe ± pinnato-dentata, basi longe cuneata dentibus angustis et longis instructa, a medio v. apice subintegra — integra cuspidata, summa sublinearia v. minima lanceolata subulato-dentata. *Anthela* ± parva raro ampla simplex v. composita ± laxa — contracta subindeterminata paniculata v. sæpius apice ± umbellata, ramis inferioribus remotis, superioribus ± approximatis sæpe umbellatis, omnibus gracilibus æquantibus v. parum superantibus ± dense canotomentosis et pilis solitariis obsitis, pedicellis mediocribus gracilibus acladioque 10—15 mm. longo dense cano- v. albidotomentosis pilis mollibus raris canis glandulisque nullis v. sub involucris solitariis minutissimis obtectis. *Involucra* canescenteratro-viridia v. sat canescentia ± lata basi rotundata postea truncata. *Squamæ* plurimæ sat imbricatæ angustæ e basi parum latiore lineari-lanceolata, exteriores obtusæ, interiores apice angustæ obtusiusculæ — sat acutæ dorso latiusculo — angusto atro-viridi marginibus ± virescentibus, ubique sparsim stellatæ et præsertim in marginibus et ad basin densiuscule floccosæ, pilis mollibus tenellis canis mediocribus v. ± longis crispulis ± densiuscule — dense pilosæ et glandulis minutissimis (raris —) solitariis obsitæ. *Calathidium* sat magnum saturate luteum — aureum radians. *Styli* luteo-ferruginei fuscohispiduli postea ± obscure ferruginei v. fusci.

Inv. $\frac{12—14}{7—8}$, D. 35, L. m. circ. 2,5 mm.

[1] Nyare undersökningar har gifvit mig full visshet om, att denna form måste betraktas som egen underart, ehuru visserligen nära beslägtad med *H.* **subramosum*. *Anm. under tryckningen.*

Denna form, hvilken C. J. LINDEBERG enl. ALMQUIST på etiketter betecknat med ofvanstående namn, är nog närmast beslägtad med föregående, ehuru mera fristående. Utmärkt af sin höga, vanligen spensliga, raka eller något vågböjda, glesbladiga stjelk, de vanligen smala och långa, glestandade bladen, af hvilka de inre och stjelkbladen vid basen äro långt och smalt fliktandade med på bladskaftet eller den smalt vigglika bladbasen nedstigande, fria tänder (de yttre glest bredtandade), och alla utom de yttersta hafva långt utdragen, skarp spets samt vanligen äro till öfre tredjedelen eller från midten helbräddade, undertill på medelnerven stjernludna och liksom på bladskaften temligen täthåriga, för öfrigt glest och i kanten äfven kort håriga samt ofvan glatta och hvitprickiga, vidare den mera sammandragna, kvastlika eller i öfre delen oftast nästan flocklika inflorescensen med nästan jemnhöga eller föga öfverskjutande, snedt utstående nästan raka eller något böjda, spensliga grenar och skaft, breda grönaktigt gråsvarta holkar med smala fjäll och rundad eller sedan tvär eller något intryckt bas samt glesa, vackert gula, stora korgar med brungula, sedan mörkt rostbruna stift. Inflorescensens grenar och skaft äro tätt gråaktigt stjernludna med inga eller få och vanligen mjuka hår, hvilka straxt under korgarne sällan helt och hållet fela. Härigenom är denna form utom genom anförda karaktärer bäst skild från närstående, af hvilka den till holkarne mest liknar föregående. Basalbladen och det eller de nedre stjelkbladen äro oftast långskaftade i motsats mot förhållandet hos närstående former. Vanligen äro blott 2 stjelkblad utvecklade, af hvilka det nedre sitter nära basen och det andra något öfver stjelkens midt, men båda långt aflägsnade från hvarandra. De öfre stjelkbladen saknas helt och hållet, eller äro de temligen små eller ersattes de af brakteer. Då de äro bättre utvecklade, aftaga de uppåt jemnt men hastigt i storlek, men vanligen följa på det andra, väl utvecklade och ofta stora bladet med ett tvärt afbrott endast fjällika brakteer, stödjande grenar, hvilka ofta nå samma höjd som blomkorgställningen och bidraga till dess rikblomstrighet. Härigenom blir denna också m. l. m. obegränsad nedåt. Den öfre eller egentliga inflorescensen blir ofta genom grenarnas starka närmande till hvarandra nästan eller ibland helt och hållet flocklik och genom de korta grenarne ofta äfven liten och hopträngd. Såväl blad som ligulæ äro tunna och de sednare ej såsom hos föregående former i spetsen cilierade. Basalbladen sitta glest och bilda sällan någon egentlig rosett. Vanligen afvissna tidigt de yttre, så att blott de 2—3 inre äro kvar vid blomningen. Stjelkens bas och bladskaften äro mera brunröda än hos föregående. Medelnerven och ofta äfven sidonerverna framträda på öfversidan med en hvitaktig eller halmgul färg. Mångbladiga former variera ibland med jemt och tätt samt kort sågtandade blad.

Ehuru denna form ej anträffats inom området, anföres den likväl för den nära slägtskap, den eger med föregående former. I norr om området är den deremot flerestädes allmän såsom i *Vestmanland*, Vestanfors (FR. LÖNNKVIST) m. fl. st.: *Dalarne*, Silfbergs s:n, Ulfshyttebruk (FR LÖNNKVIST); Norrbäcke s:n, Jätturvallen (K. P. HÄGERSTRÖM); synes enl. S. ALMQUIST vara karaktärsväxt för Dalelfvens flodområde från Elfkarleby till Siljan, der den flerestädes anträffas rikligt: *Upland*, Löfsta s:n, Mölneboparken och Fasenbo (G. A. E. LENSTRÖM); Dannemora, temligen ymnigt på grufbackarne och inuti skogen (förf.): *Gestrikland*, Gefle och Ockelbo (S. ALMQUIST och C. O. SCHLYTER); Åmot (S. ALMQUIST): *Helsingland*, Söderhamn, ymnigt vid Färsjön (A. MAGNUSSON); Alfta vid Golfsjön (E. COLLINDER): *Medelpad*, Torp (S. ALMQUIST).

2. **H. *ebenarium** K. Johanson in litt.

Caulis 35—60 ctm. altus crassus 1—3-folius scaber, inferne obscure fusco-violacens dense et longe pilosus rare — sparsim stellatus, medio sparsim pilosus magis stellatus, apice tomentellus pilisque raris firmulis parvis obsitus. *Folia* saturate viridia subprasina, subtus pallidiora subglauco-viridia densiuscule pilosa et sparsim stellata, in nervo dorsali densius floccoso pilis sat longis subdensis hirta, in petiolis pilis densis longis ± hirsuta, in marginibus dense ciliata, supra rare — sparsim pilifera v. glabrescentia; *basalia* sub anthesi persistentia lata 4—5 in rosulam conferta mediocriter et subanguste petiolata, exteriora (ovato-)elliptica obtusa subintegra — rare et late dentata v. denticulata basi breviter v. abrupte cuneata in petiolo superne sat alato descendentia, subtus hepatico-violescentia, intermedia anguste (et ± rhomboideo-) ovalia v. oblongo-lanceolata, intima ovali — ovato-lanceolata, omnia basi cuneata integra et dentibus sparsis arrectis triangularibus ± acutis instructa acuta v. intima apice integro longe cuspidata; *caulina* abrupte decrescentia longe remota ovato-lanceolata — lanceolata infra medium sparsim et sæpe longe dentata a medio in apicem longum integrum cuspidatum attenuata, infimum anguste et alate petiolatum, summum sessile, basi anguste cuneata, subtus sparsius pilosa densius floccosa, supra glabra. *Inflorescentia* vulgo composita paniculata laxa oligo — polycephala indeterminata, ramis erecto-patentibus rectis ± longis superantibus, inferioribus vulgo longe remotis, superioribus magis sed non multum approximatis tomentellis — tomentosis eglandulosis et vulgo epilosis, pedicellis mediocribus — sat longis gracilibus acladioque 20—40 mm. longo tomentosis sub involucro interdum glandulis solitariis obsitus, ceterum eglandulosis et epilosis v. pilis crassis brevibus raris — solitariis obsitis. *Involucra* brevia lata obscure atro-canescentia, alabastris fere nigris, basi ovata postea rotundato-obtusa. *Squamæ* subimbricatæ sat latæ, exteriores linearilanceolatæ obtusæ, interiores e basi latiore (1,5 mm.) lanceolatæ apice ipso cito in acuminem ± brevem triangularem contractæ, omnes apice ipso pilosulæ, ceterum ubique æqualiter et densiuscule floccosæ v. stellatæ et pilis tenellis albidis basi brevi nigra mediocriter longis ± crispulis sat dense — dense obtectæ glandulisque solitariis — raris brevissimis ideoque parum conspicuis obsitæ. *Calathidium* magnum radians luteum — aureum, ligulis interioribus præsertim apice ciliolatis. *Styli* lutei.

Inv. $\frac{11—12}{6—7}$, D. 35—40, L. m. 2,5—3 mm.

En mera fristående form, hvilken dock är beslägtad med föregående, bland hvilka den till holkarne påminner om ε *Schlyteri*, ehuru dessa dock äro mera stjernludna, och till habitus något närmar sig vissa former af δ *trichellum*. Dock har den mera *cæsium*-habitus, än denna sednare och γ *xanthostylum* någonsin antaga. Den utmärker sig från alla dessa genom sina breda, öfvervägande ovalt till äggrundt lancettlika blad med gles och rak, triangulär, ofta kort, sällan längre, men spetsig tandning, hvilken aldrig nedstiger på den korta, vigglika och helbräddade basen, undertill (isynnerhet på stjelkbladen) mera stjernhåriga blad, smalskaftade, breda basalblad, samlade i en tät, vid blomningen rik, persisterande rosett, och af hvilka isynnerhet de inre jemte de glest sittande 1—2 stjelkbladen till sin öfre

tredjedel eller hälft äro helbräddade och utdragna i en skarp, rakkantad spets, gles, långt ned grenad, kvastlik inflorescens med långt akladium och öfverskjutande grenar med föga närmade skaft, hvilka äro tätt stjernludna, liksom oftast äfven grenarne, men blott under holkarne hafva enstaka eller sparsamma, korta och styfva hår och helt och hållet eller nästan sakna glandler, samt i förhållande till föregående korta, breda, gråsvarta holkar med täta, mjuka, något krusiga, hvita hår och knappt märkbara, sparsamma eller enstaka glandler och jemt utbredt, temligen rikt stjernludd. I bladform och habitus kommer den mycket nära *H. *ampliceps* Stenstr. och är måhända endast en östlig parallelras till denna, men den synes konstant skild genom sina smalare fjäll, hvilka hafva jemt utbredt stjernludd, då deremot den nyssnämda har mycket breda och mera rundtrubbiga, mörkare fjäll, af hvilka endast de nedre äga svagt stjernludd i kanterna, hvarigenom den mera närmar sig *orarium*-serien och bland dess former står närmast *H. *impressum* Norrl.

Varierar med bredare eller smalare blad, hos grofväxta exemplar med långt men glest fliktandade stjelkblad samt ibland med flerbladig stjelk. Bladens undersida, kanter och bladskaft äro ganska tätt styfhåriga. Öfversidan är glest hårig till nästan glatt men ej glänsande utan matt. Stjernluddet saknas nästan på de yttre bladen men blir på de inre rikligare isynnerhet på medelnerven och är rikligast på stjelkbladen, hvilka äfven äro glesare håriga. Stjelkens öfre del kännes ofta sträf till följd af de kortare och styfvare håren. Korgarne äro serdeles stora och starkt radierande. Den erinrar häri om former af *H. *porrigens*. Habituelt påminner den ofta om lågväxta former af *H. *exaltatum*, men dessa hafva tätare, ojemnare tandning med mera krökta tänder, glesare hårighet på bladen vid basen, bredare fjäll med gröfre och längre hårighet, hvilken nedstiger på skaften och der är blandad med vanligen stora eller märkbara, talrikare glandler. I flera afseenden råder analogi med småväxta former af *H. *variable* (eller dess motsvarande *cæsium*-form *H. *galbanum*) isynnerhet i habitus; så t. ex. äger närvarande form ofta småbladiga grenar från de öfre eller alla bladvecken. Den förhåller sig alldeles till h. f. af *H. *subramosum* som *H. *galbanum* till *H. *variabile*.

Funnen på *Gotland* dels i stranddungar vid Kapellshamn och Flenvik dels på åkerrenar vid Kullshage i Hangvar s:n (K. Johansson).

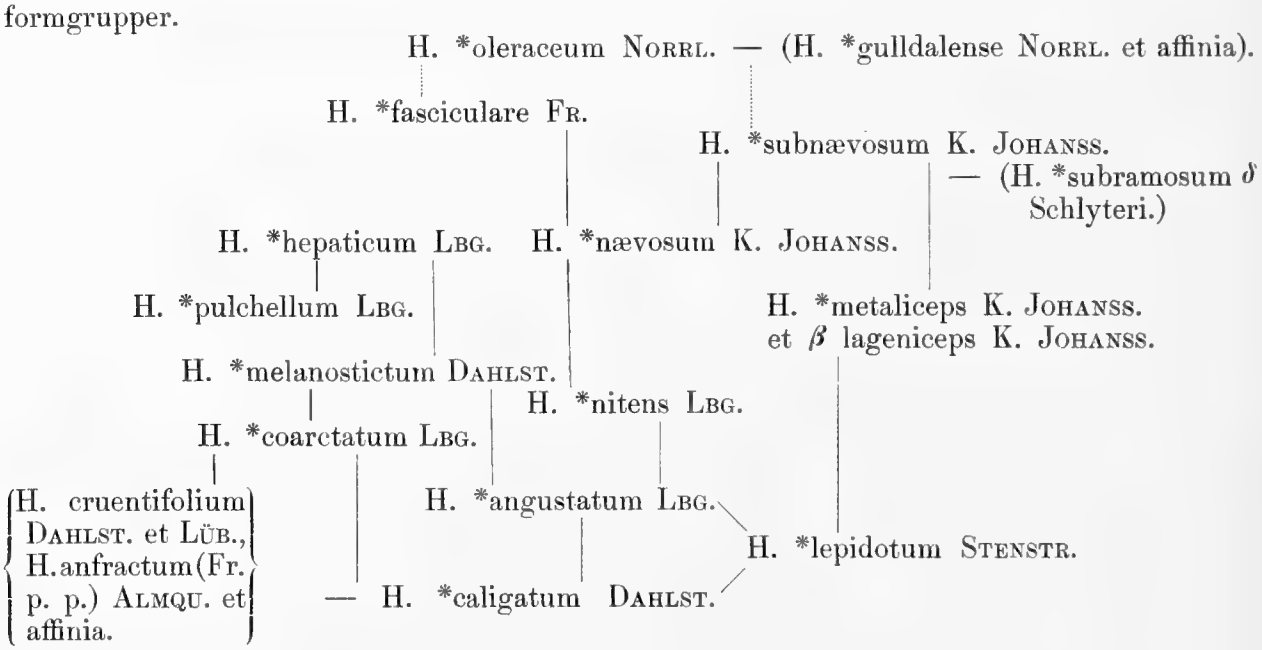
H. LEPIDOTUM (Stenstr.).

Caulis ± altus gracilis 1—5-folius, inferne ± longe et dense pilosus, superne sparsius pilosus — subglaber, basi leviter apicem versus magis magisque dense floccosus — tomentosus. *Folia* læte viridia — subprasino-viridia, subtus ± glaucescentia v. tota ± læte glaucescenti-viridia ubique rare — sparsim pilosa, subtus sæpe sparsim — dense stellata; *caulina* abrupte decrescentia ± remota subintegra v. ad basin præsertim longius et acute dentata haud raro inæqualiter laciniato-dentata; *basalia* in rosulam 3—6-foliam conferta latiora — angustiora subintegra v. sparsim et acute dentata — crebre dentata et ad basin ± longe laciniata. *Anthela* laxa subsimplex angusta v. parum divaricata — ampla ± composita paniculata

superiore parte sæpe multum contracta ramis ± rectis patentibus — erectis. *Involucra* nunc angusta gracilia — valida ± atroviridia — viridia nunc sat crassa ± canescentia squamis angustis in apicem longum protractis — latis subtriangularibus — lanceolatis in apicem ± acutum attenuatis glandulosis et pilosis, efloccosis v. floccis sparsis — densis obsitis. *Styli* ± obscuri,

De under detta namn sammanfattade formerna bilda en mycket naturlig grupp af nära beslägtade former, alla utmärkta af sina bleka, oftast åtminstone undertill blågröna blad, hvilka äro fåtandade af spetsiga tänder eller, om de äro tätare tandade, åtminstone vid sin bas äga mycket oregelbunden tandning, sina föga håriga men undertill m. l. m. rikt stjernhåriga blad och spetsiga, ofta i en lång jemnbred spets utdragna fjäll. Hithörande former tendera å ena sidan åt *H. *angustatum* Lbg. och *H. *nitens* Lbg. och genom dessa åt *H. anfractum* Fr., å andra sidan åt *H. *fasciculare* Fr. och *H. *oleraceum* Norrl. samt närma sig äfven en del former af föregående. Af alla former af *Subvulgata* synas dessa stå närmast *Cæsia*.

Formernas inbördes förhållande inom denna grupp och deras förhållande till andra grupper åskådliggöres genom följande schema. Formerna inom parentes tillhöra andra formgrupper.



Conspectus subspecierum.

1. *Squamæ* angustæ in apicem longum — longissimum protractæ. *Folia* numquam maculata.

   Involucra ± atra — atroviridia parva efloccosa v. basi levissime stellata, pilis brevibus obscuris sparsis — densiusculis et glandulis brevibus crassis sparsis (v. raris) obsita, *squamis* acutis apice leviter comatis.

   1. *H. *caligatum* Dahlst.

Involucra ± dilute — obscure virescentia sat longa, pilis mediocribus ± obscuris apice canescentibus sparsis — densiusculis glandulis parvis solitariis — raris obsita, *squamis* apice viridibus (fere) epilosis ± obtusis efloccosis v. basin versus in marginibus leviter floccosis.

2. *H.* **lepidotum* STENSTR.

Involucra obscure — dilute canovirentia angusta, pilis densiusculis brevibus basi crassa nigra apice albidis glandulis parvis — minutis parum conspicuis solitariis obsita, *squamis* apice ± comosis dorso leviter in marginibus densiuscule floccosis.

3. *H.* **metaliceps* K. JOHANSS.

2. *Squamæ* latæ ± triangulares in apicem brevem ± acutum cito protractæ. *Folia* ± maculata.

Involucra ± viridi-canescentia ubique floccis densiusculis — sat densis æqualiter adspersa et pilis tenellis brevibus apice longe albidis sparsis et parum conspicuis obsita. *Folia* sparsim et inæqualiter et longe dentata.

4. *H.* **nævosum* K. JOHANSS.

Involucra ± obscure virescenti-canescentia ubique æqualiter et sparsim stellata v. ad apicem squamarum magis floccosa pilis brevibus crassis apice breviter albidis densiusculis glandulis solitariis — raris brevibus parum conspicuis obsita. *Folia* præsertim ad basin crebre et profunde ± inæqualiter laciniata.

5. *H.* **subnævosum* K. JOHANSS.

1. **H.** ***caligatum** n. subsp.

DAHLST., Hier. exs., fasc. II, n. 64.

Caulis 30—60 ctm altus ± gracilis — crassiusculus firmus 2—3-folius, inferne ± obscure livido-violascens ± dense pilosus et sparsim — densiuscule stellatus, medio sparsim — rare pilosus sparsim stellatus, superne fere glaber — glaberrimus, sub anthelam densius floccosus. *Folia* læte et glaucescenti-viridia, subtus cæsio-glaucescentia rare pilifera — subglabra rare v. fol. caulina sparsim — densiuscule stellata, in nervo dorsali sat longe et sparsim (— densiuscule) pilosa densiuscule — sat dense stellata, in petiolis longius et densius pilosa et in marginibus pilis ± longis rarissimis v. raris — sparsis ciliata; *basalia* sub anthesi 3—5 in rosulam approximata sat longe et alate petiolata, exteriora ± ovalia — elliptica v. ovali-oblonga ± obtusa mucronata subintegra — rare angulato-denticulata, intermedia ± elliptica — lanceolata sat acuta et interiora anguste — angustissime lanceolata acuta — cuspidata subintegra v. sparsim et acute denticulata — angulato-dentata, intima basin versus subirregulariter dentibus 2—3 longioribus acutis dentata basi cuneata integra v. interdum denticulata in petiolo alato ± longe et vulgo sensim decurrentia, exteriora subtus sæpe ± violascentia; *caulina* ± longe remota cito decrescentia, inferiora ±

magna 1—2 late alate — anguste petiolata ± lanceolata acuta cuspidata basi cuneata in petiolum æquilatum et sæpe ad insertionem subdilatatum ± abrupte vel sensim contracta, superiora 1—2 sessilia lanceolata — lineari-lanceolata plerumque maxime cuspidata basi ipsa sæpe subauriculato-dilatata, omnia subintegra v. ad medium rare et anguste denticulata v. basin versus haud raro ± longius irregulariter et acute sed sparsim 2—3-dentata, interdum nonnulla subrhomboidea dente uno longiore ad medium utriusque lateris solum magis evoluto. *Anthela* laxa simplex v. composita sæpe sat angusta v. parum divaricata paniculata — furcato-paniculata, interdum subindeterminata, ramis inferioribus vulgo longe distantibus sat erectis v. erecto-patentibus, superioribus magis magisque sed haud multum approximatis magis sed non multum patentibus, omnibus gracilibus ± superantibus densiuscule — sat dense floccosis epilosis v. pilis et glandulis solitariis obsitis, pedicellis mediocribus gracillimis acladioque superne præsertim ± canotomentosis et glandulis atris sat crassis et sat longis raris sub involucris sparsis pilisque firmulis mediocribus basi crassa nigricante raris v. superne sparsis — densiusculis obsitis. *Involucra* plerumque obscure atroviridia — sat nigrescentia parva sat gracilia v. latiuscula basi ovata postea rotundato-truncata. *Squamæ* irregulariter imbricatæ dorso ± lato nigro ± virescenti-marginatæ, exteriores sublineares obtusæ — obtusiusculæ apice albocomatæ, interiores e basi lata in apicem ± longum — longissimum decumbentem angustum obtusiusculum — cuspidatum pallide virescentem v. summo acumine leviter piceatum nudum v. levissime comatulum cito attenuatæ nudæ v. levissime et rare præsertim in exterioribus stellatæ, ceterum pilis brevibus — mediocribus obscuris apice albidis sparsis — densiusculis (v. sat densis) et glandulis brevibus nigris ± crassis sparsis v. raris obsitæ. *Calathidium* sat obscure luteum subradians. *Ligulæ* apice glabræ v. levissime ciliolatæ dentibus ipsis sæpe luteo-ferrugineis. *Stylus* nigro-olivaceus postremo aterrimus.

Inv. $\frac{11-12}{5-7}$, D. c. 30—35, L. m. 1,5—2 mm.

En mycket vacker och märkvärdig form, utmärkt af sina ofvan ljust och lifligt gröna samt m. l. m. glaucescenta, undertill blågrå blad med gles, endast undertill på medelnerven och på bladskaften rikligare och lång hårighet, och hvilka äro nästan helbräddade eller glest fintandade eller någon gång de inre och stjelkbladen isynnerhet vid basen sparsamt tandade af några få längre, spetsiga, oliklånga och oregelbundet fördelade tänder samt utdragna i en lång, m. l. m. helbräddad, skarp spets och vid sin bas m. l. m. hastigt eller långsamt vigglikt nedlöpande på de ofta bredt vingade och m. l. m. jembreda samt vid sjelfva fästet ofta något vidgade skaften, vidare gles, kvastlik, vanligen enkel inflorescens med m. l. m. upprätta, öfverskjutande grenar och fina skaft, hvilka äro m. l. m. gråa af stjernludd och upptill vanligen klädda af glesa, grofva, m. l. m. mörka hår och temligen tjocka, mörka glandler, samt ganska svarta holkar med vanligen rundad bas, klädda af glesa till m. l. m. täta, mörka och grofbasiga, kort hvitspetsade hår och inblandade, glesare, mörka glandler men nästan utan stjernludd, och slutligen från bred bas hastigt hopdragna, långt utdragna, något trubbade eller långspetsade fjäll med vanligen blek, naken spets, hvilka i knoppen långt öfverskjuta de outvecklade blommorna och äro m. l. m. hopböjda

öfver dem, samt slutligen nästan alldeles kolsvarta stift. Stjelken är vanligen till större delen nästan glatt och öfverallt isynnerhet upptill mer eller mindre stjernhårig samt är i allmänhet vid sjelfva basen, som ofta är m. l. m. violettbrun, temligen rikligt och långt hårig. Mången gång äro de yttre bladen undertill till större eller mindre del blåaktigt eller mera vinrödt violettfärgade, oftast dock ofärgade. Basalbladens medelnerv och de öfre stjelkbladen äro m. l. m. tätt stjernludna, men för öfrigt är stjernluddet glest eller spridt. Hos lågväxta exemplar äro bladen vanligen bredare och stjelkbladen få (1—2), hos högväxtare äro de sednare flera och alla bladen oftast smalare. Inflorescensen är hos fåbladiga individ ofta fåblomstrig och djupt ned grenad, hos flerbladiga mera rikblomstrig med de öfre grenarne mera närmade och ofta ökad genom grenar från de öfre bladvecken.

Med följande är denna underart mycket nära beslägtad men skiljer sig från den genom vanligen bredare blad, mera utstående grenar, mörkare, kortare och bredare holkar med mera tvär bas, bredare och ej så långt utdragna men mera smalspetsade fjäll, kortare hår och rikligare samt kraftigare glandler på holkarne och skaftens öfre del samt nästan svarta stift. Å andra sidan är den nära beslägtad med *H. *angustatum* Lbg. Hier. Scand. exs. n. 64 och n. 128 samt *H. *nitens* Lbg. Hier. Scand. exs. n. 68 (möjligen äfven med *H. cæsium v. accipitrinum* Lbg. Hier. Scand. exs. n. 63). Från dessa är den skild bland annat genom sina smalare fjäll, mera glaucescenta blad och närvaron af glandler på holkar och skaft. Vidare är den mycket närstående *H. *melanostictum* Dahlst., Hier. exs., fasc. III, n. 49 (= *H. vulgatum v. elegans* Lbg. Hier. Scand. exs. n. 71) och *H. *coarctatum* Lbg. Hier. Scand. exs. n. 130. Genom dessa sammanbindes denna grupp medelst sådana former som *H. *cruentifolium* och *H. *obscuriceps* med *H. *anfractum* och närstående. Genom *H. *angustatum* och *H. *nitens* förbindes den äfven med *H. *hepaticum* Lbg. Hier. Scand. exs. n. 131 och *H. *pulchellum* Lbg. Hier. Scand. exs. n. 70. Genom följande men framförallt genom *H. *metaliceps* och *H. *nævosum* bildas en vacker, nästan oafbruten serie till *H. *fasciculare* Lbg.

Inom området anträffad i *Östergötland*, Rinna s:n, Stortorp; Trehörna s:n, Slangeryd (förf.): *Småland*, Grenna (Fr. Hagström); Öggestorps s:n, Romelsjö; Rogberga s:n, Klefarp och Tenhult i skogsängar och på klippor ymnigt (K. Johansson); Forserums s:n (C. O. v. Porat); Burseryds s:n, Åsberg (K. A. Th. Seth); Madesjö s:n, Mellan-Örsjö (K. J. Lönnroth); Femsjö s:n, Valshult (E. Fries, K. O. E. Stenström).

Utom området anträffad i *Vestergötland*, Toarps s:n, Bygd (A. O. Olsson); Alingsås (K. O. E. Stenström): *Bohuslän*, mellan Gustafsberg och Hisleröd samt vid Fiskebäckskil; Nafverstads s:n mellan Östad och Sundhult (C. J. Johansson); nära Uddevalla (S. Almquist): *Dalsland*, Hjulsängen vid Gunnarsnäs (N. C. Kindberg).

Närmast hithörande, måhända blott en modifikation, men i några afseenden afvikande är:

b *recedens* n. forma.

Caule foliisque magis pilosis, foliis basalibus exterioribus ± ovalibus — ovali-lanceolatis ± crebre et latius triangulari-dentatis, interioribus et caulinis lanceolatis — lineari-lanceolatis infra medium irregulariter ± longe et anguste 3—4-dentatis, subtus dense floccosis, omnibus crassis et subcoriaceis, involucris majoribus plumbeo- v. viridi-nigricantibus basi sat turbinatis, squamis latioribus obtusiusculis pilis molli-

bus et glandulis parvis modo sparsim vestitis, pedicellis apice incrassatis magis squamiferis epilosis et eglandulosis v. pilis parvis et glandulis minutis vulgo raris obsitis calathidiisque majoribus et stylis ferrugineo-livescentibus distinctum.

Genom tandningen och formen på stjelkbladen, som äro grönare och tjockare än hos hufvudformen, genom de större och längre holkarne, som äro blekare, grönaktigt blysvarta och genom de finare håren samt sparsammare och smärre glandlerna på holkar och skaft, på hvilka sednare de liksom håren ofta saknas, afviker den märkbart från hufvudformen, af hvilken den måhända dock är en modifikation, och närmar sig i flera af sina karaktärer men isynnerhet i habitus följande, till hvilken den ser ut att vara en medelform. Dock är den att hänföra närmast till *H. *caligatum*. Till basalbladens och äfven stjelkbladens tandning erinrar den rätt mycket om *H. *nævosum* men äfven om *H. *obscuriceps* och närstående åt *H. *anfractum* tenderande former.

Endast anträffad i *Östergötland* på Kalfholmarne i Roxen men i temligen rikligt individantal och som det synes konstant till sina karaktärer.

2. **H. *lepidotum** Stenstr.

H. Lawsonii Sm., Fr. H. N. II: 15.[1] — H. vulgatum v. ericetorum Fr. Symb., p. 116. — H. lepidotum Stenstr., Verml. Archier., 1889. — Dahlst. Hier. exs., fasc. II, n. 63.

Caulis 25—50 ctm. altus gracilis subflexuosus 1—4-folius, basi livide v. vinose purpureus sparsim et longe pilosus, ceterum vulgo glaber levissime stellatus, apice rare — sparsim stellatus. *Folia* supra dilute viridia glabra, subtus pallidiora subglaucescentia glabra — rare pilosa, efloccosa v. caulina præsertim leviter stellata, in nervo dorsali magis floccosa sparsim v. densiuscule pilosa, in petiolis sat longe et sparsim pilosa, marginibus rare — sparsim ciliata; *basalia* exteriora ± oblonga — lingulata integra v. obtuse dentata obtusa, intermedia oblonga — oblongo-lanceolata sparsim et angustius dentata obtusiuscula — sat acuta, interiora ± anguste lanceolata — lineari-lanceolata cuspidata sparsim et argute et ad basin sæpe longius subulato-dentata, cuspidata, omnia mediocriter — longe petiolata basi cuneata in petiolum superne ± alatum dentibus acutis subulatis raris sæpe instructa longe decurrente; *caulina* ± anguste lanceolata sæpe anguste rhomboideo-lanceolata — linearia ad basin rare dentata — denticulata v. dentibus 2—3 longis angustis ± arrectis — patentibus instructa basi longa cuneata et in apicem ± longum — longissimum integrum cuspidatum protracta, infimum v. infima sæpe ± longe et alate petiolata, superiora sessilia, omnia remota sat decrescentia. *Anthela* ± laxa — subcontracta simplex — subcomposita paniculata v. furcato-paniculata ramis inferioribus ± remotis superioribus ± approximatis rectis ± erecto-patentibus — sat erectis ± tomentellis epilosis v. pilis solitariis obsitis pedicellis gracilibus mediocribus acladioque 5—30 mm. longo sat tomentosis, inferne ± epilosis superne pilis mediocribus — sat longis basi nigricantibus sparsis et glandulis nullis v. solitariis obsitis. *Involucra* sat longa crassiuscula — sat gracilia ± dilute (præsertim superne) v. obscure virescentia basi ovata postea rotundata. *Squamæ* valde irregulariter imbricatæ, exteriores

[1] Åtminstone i Riksmuseets exemplar af Herbarium normale.

breves sat latæ ± lineares — lanceolato-triangulares obtusæ obscuriores, intermediæ obtusiusculæ ± ovato- v. triangulari-lanceolatæ, reliquæ ± ovato-lanceolatæ — lanceolatæ, omnes ad medium v. infra cito in apicem viridem sat angustum linearem longum — longissimum acumine ipso obtuso v. late triangulari sæpe subdilatato v. in intimis acutum — subulatum vix incumbentem protractæ, pilis brevibus — mediocribus ± obscuris firmulis apice ± longe canescentibus sparsis — densiusculis et glandulis parvis solitariis — raris v. in exterioribus sparsis obtectæ, ceterum basi sparsim apicem versus rare et vulgo inconspicue stellatæ v. nudæ apicibus ipsis vix v. non comatæ. *Calathidium* sat obscure luteum subradians. *Ligulæ* apice glabræ v. breviter ciliatæ. *Stylus* subluteus — virescens fuscohispidulus postremo ± ferrugineo-fuliginosus.

Inv. $\frac{12-15}{6-7}$, D. 35—40, L. m. 2,5—3 mm.

Nära beslägtad med föregående, med hvilken den ibland har stor likhet, men från hvilken den är väl skild genom följande karaktärer. Stjelken är lägre, endast vid sjelfva basen glest hårig, eljest nästan alldeles eller helt och hållet glatt, sparsamt stjernluden, endast under inflorescensen mera stjernhårig; denna är vanligen enkel eller föga sammansatt, kvastlik med vanligen mera upprätta och raka grenar, af hvilka de nedre vanligen sitta aflägsnade, de öfre mera närmade, klädda af glesare eller rikligare ludd. De gråhvita, tätt stjernludna holkskaften äro nedtill nästan hårlösa men upptill klädda af glesa eller ej serdeles talrika hår, mellan hvilka sitta oregelbundet fördelade få eller enstaka glandler, hvilka ofta dock alldeles felslå. Bäst skild och mest utmärkt är den dock genom holkarne. Dessa äro vanligen gröna eller grönsvarta, aldrig så mörka som hos föregående, långa, af vexlande bredd och med ytterst långa, de unga holkarne långt öfverskjutande fjäll. Dessa äro mycket ojemt tegellagda, och skillnaden i längd mellan de yttre och inre fjällen är högst betydlig. De yttre äro breda, jembreda eller smalt triangulära, tvärtrubbade och temligen mörka, de inre äro deremot från bred, äggrundt lancettlik, mörkare färgad bas nedom, vid eller stundom öfver midten hastigt hopdragna i en lång, jembred, grön, trubbad eller hos de innersta skarp spets. Ofta blir ett och annat fjäll återigen något bredare i sjelfva spetsen, hvilken kan vara rundad eller bredt triangulär och ej sällan något rödaktigt färgad. Holkens beklädnad består af korta eller medellånga, raka, ofta vid basen grofva och m. l. m. långt upp mörka hår, hvilka vanligen ej äro serdeles täta och äro blandade med enstaka eller sparsamma, på de yttre fjällen talrikare, små och föga synliga glandler samt spridt ludd, hvilket nedtill är något talrikare och ibland mera samladt mot kanterna af fjällen men upptill saknas eller är ytterst sparsamt förhanden och på de långa gröna fjällspetsarne ersättes af ytterst små, vattenklara hår, som äro något rikligare och hvitare i sjelfva toppen af fjällen. Likväl bibehålla de i hvarje fall sitt egendomliga gröna och nakna utseende i motsats mot följande, hvars fjäll äro tydligt stjernludna ända till den rätt starkt hårtofsade spetsen. Stjelken är liksom hos föregående nedtill röd. Både basal- och stjelkblad äro smalare och glattare än hos föregående och ljust gröna samt något men ej så tydligt glaucescenta, som hos denna. Bredbladigare former, hvilka uppträda på friskare mark, likna i habitus både föregående och följande, men smalbladiga former, hvilka mest förekomma på berg, der denna underart för öfrigt gerna uppträder, ofta sällskapligt med former af Oreadea, få ett från

båda högst skiljaktigt och karaktäristiskt utseende. På dylika lokaler synas äfven holkfjällen oftare bli mera utdragna än annorstädes.

Inom området anträffad i *Småland*, Burseryds s:n, Åsberg, Mölneberg, Lilla gärdet, Lida m. fl. st. (K. A. TH. SETH), Femsjö, Bålshult (E. FRIES).[1]

Utom området funnen i *Vermland* såsom i Gillberga och Borgviks socknar och i *Dalsland* (enl. K. O. E. STENSTRÖM) mångenstädes ymnigt, från seduare landskapet bland annat i Dalskogs s:n, Dansbo (N. C. KINDBERG) och Gunnarsnäs i Rostock (A. FRYXELL).

3. **H. *metaliceps** K. JOHANSSON in litt. n. subsp.

H. lepidotum STENSTR., *β* metaliceps K. JOHANSS., DAHLST., Hier. exs., fasc. IV, n. 86.

Caulis 30—40(—50) ctm. altus 2—5-folius ± gracilis, basi ± obscure violascens pilis longis mollibus densiusculis (— sat densis) obsitus rare stellatus, medio sparsim pilosus et stellatus, superne densius stellatus — subtomentellus epilosus. *Folia* dilute viridia tenuia, supra fere glabra et nuda, subtus pallide cæsio-prasina pilis brevibus gracillimisque raris adspersa (foliis extimis exceptis) ± dense stellata præsertim in nervo mediano sparsim piloso, marginibus pilis raris — sparsis brevibus longioribus intermixtis ciliata v. epilosa, in petiolis violaceis rarissime v. rare et ± longe pilosa; *basalia* 3—5 in rosulam conferta v. sub anthesi haud raro emarcida, exteriora (ob-) ovata — oblonga basi breviter — sat longe cuneata integerrima v. breviter et late subangulate paucidentata ± obtusa, interiora et intima ± oblonga — late v. anguste lanceolata sæpe subrhomboidea margine dentibus 2—3 sparsis ± triangularibus — lanceolatis ± patentibus et sat acutis brevius v. longius dentata apicem versus subdenticulata in apicem ± acutum — acuminatum et ± integrum protracta, intima basi ± cuneata dentibus parvis in petiolum oblique descendentibus; *caulina* ± approximata — remotiuscula cito v. abrupte decrescentia ± late — anguste lanceolata inæqualiter et acute paucidentata — irregulariter longe v. longissime dentibus angustis ± arrectis — patentibus sæpe ± curvatis pinnata, omnia basi ± breviter — longe cuneata, infimum ± late petiolatum, superiora sessilia subtus (summa quoque supra) stellata — floccosa. *Anthela* simplex angusta v. ± composita divaricata, deorsum ramis divaricatis ex alis foliorum superiorum v. interdum omnium evolutis sæpe ± indeterminata, paniculata — corymboso-paniculata, ramis inferioribus ± remotis vix æquantibus, superioribus magis approximatis paullum v. sæpe longe superantibus erecto-patentibus — sat multum patentibus rectis v. flexuosis gracilibus ± stellatis — tomentellis epilosis, ramulis pedicellisque gracillimis ± approximatis sæpe leviter curvatis acladioque (3—)5—25 mm. longo tomentosis epilosis v. sub involucris raro pilis solitariis obsitis. *Involucra* obscure v. dilute cano-virescentia angusta basi ± truncata, deflorata metalia. *Squamæ angustæ* sat irregulariter imbricatæ, exteriores lineares obtusæ ± laxæ et 1—2 in petiolo summo descendentes, interiores e basi latiore lanceolato — subulato-lineares obtusiusculæ, intimæ paucæ acutæ — subulatæ latiuscule — late viridi-marginatæ dorso inferne

[1] Äfven under namn af *H. cæsium var.* i Ups. bot. Museum.

sparsim, ceterum in marginibus et superne ubique usque in apicem comosum densiuscule floccosæ, pilis densiusculis brevibus basi ± crassa nigricante apicibus ± brevibus albidis et inferne glandulis parvis v. minutis parum conspicuis solitariis adspersæ. *Calathidium* læte luteum sat radians. *Ligulæ* apice glabræ. *Stylus* luteus et (in umbrosis præsertim magis conspicue) fusco-hispidulus.

Inv. $\frac{10,5—12,5}{5,5—7}$, D. 30—35, L. m. 2—2,5 mm.

Paralellform till föregående, från hvilken den förnämligast skiljer sig genom bredare blad, mera utspärrade inflorescensgrenar och af rikligare stjernludd gråare holkar samt smalare men ej så långt utdragna, ifrån bredare bas jemt afsmalnande fjäll och gula stift. I mina »Hieracia exsiccata» har jag utdelat denna form som varietet af föregående på grund af dess, såsom jag då tyckte, obetydliga skillnad från densamma, men vid närmare granskning har jag i likhet med namngifvaren funnit den till sina flesta karaktärer vara väl markerad. Den afviker i sjelfva verket i samma grad från föregående som denna från *H. *caligatum* och bör derföre lika väl som denna äga underarts värde. Genom sina bredare blad och i allmänhet utspärrade, fina inflorescensgrenar och grågröna, smala holkar, hvilka sitta närmade på fina skaft, erhåller den, isynnerhet då stjelken är längre ned och ofta ända till basen utstående grenig, ett karaktäristiskt och såväl från föregående som efterföljande underart afvikande utseende. Holkarne äro smala med tvär bas, hvilken ofta genom att ett och annat af de yttre, något frånstående fjällen nedstiga på skaftet blir sned och något knotig. Fjällen äro från något bredare bas jemnt afsmalnande med nästan raka sidor och uppåt mycket smala, jembreda, i sjelfva spetsen trubbade (utom de inre) och stundom i spetsen skärformigt krökta. Stjernluddet är temligen jemnt utbredt och ganska tätt, mot basen mera samladt i kanterna och glesare på midten. I spetsen och ett stycke nedåt kanterna äro fjällen derjemte tätt och ljust finhåriga. Skaften äro hvitgrå af stjernludd och normalt utan hår eller glandler. På holkarnes nedre del äro de sednare enstaka förhanden och korta med små knappar samt liksom de korta, svartfotade hårens bas mer eller mindre dolda af luddet. Bladen variera med kortare eller längre tänder och stjelkbladen äro ofta fliktandade; de nedre stjelkbladen och inre basalbladen äro ofta osymmetriska, derigenom att tandningen är olika lång på bägge sidorna och ofta på ena sidan nedstigande ett längre stycke på bladbasen eller på bladskaftet.

Skogsformer hafva svagare och kortare tandning, mera upprätta blad och rakare, mera upprätta grenar samt enklare inflorescens. Strandformer hafva oftast mycket djupt och smalt samt tätare flikade stjelkblad och inre rosettblad med ännu mera ojemn tandning och långa tänder, omvexlande med små uddtänder, mera utstående, tjockare blad och mera utspärrad, rikare inflorescens samt äro ofta rikt grenade nästan ända till basen af stjelken. Stiftet är hos dessa rent gult men blir hos skogsformerna mera orent genom de mörkare hårpapillerna. Bladen äro vanligen mycket svagt håriga men i stället undertill rikt stjernhåriga, de öfversta äfven på öfversidan. Stjelkbasen och bladskaften äro nästan alltid mörkt och vackert violettfärgade. Bladens undersida är ofta hos de yttre helt och hållet eller hos de inre delvis violettfärgad, och på soliga ställen blir bladspetsen på båda sidor m. l. m. långt ned purpurfärgad eller mörkt blodröd. Blommar i slutet af juni till i slutet af juli.

Endast anträffad på *Gotland* i Bunge s:n flerestädes i skogsängar, barrskog och på en åkerren nära hafsstranden vid Fårösund samt i Fleringe s:n, Lunderhage äng (K. JOHANSSON).

β lageniceps K. JOHANSSON n. var.

DAHLST., Herb. Hier. Scand., Cent. II, n. 96.

Ab *H. *metalicipite* K. JOHANSS., cui habitu foliorumque forma et colore nec non indumento simillima, hæc forma capitulis brevioribus magis canescenti-viridibus v. plumbaceis, effloratis basi exacte ovata paullulum attenuata, squamis adpressis basi latis pilis abortivis v. minimis paucis floccis æqualiter dispersis, glandulis nullis vestitis, stylis luteis, foliisque haud raro maculatis satis distincta videtur.

Synes genom ofvanstående karaktärer så väl skild från föregående, att den bör uppfattas som särskild varietet. Läroverksadjunkten K. JOHANSSON, den skarpsynte iakttagaren, hvilken urskilt så många gotländska former och sett dessa båda former lefvande, skrifver till mig, att han trots den slående habituella likheten mellan båda omöjligt kan förena bägge formerna, då dennas holkform är så absolut olik hufvudformens. Den har liksom denna mycket ljusa, bugttandade blad och reproducerar den i detta afseende fullständigt, men med afseende på holkarne är den märkbart skild. Dessa äro kortare och bredare med bredare fjäll, hvilka ej som hos denna äro mera jemnsmala med lång och smal, tydligt finhårig och hårbräddad samt luddkantad spets utan triangulärt lancettlika, hastigt hopdragna i en vanligen skarpare spets, hvilken genom de vattenklara och i kanterna knapt nedstigande håren samt mycket glest öfver hela fjällspetsen jemnare fördeladt stjernludd få ett betydligt mera naket utseende. Holkarne äro mörkt grågröna eller blyfärgade genom fjällens grönsvarta eller blysvarta ryggar och breda gröna kanter samt det öfverallt jemnt fördelade, spridda eller nedtill medeltäta stjernluddet. Genom de tilltryckta fjällen och den nästan rudimentära hårbeklädnaden förefalla holkarne derjemte ovanligt släta och jemna. Efter afblomstringen få de äggrund, något afsmalnande bas. Med afseende på holkarnes beklädnad och fjällens färg (isynnerhet fjällspetsarnes) står denna form betydligt närmare *H. *lepidotum* än hufvudformen gör. Deremot får den till holkformen och de breda fjällen större likhet med *H. *fasciculare* och *H. *nævosum* och är i alla dessa afseenden intressant emedan den belyser den nära slägtskapen mellan alla dessa former. I hvilket förhållande den står till *H. *cæsium* Fr. var. *chondrodes* derom vågar jag ännu ej något bestämdt uttalande, men den äger så anmärkningsvärda likheter äfven med denna, att jag är tveksam, huruvida ej denna sistnämde bör räknas till denna formgrupp snarare än till *H. *cæsium* Fr. Möjligt är att *H *cæsium* Fr. var. *chondrodes* utgör en förmedlande form till den sednare, och på grund af flera karaktärer synnerligen med afseende på indumentet och holkarnes allmänna utseende misstänker jag, att den här behandlade formkretsen står i ett visst, kanske ej så aflägset genetiskt samband med *H. cæsium* Fr. och närbeslägtade.

Ifrågavarande form är hittills endast anträffad i ängar vid Gerungs och Risungs i Rute socken på *Gotland* (K. JOHANSSON).

4. **H. *nævosum** K. Johansson in litt. n. subsp.

Caulis 35—50 ctm. altus 3—4-folius flexuosus, inferne dilute violaceus v. fusco-violascens pilis sat densis crispulis longis obsitus, medio sparsim — rarius pilosus, apice epilosus sat densiuscule floccosus, ceterum sparsim v. rare stellatus. *Folia* tenuia, supra læte viridia ± fusco- v. purpureo-maculata rare pilosa — subglabra subtus subglaucescentia sparsim in nervo dorsali magis piloso efloccosa v. caulina in nervo mediano rarissime stellata; *basalia* ovalia — oblongo-lanceolata pauca ± longe et anguste petiolata obtusa v. intima breviter acuta sparsim et late dentata, interiora ad basin sat longe 2—3-dentata; *caulina* ± cito decrescentia, infima internodiis vulgo longiora bene evoluta, superiora internodia æquantia v. iis breviora ± lanceolata — anguste lanceolata infra medium paginæ vulgo latiora, inferiora ± anguste petiolata, superiora sessilia, omnia ad medium sparsim et inæqualiter et grosse dentata, dentibus inferioribus maximis et valde patentibus omnibus ± triangularibus — lanceolatis acutis, in apicem ± longum integrum acutum — cuspidatum attenuata, summa vulgo linearia integra. *Anthela* simplex 1—3-cephala paniculata, ramis arcuato-patentibus — sat erectis superantibus gracilibus tomentellis — tomentosis rare v. superne sparsim pilosis — epilosis, eglandulosis. *Acladium* 20—30 mm. longum. *Involucra* parva ± obscure — dilute viridi-canescentia basi ovata postea rotundata. *Squamæ* inæqualiter imbricatæ, exteriores paucæ angustæ lineares, intermediæ ± triangulares — ovatæ ± obtusæ, internæ ± ovato-lanceolatæ acutæ — subulatæ, omnes marginibus præsertim apicem versus ± dilute virescentes dorso ± lato — angusto fusco-virescente, pleræque apicibus ipsis sæpe fuscæ, ubique floccis tenuibus densiusculis — sat densis æqualiter adspersæ et pilis tenellis brevibus basi ipsa nigricantibus apicibus albis sparsis et parum conspicuis obsitæ. *Calathidium* luteum radians. *Ligulæ* apice glabræ. *Stylus* luteo-ferrugineus ± fuscohispidulus postremo ± fuscus.

Inv. $\frac{8—10}{4—5}$, D. 30—35, L. m. 2 mm.

En mycket vacker och egendomlig form hvilken af namngifvaren anses beslägtad med *H. *violascens* Almqu. Fjällens form och holkens bildning erinrar också om skuggformen af denna sednare. Dock är den sannolikt att föra till samma grupp som följande och *H. *fasciculare* Fr., hvilken den i hög grad liknar till holkens utseende och beklädnad. Till bladens tandning och form erinrar den deremot mycket om *H. *nitens* Lbg. I sjelfva verket bildar denna formserie från *H. *caligatum* till *H. *fasciculare* jemte *H. *angustatum* och *H. *nitens* m. fl. en med *H. irrigui* formserie paralell serie och båda utmynna genom sådana former som *H. *obscuriceps* och *H. cruentifolium* m. fl. i *H. anfracti* formgrupp. Liksom *H. *lepidotum* är analog med *H. *lepidum* och *H. *subnævosum* med *H. *irriguum* så är förhandenvarande form analog med *H. *violascens*. Närvarande form har äfven en rätt påfallande likhet med *H. *latilobum*, såsom i holkfjällens byggnad och beklädnad, och är möjligen att anse som dess beslägtade och motsvarande *vulgatum*-form.

Från föregående är den utan vidare skild genom holkfjällens och holkarnes form. Från följande skiljes den genom den flerbladigare stjelken, de glesare och gröfre tandade bladen samt de gråare och mera stjernludna holkarne med finare och sparsammare hår och saknaden af glandler på holkar och skaft.

Från *H.* **fasciculare* är den bland annat skild genom de längre och glesare tandade, bredare och fläckiga bladen, de öfverallt jemt och ej endast i kanterna af fjällen stjernludna holkarne samt saknaden af glandler på dessa och skaften.

Endast anträffad i *Småland*, Lannaskede i kanten af barrskog (K. JOHANSSON).

5. **H. *subnævosum** K. JOHANSSON in litt. n. subsp.

DAHLST., Hier. exs., fasc. IV, n. 87. — DAHLST., Herb. Hier. Scand., Cent. II, n. 49.

Caulis 25—40 ctm. altus crassus — crassiusculus 1—2(—3)-folius, basi ± obscure fusco-violaceus leviter stellatus longe et ± dense pilosus, medio sparsim pilosus — subglaber rare stellatus, superne ± floccosus pilisque raris adspersus. *Folia* supra læte viridia v. subprasino-viridia sublutescentia sæpius præsertim in apicibus et caulina sæpe tota ± fusco-maculata rare pilifera — glabra, subtus pallidiora glaucocinerascentia v. apicem versus et caulina sublutescentia sparsim pilosa; *basalia* rare stellata, *caulina* sparsim — densius stellata in nervo dorsali magis pilosa præsertim ad basin dense floccosa, marginibus petiolisque ± longe et dense — densiuscule pilosis; *basalia* ± breviter et acute petiolata magna et lata 4—6 in rosulam congesta, exteriora ovali — ovato-elliptica plerumque dense — densissime et æqualiter dentata basi ± abrupta — levissime descendente obtusa, intermedia ± ovato-oblonga dense et argutius dentata, interiora ± anguste — latiuscule ovato-lanceolata obtusiuscula — acuminata basi ± abrupte contracta sæpe ± anguste lanceolata cuspidata laciniis et dentibus ± longis acutis arrectis — patentibus minoribus immixtis ± grosse et inæqualiter dentata — pinnata, ad basin ± descendentem dentibus laciniisque subulatis angustis liberis in petiolo alato sæpe decurrentibus; *caulina* anguste ovato-lanceolata — lanceolata ± longe subulato-cuspidata abrupte decrescentia dentibus et laciniis longis — longissimis angustis patentibus minoribus sæpe glanduliformibus inæqualiter immixtis profunde et maxime irregulariter pinnato- et eroso-laciniata sessilia v. infimum late et alate petiolatum basi breviter v. longius descendente laciniis linearibus sæpissime instructa, unum v. duo inferiora sæpe bene evoluta, cetera parva v. minima bracteolata. *Anthela* parva simplex v. plerumque ampla ± composita divaricata paniculata, ramis inferioribus ± distantibus erecto-patentibus sat rectis longis, superioribus ± approximatis ± divaricatis et patentibus basi ± curvatis sæpe longe superantibus crassiusculis densiuscule floccosis, ramulis pedicellisque mediocribus — brevibus ± approximatis gracilioribus acladioque 0—15 mm. longo ± dense floccosis — tomentosis livido-albidis epilosis v. superne pilis brevibus basi crassa nigricante solitariis — sparsis et glandulis mediocribus nigris solitariis obsitis. *Involucra* sat crassa ± obscure virescenti-canescentia basi ovata postea rotundato-truncata. *Squamæ* latæ — latiusculæ apice comosæ irregulariter

imbricatæ, basales lineares brevissimæ ± obtusæ obscure virescentes et inferiores latiores triangulares paucæ, interiores et intimæ e basi lata ± lanceolata cito in apicem acutum — subulatum attenuatæ, interiores late viridimarginatæ et intimæ totæ virides, ubique æqualiter et sparsim stellatæ v. ad apicem floccosiores, ceterum pilis brevibus basi crassa et sat longa nigricante albidis densiusculis et glandulis solitariis — raris brevibus parum conspicuis obsitæ. *Calathidium* obscure luteum sat radians. *Styli* ferrugineo-livescentes postremo sat obscuri.

Inv. $\frac{11-12}{6-8}$, D. circ. 35, L. m. 2,5—3 mm.

Denna serdeles utpräglade form är synnerligen utmärkt såväl genom sina karaktärer som genom sitt utseende. Basalbladen äro stora, temligen breda, samlade i en rik rosett, de yttre vanligen med mycket täta och breda tänder, de inre och stjelkbladen med en karaktäristisk tät, ojemn och lång tandning. Hos rikligare närda och grofväxta exemplar är tandningen längst och ojemnast. De långa flikarne och tänderna, hvilka äro längst och smalast vid bladets bas, der de äro af lancettlik eller smalt triangulär form eller på sjelfva bladbasen ännu smalare, stundom nästan syllika, omvexla oregelbundet med små tänder eller blott uddtänder, hvilka ej sällan uppstiga på de större tändernas bas. Tandningen fortsätter vanligen till öfver midten af bladen, der tänderna bli bredare och stjelkbladen äro utdragna i en lång och smal, skarp, upptill helbräddad spets, hvaremot de yttre bladen äro trubbade och ofta glandeltandade nästan ända ut i spetsen. På basalbladen äro tänderna mera framåtrigtade, men på stjelkbladen vanligen utåtrigtade och sjelfva spetsen af tänderna är ej sällan bakåt- eller framåtkrökt. Genom de breda basalbladen och de vanligen blott till ett antal af 1—2 väl utvecklade nedre stjelkbladen, på hvilka med ett tvärt afbrott följa de brakteliknande öfre bladen eller blott brakteer, och den m. l. m. utspärrade och temligen glesa inflorescensen, hvilken ofta ökas genom utstående grenar från de öfre eller de flesta bladvecken, får växten en m. l. m. väl utpräglad *cæsium*-habitus. Men den erinrar äfven mycket om *silvaticum*-typen genom de yttre och mellersta basalbladens obetydligt nedlöpande eller vanligen m. l. m. tvära och endast i sjelfva midten något vigglika bas, hvarvid basaltänderna tendera att rigtas eller ej sällan äro m. l. m. rigtade bakåt, hvartill kommer att ena sidan af bladet ofta blir mera nedstigande på skaftet än den andra, såsom hos många former med äkta *silvaticum*-typ. Tendensen mot denna sednare typ visar sig äfven i den oregelbundna och isynnerhet mot basen långa och täta tandningen, hvilken är lika karaktäristisk äfven hos skogsformer och spädare exemplar, ehuru den här är betydligt mera reducerad med afseende på tändernas längd, än hos former från öppna lokaler eller hos kraftigare exemplar. Bladen äro sällan undertill violetta utom de yttre och deras medelnerver. Ofvantill äro de m. l. m. rikt mörkfläckiga, isynnerhet stjelkbladen eller åtminstone spetsarne af bladen. Fläckigheten är bäst utpräglad på öppna lokaler. Genom dessa karaktärer förnämligast genom bladen och växtsättet skiljes den lätt från föregående former, från *H.* **nævosum* äfven genom sina mindre rikligt stjernludna holkar med spetsigare fjäll och från de öfriga genom sina bredare och mindre utdragna fjäll och rikligare ludd. Karaktäristiska för formen äro vidare de fåtaliga och (nedtill ända till 1,5 mm.) breda holkfjällen, af hvilka de inre långfjällen, som ha breda, ljusa kanter, äro spetsiga och de innersta helt och hållet gröna och sylspetsade, alla med fin-

hårig spets, hvaremot de nedre fjällen och basalfjällen äro korta, hvarföre holkbasen hufvudsakligast bildas af långfjällen, hvilkas breda bas är glest klädd, så att de gröna kanterna väl synas och den grönaktiga ryggen gifver den smala holkbasen ett nästan köttigt utseende. Vidare karaktäriseras den mycket ofta af kort akladium, oftast nästan intet, så 2 holkar komma att sitta mycket tätt tillsammans och stundom delvis hopväxa. Stundom sitta 3—4 korgar i en nästan hufvudlik gyttring, isynnerhet hos skogsformer. Samma egendomliga förhållande har jag iakttagit hos *H.* **oleraceum* Norrl. (var. *basifolium* Norrl. Hier. exs. n. 143; Dahlst. Hier. exs., fasc. IV, n. 83), hvilken antagligen är beslägtad med denna formgrupp.

Anträffad på *Gotland*, Fleringe s:n söder om Ar träsk på åkerrenar och gräsbeväxt mark å groft grus (gammalt strandgrus) samt en spädare form ymnigt i tallskogen i trakten (K. Johansson).

H. IRRIGUUM (Fr.).

Caulis altus — elatus (1—)2—6-folius, inferne sæpius violascens v. purpurascens sparsim — sat dense et longe pilosus, superne sparsim pilosus — subglaber rare — sparsim pilosus — sat tomentellus v. apice tomentosus. *Folia* læte — saturate gramineo-viridia, supra glabriuscula v. parce pilosa, subtus densiuscule pilosa et leviter v. in nervo dorsali densius stellata; *caulina* sensim v. abrupte decrescentia sparsim dentata — serrato-dentata v. subintegra apicem versus utrinque sæpissime obscure — læte sanguinea, subtus haud raro dense supra interdum leviter stellata; *basalia* plerumque in rosulam 3—6-foliam conferta latiora sparsius dentata — subintegra. *Anthela* sæpe ± laxa rarius contracta ± paniculata ramis sæpe longis ± erecto-patentibus. *Involucra* mediocria viridia et canescentia — atra efloccosa v. marginibus squamarum leviter — dense floccosa v. etiam undique ± dense stellata et glandulosa v. glandulis et pilis brevibus ± obscuris v. dilutis parcioribus — frequentioribus immixtis obsita. *Styli* obscuri (nigri) v. lutei.

En mycket naturlig formgrupp, hvars former mera öfverensstämma i habitus, bladens färg, form och tandning än till beskaffenheten af holkarnes indument. Men äfven de i detta sednare afseende mest skilda formerna ansluta sig ofta i andra afseenden så nära till hvarandra, att de på grund häraf och till följd af öfriga, i detta afseende intermediära former, hvilka på mångfaldigt sätt förena dem med hvarandra, ej kunna afskiljas ur gruppen. En serdeles i ögonen fallande karaktär är gemensam för en stor del af dem, nämligen de på båda sidor blodrödt färgade bladspetsarne. Hos en del former är denna färg dels ej så stark, dels gående mera i brunt och violett, men äfven hos dessa former uppträda mycket ofta exemplar med den karaktäristiska färgen. Hithörande former gränsa å ena sidan till *H. anfractum* och å andra sidan till *H. diaphanum* och *H. pinnatifidum*. En del närma sig äfven åt *H. cruentifolium*.

Conspectus subspecierum.

1. *Involucra* efloccosa dilute viridia nitentia v. lucide atro-viridia.

   Squamæ latæ — latiusculæ glandulis nigris v. lutescentibus brevibus simplici serie dispositis densiusculis (sæpe) pilis paucis brevibus canescentibus parum conspicuis obsitæ. *Styli* obscuri.

   1. *H.* **lepidiceps* Dahlst.

2. *Involucra* ± canescentia v. sordide fusco-viridia, ubique ± floccosa v. in marginibus squamarum magis floccosa.

   a. *Squamæ* ubique æqualiter et ± dense v. marginibus paullo densius floccosæ.

      Involucra griseo-livida dense — sat dense cano- v. albido-floccosa pilis brevibus — brevissimis mollibus canescentibus sparsis — densiusculis glandulis minutis solitariis floccis vulgo occultis obsita. *Stylus* obscurus.

      2. *H.* **spodoleucum* Dahlst.

      Involucra canescenti-viridia obscuriora v. dilutiora ubique rare — sparsim v. superne marginibus squamarum etiam densius albido-floccosa glandulis raris — densiusculis lutescentibus et pilis subobscuris brevissimis raris — frequentioribus obsita. *Styli* lutei (v. subobscuri).

      3. *H.* **lepidulum* Stenstr.

   b. *Squamæ* dorso sparsim — densiuscule quasi pulverulenter stellatæ marginibus late v. anguste et conspicue floccoso-limbatæ.

      Involucra fusco- v. virescenti-canescentia dorso squamarum floccis sparsim pulverulenta marginibus præsertim apicem versus anguste floccoso-limbata glandulis tenellis fuscis v. cerineis sat densis obtecta. *Styli* lutei.

      4. *H.* **frondosum* Lönnr.

      Involucra e viridi fusco-canescentia subvariegata dorso squamarum sparsim — densiuscule stellata marginibus ± late et dense floccoso-limbata pilis canescentibus v. obscuris brevibus densis — sat confertis et glandulis obscuris — lutescentibus minutis sat densis — densis obsita. *Styli* nigri.

      5. *H.* **violascens* Almqu.

3. *Involucra* plerumque gracilia e viridi fusco-atra v. fusco-virentia — atroviridia sæpe nitentia fere efloccosa v. marginibus squamarum inferne levissime et vix conspicue floccosa.

Involucra gracilia mediocria v. parva efloccosa v. marginibus squamarum exteriorum præcipue leviter floccosa dense — sat conferte atro-glandulosa et pilis paucis obscuris vulgo obsita. *Styli* atri.

6. *H. *irriguum* Fr.

Involucra sat gracilia mediocria basi parum stellata densiuscule — sat dense nigroglandulosa et pilis obscuris raris — sparsis obsita, nitentia. *Styli* sublutei v. vulgo fuscescentes.

7. *H *obscuriceps* Dahlst.

Involucra gracilia sat elongata, glandulis gracillimis longis (iisdem parvis immixtis) nigris densis obtectis partim in pilos nigros solitarios — sat frequentes transformatis obsita, efloccosa v. marginibus squamarum exteriorum leviter stellata. *Styli* obscuri.

8. *H. *batylepium* Dahlst.

1. **H. *lepidiceps** *n. subsp.*

H. lepidum Lönnr. in sched. et in Dahlst., Hier. exs., fasc. II, n. 67 et n. 68 (forma). — Dahlst., Herb. Hier. Scand., Cent. IV, n. 38 (forma).

Caulis 60—80 ctm. altus plerumque elatus gracilis 3—5(—6)-folius, inferne ± violaceus v. purpureus sparsim et longe pilosus et leviter stellatus, superne viridis rare pilosus et rare — sparsim stellatus. *Folia rosularia* 3—6 breviter — longe petiolata, exteriora late ovalia — obovato- v. oblongo-ovalia apice rotundata v. ± obtusa integerrima sparsim mucronato-dentata, intermedia ± anguste oblonga — oblongo-lanceolata obtusiuscula — acuta magna sparsim denticulata, interiora ± lanceolata (sæpe elongate lanceolata) sparsim et subinæqualiter dentata in apicem ± longum acutum attenuata basi sensim in petiolis ± alatis decurrentia; *caulina* subrhomboideo- v. elliptico-lanceolata — elongate lanceolata v. superiora lineari-lanceolata basi sensim attenuata apice ± longo integro acuto v. acuminato ± protracta acute paucidentata (dentibus 3—4) v. crebrius et inæqualiter dentibus mediocribus ad basin sæpe patentibus v. interdum subrepandis incisa, infimum breviter v. mediocriter petiolatum v. omnia sessilia sursum sensim decrescentia; omnia læte v. pallide gramineo-viridia tenuia, supra glabra v. parce pilifera, subtus pallidiora, infima sæpe subtus purpurascentia (superiora et caulina in utraque pagina apice sæpe fusco- v. claro-purpurea), pilis brevibus raris — sparsis in costa leviter stellata densiusculis obsita (caulina ubique sparsim — densiuscule stellata), marginibus brevissime et densiuscule ciliata, petiolis coloratis breviter et sparsim — densiuscule piliferis. *Anthela* parva v. magna sæpe laxa ± paniculata subcontigua, ramis inferioribus sæpe ± longe distantibus sat erectis — erecto-patentibus rectis — curvatis ± superantibus, superioribus magis approximatis erecto-patentibus rectis — sat arcuatis, omnibus gracilibus — gracillimis, pedicellis tenuibus brevibus — mediocribus apice sub involucris squamis ± latis

1—2 basi tumida instructis acladioque 15—35 mm. longo viridibus et leviter sub involucro sat dense stellatis, ceterum inferne rare superne sparsim et minute glandulosis. *Involucra* mediocria crassa sursum ± læte viridia basi obscuriora ± rotundata postea truncata. *Squamæ* irregulariter imbricatæ latæ — latiusculæ, exteriores breves e basi ± ovata tumida et crassa triangulares laxæ obtusæ — obtusissimæ fusco-virides margine basique levissime stellatæ, interiores e basi latiore in apicem obtusiusculum — subacutum sensim angustatæ et intimæ paucæ acutæ — cuspidatæ dorso angusto obscuræ ceterum viventer et lucide virides nudæ, omnes v. plures apicibus sæpe fuscæ v. piceæ, dorso simplici serie glandulis gracilibus parvis fusco-virentibus — lutescentibus sat densiusculis et sæpe pilis paucis brevibus canescentibus passim immixtis vestitæ. *Calathidium* luteum. *Ligulæ* glabræ. *Stylus* vivus fusco-virens, siccus sat obscurus.

Inv. $\frac{10—11}{5—6}$, D. 35 mm., L. m. 2,5—3 mm.

En i hög grad framstående och vacker form, först urskiljd af afl. lektor K. J. Lönnroth. Igenkänd på sina ljusgröna, vanligen tunna, gleshåriga, m. l. m. skaftade, utdragna och långspetsade inre samt trubbiga yttre rosettblad, hög, spenslig stjelk med 3—6 decrescerande blad, af hvilka det nedre är m. l. m. vingskaftadt, de öfre oskaftade af m. l. m. lancettlik form och vanligen fåtandade af raka tänder eller mera sällan ojemt och tätare tandade med stundom utstående, längre (och ibland något krökta) tänder, vanligen gles inflorescens med m. l. m. upprätta, fina, öfverskjutande, långa grenar och korgskaft, rent och klart gröna, vid basen mörkare holkar med breda, triangulära, trubbiga och korta, endast i kanterna och vid basen fint stjernhåriga yttre fjäll samt trubbade, tillspetsade och nakna inre fjäll, klädda af en enkel rad fina glandler, stundom med få, hvita, inblandade hår, samt från början grönaktiga stift. Serdeles karaktäristiska äro de luddlösa holkarne och de gröna fjällen. De yttre äro vanligen vid den äggrunda och ibland öronlikt utvidgade basen ansvälda, hvarigenom spetsarne bli frånstående. Stundom hafva de, liksom alltid de 2—3, nära holken sittande brakteerna, på den uppsvälda basen en utstående, rundad eller hornlik, mörkare knöl. Vanligen äro de inre klargröna och glänsande, de innersta med en smal ljus hinnkant, men de variera äfven mörkare gröna eller något brungröna. I sjelfva spetsen äro de än rent gröna, än och vanligen brunaktiga till tjärfärgade. Bladens tandning blir hos mångbladigare former med smalare blad, hvilka derjemte hafva *rigidum*-habitus samt dessutom äga bredare och trubbigare fjäll äfvensom hos lund- och skuggformer glesare och stelare, hos backformer deremot eller sådana med mera *vulgatum*-habitus blir tandningen tätare och mjukare. Stundom äro hos fåbladiga exemplar alla rosettbladen jemte det nedre stjelkbladet bredare, mera helbräddade och trubbiga, men vanligen äro alla, utom de yttersta rosettbladen, långsträckta och spetsiga samt tandade. Rosetten är i allmänhet ej tät, utan bladen äro ofta något åtskilda, på soliga lokaler blir den dock oftast tät och bladen något tilltryckta till marken. Den i mina Hier. exs., fasc. II, n. 68 utdelade formen, som är insamlad på öppnare, hård gräsmark, har mörkare och kortare holkar än vanligt. Detta synes till dels men ej alltid bero på lokalen. Mörkholkiga former skilja sig oftast genom tätare tandade, mindre utdragna stjelkblad, men öfvergångar

till den typiska äro likväl vanliga. Bladen och stjelken variera något till hårigheten, glattare eller temligen rikhåriga, alltefter lokalens beskaffenhet (friskare eller torrare).

Från *H.* **anfractum*, hvilken den ibland mycket liknar (isynnerhet former med kortare, mörkare holkar), skiljes den genom sin glesare inflorescens med finare, mera upprätta, grönare grenar och skaft, rent gröna, tjockare holkar, ett och annat gråspetsadt hår bland holkarnes finare, ljusare och glesare glandler samt genom längre och större stjelkblad med mindre och glesare tänder m. m. Från de båda följande, hvilka den står närmast, är den lätt skild genom holkarnes brist på stjernludd.

Anträffad inom området i *Östergötland*, Norra Vi s:n, Siggemålen, Kärremåla och Kyrkohögmålen; Sunds s:n, Löfåsa; Vestra Ryd s:n Krämarbo; Trehörna s:n, Slangeryd; Åtvids s:n, Åtvidaberg, Karstorp, Slefringe och Adelsnäs; Vists s:n, Söderby och Vessentorp (förf.); Qvarsebo (S. ALMQUIST); Gårdeby s:n, Örsby (H. STRÖMFELT): *Småland*, Gärdserums s:n, Qvistrum (förf.); Gladhammars s:n, Thorsfall, allmän; Fagerhults s:n, i en trädbevuxen och bergig äng vid Fagerhults herrgård, allmän; Mörlunda s:n, Haddetorp, på ett berg i lundar (K. J. LÖNNROTH); Lannaskede s:n, mellan Lannaskede brunn och Ålhult (K. JOHANSSON). Utom området funnen i *Vestergötland*, Åsöboda vid sjön Unden (A. CALLMÉ): *Vestmanland*, Kungsör (C. O. VON PORAT).

2. H. *spodoleucum *n. subsp.*

DAHLST., Hier. exs., fasc. I, n. 91.

Caulis 30—60 cmt. altus gracilis subflexuosus 4—6-folius, inferne purpurascens pilis sparsis — sat densis mollibus obtectus sparsim stellatus, superne sparsim pilosus et usque ad apicem magis magisque floccosus — sat tomentosus. *Folia basalia* 2—4, exteriora minora ± ovalia — ovali-oblonga obtusa minute denticulata, intermedia anguste oblonga v. elliptica obtusiuscula — sat acuta et intima oblongo-lanceolata — lanceolata ± acuta, omnia sparsim et minute ± acute dentata v. undulato — breviter sinuato-dentata in petiolum longum angustum ± abrupte attenuata; *caulina* inferiora v. infimum anguste petiolata sparsim denticulata — sat acute sinuato-dentata, superiora sessilia ad basin v. ad medium ± pauci-dentata in apicem ± longum integrum attenuata ± anguste ovato-elliptica — lanceolata sursum sensim decrescentia, saturate gramineo-viridia in utraque pagina pilis brevibus sparsis — densiusculis hirta; *basalia* subtus leviter in nervo dorsali sparsim stellata; *caulina* sparsim — densiuscule in nervo dorsali sat dense floccosa, summa fere tomentosa, omnia supra leviter stellata subtus sæpius hepatico-violascentia, marginibus brevissime sparsim — sat dense ciliata, petiolis pilis mediocribus sparsis — densiusculis hirtis. *Anthela* paniculata brevis pauciflora simplex v. subsimplex, ramis brevibus ± patentibus arcuatis pedicellis mediocribus gracilibus acladioque 10—30 mm. longo tomentellis — dense canotomentosis pilis mollibus albidis solitariis obsitis eglandulosis. *Involucra* mediocria crassa brevia griseo-livida basi primo lata rotundata postea truncata. *Squamæ* latiusculæ sublineares v. angustæ triangulares parum extractæ irregulariter imbricatæ, exteriores fusco-virescentes ± obtusæ, interiores dorso fusco-viridi ± late virescentes apice fusco v. piceo ± obtusiusculæ (— subacutæ), intimæ paucæ acutæ, exteriores dense interiores sat dense præsertim

apicem marginemque versus cano- v. albido-floccosæ et pilis brevibus — brevissimis ± mollibus canescentibus v. basi obscuris sparsis — densiusculis glandulis minutis solitariis vulgo floccis occultis obtectæ. *Calathidium* ± obscure luteum. *Ligulæ* glabræ. *Stylus* vivus livescens, siccus ± obscurus.

Inv. $\frac{9-10}{5-6}$, D. c. 35, L. m. 2—2,5 mm.

Utmärkt af hög spenslig, flerbladig stjelk med decrescerande, vanligen små, smalt lancettlika, spetsiga, undertill isynnerhet de öfre rikligt stjernhåriga blad, af hvilka vanligen ett par af de nedre äro m. l. m. skaftade, små, medelstora, liksom stjelkbladen mörkgröna och vanligen kort glestandade basalblad, fåblomstrig inflorescens (ofta blott med 2—3 holkar) med korta, något utstående, böjda grenar, medelstora, blygrå till perlgrå holkar af tätt tilltryckt m. l. m. rikligt grått till blåaktigt stjernludd och gråa eller kort svartfotade, mjuka, korta, glesare eller något tätare sittande hår. De sparsamma eller enstaka glandlerna äro ytterst små och i allmänhet dolda af håren och luddet. Holkskaften äro i allmänhet tätt stjernludna, nästan utan hår och alldeles saknande glandler. Stjelkens nedre del och bladskaft äro nästan alltid brunvioletta, stundom äfven större delen af stjelken. Oftast äro de yttre, stundom alla, äfven stjelkbladen, öfverallt på undersidan lefverfärgade. Hårigheten på örtståndet varierar glesare eller tätare, men är öfverallt kort. Varierar med bredare blad och något djupare tandning och påminner då i bladform och habitus om *H. *violascens*, med hvilken den säkerligen är nära beslägtad. Den torde äfven vara beslägtad med följande, hvilken den liknar till holkarnes utseende och fjällens form, men den är vida mera stjernluden och rikhårig samt saknar glandler.

Anträffad i *Östergötland*, Rinna s:n, Stortorp och Sunds s:n, Sunds Södergård (förf.): *Småland*, Målilla s:n vid Målilla (K. J. Lönnroth).

3. **H. *lepidulum** Stenstr.

H. *lepidulum Stenstr., Värml. Arch. 1889. — Dahlst., Hier. exs., fasc. III, n. 47. — Dahlst., Herb. Hier. Scand., Cent. II, n. 77.

Caulis 30—70 cmt. altus 1—4-folius gracilis — sat robustus subflexuosus, inferne rare — sparsim pilosus leviter stellatus viridis. *Folia rosularia* 2—4, exteriora ± late ovalia — elliptica v. spathulata margine undulata obtusa, intermedia ovali- v. elliptico-lanceolata — oblonga obtusa — obtiuscula, intimum ± oblongo-lanceolatum — lanceolatum acutiusculum, omnia sæpe medio v. ad apicem in latere uno oblique dilatata, integerrima v. inæqualiter undulata dente uno alterove angulata v. dentibus humilibus mucronulatis crebrius crenulato-serrata in petiolum sat alatum sensim descendentia; *caulina* sæpe magna v. maxima sursum sat v. vix decrescentia v. sub inflorescentia ipsa abrupte diminuta, infimum ± petiolatum in petiolum valde alatum sensim descendens, superiora sessilia ± lanceolata — lanceolata oblonga v. elongate et sæpe oblique rhomboidea in apicem ± longum sat latum obtiusculum v. apice ipso acutum raro cuspidatum attenuata subintegra v. dentibus

paucis brevibus inæqualiter undulato-dentata — crebre et argute serrulata raro ad basin dentibus paucis longioribus sed latis instructa, summum minus sæpissime integrum subpetiolatum oblongo-lineare obtusum — obtusiusculum sæpe sub ipsa anthela affixum, omnia supra ± læte gramineo-viridia subtus pallidiora sæpe violascentia et apicibus in utraque pagina sæpissime fusco- v. claro-purpurea, supra glabra v. rare pilifera sæpe adipose nitentia, subtus rare — sparsim pilifera v. etiam subglabra in nervo dorsali leviter — sparsim stellato sparsim — densiuscule pilosa et præsertim caulina subtus ubique sparsim — densiuscule stellata, marginibus breviter ciliata, petiolis pilis mediocribus sparsis — densiusculis hirtis. *Anthela* ± parva contracta v. sat magna ± laxa, ramis inferioribus ± remotis, superioribus approximatis paniculatis v. sæpe omnibus (folio summo ± evoluto sæpius suffultis) v. summis saltim valde umbellatis inæqualiter et sæpe longe superantibus sat gracilibus ± erecto-patentibus v. sat patentibus sat rectis — leviter curvatis, pedicellis brevibus ± gracilibus apice subincrassatis acladioque (5—20—)30—70(—100) mm. longo fusco-virentibus — sat viridibus ± dense albido-floccosis glandulis solitariis minutis v. parvis sursum raris — sparsis interdum etiam pilis paucis brevissimis obsitis. *Involucra* mediocria crassa ± pallide canescenti-viridia v. obscuriora sordido- v. fusco-viridia florendi tempore basi rotundata postea lata ± truncata. *Squamæ* latæ ± imbricatæ, exteriores subtriangulares obtusæ sublaxæ ± obscuræ, intermediæ obtusæ — obtiusculæ et intimæ obtusiusculæ — sat acutæ, paucæ subulatæ, in marginibus ± late et pellucide virescentes, dorso angusto fusco-viridi apice fuscescentes ubique rare — sparsim et adpresse v. superne marginibusque densius ad basin exteriorum sæpe subdense albido-stellatæ, ceterum glandulis brevibus lutescentibus raris — densiusculis sæpe pilis paucis interdum frequentioribus subobscuris brevissimis immixtis vestitæ. *Calathidium* saturate luteum subdensiusculum. *Ligulæ* glabræ. *Stylus* luteus v. leviter livescens, siccus interdum sat obscurus.

Inv. $\frac{8-10}{4-5}$, D. 30—35, L. m. 2,5 mm.

En synnerligen utmärkt form, på en gång påminnande om *H. *frondosum* och *H. *lepidiceps* och bildande en fullt sjelfständig mellanlänk mellan båda. Framförallt utmärkt af sina ovalt-lancettlika, aflångt rhomboidiska, bredare eller smalare, vanligen mycket helbräddade, men i kanten genom trubbiga utbugtningar ofta vågiga, sällan af skarpare udd-tänder sågade blad med nedlöpande bas och vanligen m. l. m. utdragen, trubbad spets med kort udd, ofta stora och långa, närmast vippan ej sällan tvärt i storlek aftagande stjelkblad, hopdragen och liten eller vid och utbredd inflorescens med utspärrade eller mera upprätta, ofta långt och ojemt öfverskjutande grenar, som alla än äro kvastlikt ordnade samt ojemt närmade hvarandra, och af hvilka ibland i så fall några delvis äro med hvarandra samsammanvuxna, eller de nedre aflägsnade från hvarandra, och som än äro upptill eller till större delen flocklikt samlade, stundom men ej alltid lika långa med akladiet, hvilket ofta blir mycket långt, utgående ur flockens midt, och hvilka, då inflorescensen tenderar att bli eller är flocklik alltigenom, understödjas af det öfversta, m. l. m. utvecklade trubbiga, aflångt jembreda stjelkbladet, samt slutligen små, breda och bredfjälliga, orent eller brunaktigt gröna, af m. l. m. glest eller rikligt stjernludd öfverdragna, gråaktiga holkar och vanligen

från början rent gula stift. Stjernluddet blir rikligast och bäst framträdande hos former med gula stift, hvilkas fjäll äfven äro nästan enbart klädda af gulaktiga glandler. Häri likna dessa individ mycket följande, men skiljes lätt på bladens form och tandning, vanligen äfven på inflorescensens egendomliga bildning, de bredare fjällen och det mera tilltryckta luddet. Hos former, hvilka redan från början hafva livescenta stift, äro fjällen ofta mörkare, stjernluddet otydligare (ehuru dess anordning vanligen kan iakttagas på åtminstone någon holk) och mest framträdande vid basen, hvarjemte glandlerna äro sparsamt, någon gång rikligare uppblandade med korta, mörka hår. Dessa former erinra ibland något om *H. *violascens* (isynnerhet de hårigare), men äro väl skilda till holkarnes utseende och den ringare hårigheten samt till bladform och tandning och bladspetsens färg. Ibland likna de, isynnerhet de svagt stjernhåriga formerna, *H. *lepidiceps*, hvilken dock i allmänhet är lätt skild genom habitus, men isynnerhet genom de klargröna, alltid luddlösa inre fjällen och deras deraf framkallade egendomliga utseende. Serdeles karaktäristiskt för denna form (hvilket dock äfven tillkommer *H. *lepidiceps* oeh *H. *irriguum*) är den brunaktigt till lifligt purpurröda färgen på både öfre och undre sidan af bladspetsarne, framförallt på stjelkbladen. Dessa äro på undersidan rätt ymnigt stjernhåriga. Liksom rosettbladen äro de ofta rhombiska eller sneda genom ena sidans större bredd öfver midten, stundom bredast ofvan midten. Hos former med fint syltandade blad äro isynnerhet de öfre bladen spetsigare och smalare lancettlika än vanligt, och det öfversta bladet, hvilket hos helbladigare former är så karaktäristiskt genom sin plats, form m. m., är vanligen rudimentärt, spetsigt och längre aflägsnadt från inflorescensen, hvilken blir mera kvastlik med aflägsnade nedre grenar, hvarigenom dylika former komma att likna följande varietet.

Inom området anträffad på följande ställen i *Östergötland*, Sunds s:n, Sandbäckstorp, Löfåsa; V. Ryd s:n, Krämarbo; Wäderstad s:n, Lindekullen och Skållerud (förf.); St. Åby s:n, Frösäng (G. A:N MALME); Rinna s:n, Stortorp (förf.); Åtvids s:n, Adelsnäs; Kärna s:n, Malmen (förf.), Simonstorp, Uddetorp (A. WIRÉN); Norrköping, Hult (P. OLSSON): *Småland*, Gärdserums s:n, Bossgård (förf.); Rogberga s:n, Tenhult (K. JOHANSSON); Öggestorps s:n, Ljungarp (K. JOHANSSON); Burseryds s:n, Ödelyckan (K. A. TH. SETH).

Utom området anträffad i *Södermanland*, Kila s:n, Ålberga (S. ALMQUIST), Ålspånga (O. G. BLOMBERG); Österhaninge s:n, Gålö, Dyvik (S. ALMQUIST); St. Malms s:n, Bränkärr och Sörgölet (G. A:N MALME); Stockholms skärgård, Vadholma (S. ALMQUIST): *Vestergötland*, Sandhem, Vimla (O. NORDSTEDT); Toarps s:n, Bygd (A. O. OLSSON): *Vermland*, Gerdsberg nära Kristinehamn (B. M. BROSTRÖM); Eng i Nysunds s:n (LAGERSTEDT); Gillberga och Borgviks socknar (K. O. E. STENSTRÖM); Arvika (E. HOLMGREN): *Gestrikland*, Åmot (S. ALMQUIST): *Ångermanland*, Själevads s:n (V. F. HOLM). En form med groft bugttandade blad och nästan svarta, tätare glandelhåriga holkar från Vermland, Gillberga s:n (K. O. E. STENSTRÖM) är anträffad bland hufvudformen och H. *irriguum och är troligen efter utseendet att döma hybrid af dem.

β hæmatophyllum n. var.

H. *purpurascens DAHLST., Hier. exs., fasc. II, n. 66.[1]

Är en ytterlighetsform, anslutande sig till de mörkstiftiga formerna af hufvudformen. Upptages här som varietet, emedan den i sällskap med fullkomligt typiska exemplar med gula stift af hufvudformen, bland hvilka den ofta sida vid sida anträffades, var väl skild såväl genom sin habitus som karaktärer och utan att några mellanformer kunde iakttagas.

[1] Namnet är förut användt och måste derföre utbytas mot ett nytt.

I Hier. exs. ansåg jag den förtjena rang af subsp., men de hårigare och mörkstiftigare formerna af hufvudformen, hvilka synas intermediära, tyda på, att den ej äger detta formvärde.

Utmärkt från hufvudformen genom högre, spensligare, ofta ytterst spenslig, rak stjelk med vanligen små och smala, skarpt sågtandade och ofta flera (ända till 6) stjelkblad, kvastlik smal eller något utspärrad inflorescens med de nedre grenarne aflägsnade och korta, de öfre närmade och endast de öfversta ofta bildande en kortgrenig och vanligen nästan enkel flock med kort, 3—12 mm. långt akladium, längre och smalare holkar med smalare, mera brungråa, i toppen brunaktiga fjäll, hvilka alla eller åtminstone de inre, som på outslagna holkar äro långt öfverskjutande, äro spetsiga och nästan endast på midten och i kanterna mycket glest, vid basen af de yttre något rikligare stjernbåriga och liksom skaften klädda af kortare, gröfre, mörka, glandler och glest till mera rikligt (isynnerhet på äldre holkar) inblandade korta, mörka hår samt redan från början mörka, sedan svartnande stift. Erinrar habituelt rätt mycket om följande och är stundom ganska lik *H. *obscuriceps* men afviker genom tandningen, de grönbruna, ej svartgrönt glänsande holkarne, stiftens färg m. m. Bladspetsarne äro ofta starkt blodfärgade. Synes äfven stå ytterst nära *H. *lepidiceps*, af hvilken den kanhända med ännu större sannolikhet kunde uppfattas som varietet.

Anträffad i *Småland*, Gärdserums s:n, Bossgård (förf.).

4. **H. *frondosum** Lönnr. *n. subsp.*

Caulis 35—60 ctm. altus magis minusve purpurascens, sat robustus ± rigidus subflexuosus 2—5(—7)-folius, plerumque apice paniculatus v. a medio haud raro a basi ramosus, inferne pilis mollibus albidis raris — densiusculis hirsutus leviter stellatus, superne parce pilosus — subglabrescens sparsim v. apice dense floccosus et glandulis raris v. solitariis obsitus. *Folia rosularia* 3—5 sub anthesi plerumque persistentia, exteriora late ovalia — obovato-oblonga v. rotundato-ovalia apice rotundata — obtusa undulato-dentata v. minute denticulata, intermedia magna ± ovato-lanceolata — lanceolato-oblonga v. obovato-oblonga v. etiam lanceolata obtusiuscula — acuta et intimum ± elongate ovato-lanceolatum — lanceolatum in apicem breviter — longe acutum protractum regulariter et argute sparsim — sat crebre serrato-dentata v. interdum subirregulariter et longius dentata rarius minute crenulato-dentata basi breviter — sat longe descendente; *caulina* sæpius abrupte rarius sensim decrescentia, infimum v. infima interdum longe vulgo breviter petiolata sæpe subsessilia, reliqua sessilia, inferiora ovalia — ovato-lanceolata regulariter et argute serrata interdum irregulariter et grosse serrato-dentata — pauci-dentata v. superiora ovato-lanceolata — lanceolata ad basin crebrius et longe ± inæqualiter subulato — (subinciso-)dentata dentibus sæpe divergentibus acuta basi ± descendente; omnia mollia pallide v. lutescenti-viridia — saturate gramineo-viridia, supra sparsim et breviter pilifera, subtus pilis brevibus densiusculis in nervo dorsali leviter floccoso paullo densioribus et longioribus adspersa, marginibus breviter et sparsim — subdense ciliata, petiolis ± alatis pilis mediocribus sparsis — densiusculis

obtectis. *Anthela* sat ampla paniculata ± composita v. subsimplex parva discreta v. ramoso-paniculata indeterminata, ramis inferioribus ± erecto-patentibus ± remotis, superioribus magis magisque patentibus subrectis approximatis, summis sæpe umbellatis ± superantibus, pedicellis brevibus gracilibus acladioque 10—30(—40) mm. longo ± dense canofloccosis glandulis minutis — minimis gracilibus fuscis v. fusco-cerinis inferne raris — sparsis sub involucris densioribus obsitis. *Involucra* mediocria crassiuscula sordide fusco- v. virescenti-canescentia basi rotundato-ovata postea ± truncata. *Squamæ* frequentes subimbricatæ sordide virescentes dorso fusco, latiusculæ e basi latiore in apicem obtusum v. acutiusculum ± obscurum sensim angustatæ, floccis tenuibus æqualiter sparsis v. ad apicem magis confertis ± pulverulentæ, exteriores breves angustiores obtusæ marginibus magis floccosæ, dorso glandulis tenellis fuscis v. cerinis sat dense obtectæ. *Calathidium* sat obscure luteum. *Ligulæ* non ciliatæ. *Stylus* luteus v. viridulus, postea sæpe obscurascens.

Inv. $\frac{10—11}{5—6}$, D. 30—35, L. m. 2,5 mm.

En mycket vacker form, utmärkt af temligen breda, ovala till ovalt-lancettlika yttre eller aflånga till lancettlika inre få- och glestandade rosettblad, få- till mångbladig stjelk, hvars nedre blad äro ovala till äggrundt lancettlika och ibland skaftade — hos mångbladiga former dock kortare samt oskaftade — glest fåtandade till sågtandade eller ojemt och gröfre fåtandade nedre stjelkblad och m. l. m. äggrundt lancettlika till lancettlika, oskaftade, fåtandade eller vid basen ofta djupt hvasst och tätt samt något ojemt tandade öfre stjelkblad, alla vanligen med framåtrigtade eller vid basen med något utstående tänder och af oftast rent gräsgrön, stundom blekgrön färg, utbredd inflorescens, hvilken oftast är mångblomstrig med utspärrade grenar, men framförallt utmärkt genom sina korta, brunaktigt grågröna holkar med trubbiga fjäll, hvilka öfverallt äro klädda med m. l. m. rikligt, mest mot spetsarne och kanten isynnerhet af de yttre utströdt, kliliknande stjernludd och temligen täta, brunaktiga eller gulaktiga, fina glandler. Stiftet är oftast från början gult eller svagt grönaktigt. Varierar rätt mycket till habitus genom stjelkens olika bladrikedom och bladformen, liksom de flesta former af denna grupp. Fåbladiga former hafva vanligen de flesta af rosettbladen mera trubbade och fåtandade och ofta med största bredden ofvan midten, liksom de nedre skaftade eller stundom långskaftade stjelkbladen. Inflorescensen är ofta hos dessa former mera utspärradt grenig men varierar liksom hos öfriga, fåblomstriga former enkel och hopdragen. Hos former med många stjelkblad, hvilka i motsats mot de nyssnämda, som äga *vulgatum*-habitus, ofta äro ganska *rigidum*-lika, äro de flesta rosettbladen liksom stjelkbladen, hvilka stundom alla äro oskaftade, spetsiga, ofta skarpspetsade och vanligen längre, tätare och isynnerhet vid basen ojemnare tandade. Mellan dessa ytterlighetsformer i habitus finnes likväl alla öfvergångar. Stundom bli alla bladen smala, grundt och kort glestandade, förnämligast på torrare, magrare lokaler. Liknar habituelt än *H.* **irriguum* än *H.* **violascens* men är lätt skild från båda genom holkarnes beklädnad. Är nära beslägtad med båda, af hvilka den står närmare den sednare. Liksom denna har den de yttre bladens undersida, stundom äfven stjelkbladens, isynnerhet hos individer med mörkare bladfärg, lifligt och starkt violettfärgad. Derjemte saknar den nästan alltid den ljust purpur- eller blodröda färgen på bladspetsarne, hvilken är så karaktäristisk för *H.* **lepidiceps* och *H.* **irriguum*.

Inom området anträffad i *Östergötland*, Wist s:n, Sturefors och Wessentorp; Trehörna s:n, Slangeryd; Rinna s:n, Stortorp; Sunds s:n, Löfåsa, Sandbäckstorp och Rödkulla; V. Ryd s:n, Krämarbo; Åtvids s:n, Adelsnäs, Karstorp och Slefringe (förf.): *Småland*, Rogberga s:n, Klefarp (K. JOHANSSON); Vrigstads s:n (G. WETTER); Gärdserums s:n, Bossgård (förf.); Gladhammars s:n, Thorsfall; Fagerhults s:n, Fagerhults herrgård; Mörlunda s:n, Haddetorp; Järeda vid Sällevarån (K. J. LÖNNROTH); Drefs s:n, Braås (G. E. HYLTEN-CAVALLIUS): *Gotland*, Klinte s:n, Walla (K. J. LÖNNROTH).

Utom området i *Södermanland*, St. Malms s:n, Brännkärr; Julita s:n, Gimmersta (G. A:N MALME).

β poliochlorodes n. var.

Caulis humilior 3—4-folius, gracilis. *Folia* pallidiora rosularia oblongo-lanceolata — lanceolata; *caulina* elliptico-lanceolata — lanceolata creberrime anguste et inæqualiter crenulato-dentata dentibus sæpe patentibus v. subrepandis. *Anthela* plerumque parva contracta sæpe simplex, ramis pedicellisque brevibus acladioque brevi — brevissimo cum superiore parte caulis dense canotomentosis eglandulosis v. glandulis raris sub involucris sparsis longioribus obsitis. *Involucra* minora crassa griseo-viridia variegata glandulis sat densis longioribus vestita, squamis exterioribus brevibus triangularibus, interioribus elongate triangularibus obtusiusculis — acutis, omnibus dorso sparsim stellatis marginibus densius usque ad apicem comatulum floccosis. *Stylus* ut in precedente.

En utmärkt form, hvilken måhända snarare bör anses som en god underart än som varietet, i alla händelser nära beslägtad med föregående. Till habitus och bladens tandning erinrar den om *H. *anfractum* (hufvudformen) och smärre exemplar af *H. *chlorodes*, men är väl skild från dessa både genom holkarnes bekládnad. Från hufvudformen är den skild genom längre glandler, bredare och grönare fjäll med hufvudsakligast åt kanterna hopadt, ehuru glesare, stjernludd samt smärre holkar m. m. De yttre rosettbladen äro vanligen smala, grundt tandade, de inre oftast bredare och djupare tandade. De nedre stjelkbladen äro ofta i förhållande till längden bredare än de inre rosettbladen och de öfre aftaga hastigt i bredd och längd. Alla bladen äro ljusa, starkt och ojemt inskuret sågtandade eller nästan dubbelsågade och vid basen isynnerhet oftast fint inskurna samt hafva m. l. m. kort, helbräddad, skarp spets. Liksom hos hufvudformen äro stjelkbasen, bladskaften och ofta äfven bladens undersida brunvioletta.

Anträffad i *Småland*, Mörlunda s:n, Haddetorp; Kråksmåla s:n, Barkebo; Madesjö s:n, Mellan-Örsjö och Brånahult samt nära Orrebäck och Ellebäck (K. J. LÖNNROTH); Ö. Thorsås s:n, Sjölyckorna (K. A. TH. SETH); Vrigstads s:n (G. WETTER).

5. **H. *violascens** ALMQU. *n. subsp.*

DAHLST., Hier. exs., fasc. II, n. 65.

Caulis 30—70 ctm. altus (1—)2—3(—4)-folius ± gracilis, inferne violascens pilis brevibus sparsis — densiusculis hirtus sparsim stellatus, superne parcius et breviter piliferus sparsim — densiuscule stellatus, apice subtomentellus et glandulis solitariis obsitus. *Folia rosularia* 2—4, exteriora ± late — anguste ovalia (— ovali-oblonga) subintegra v. obtuse denticulata — undulata basi ± descendente v. ovata

raro etiam abrupta ± obtusa, intermedia ± oblonga — oblongo-lanceolata v. elliptica obtusiuscula — acuta et intima ± elliptico-lanceolata — anguste v. late lanceolata ± longe acuta basi in petiolum alatum sensim descendente v. breviter cuneata, omnia vulgo sparsim et obtuse v. crebrius et angustius ± breviter et subirregulariter dentata rarius (vulgo ad basin) grosse et profunde dentata; *caulina* magna v. mediocria sursum abrupte decrescentia, infimum ± petiolatum in petiolum alatum descendens ± ellipticum — ovato-lanceolatum — lanceolatum, superiora sessilia ovata — ovato-lanceolata — rhomboideo-lanceolata basi cuneata v. ± oblique dilatata ovata interdum abrupta, omnia sparsim et argute serrato-dentata v. inæqualiter subulato-dentata ad basin interdum ± longe pinnatifido-dentata v. etiam subintegra in apicem ± integrum et ± longum acutum attenuata, summum sæpius minutum lineare acutum v. lineare — lingulatum obtusiusculum subintegrum; folia omnia obscure viridia subprasina, supra glabrescentia v. rare et breviter pilosa sæpe levissime stellata, subtus pallidiora et præsertim rosularia exteriora sæpe valde hepatico-violascentia sparsim et breviter pilosa sparsim præsertim in nervo dorsali piloso stellata, marginibus brevissime et sat dense ciliata, petiolis ± alatis violascentibus pilis longioribus sparsis v. densiusculis hirtis. *Anthela* ± paniculata contracta — laxa angusta v. sat ampla sat composita ramis mediocribus — longioribus vulgo ± approximatis, summis sæpe umbellatis ± erecto-patentibus subrectis v. ± arcuatis gracilibus ± superantibus pedicellis sat brevibus — mediocribus apice crassioribus ceterum gracilibus acladioque 10—30 mm. longo dense canofloccosis glandulis minutis gracilibus obscuris sparsis v. densiusculis — densis et pilis brevibus — brevissimis nigris v. brevissime cano-apiculatis sparsis — densis hirtis. *Involucra* mediocria v. parva crassiuscula — sat gracilia e viridi fusco-canescentia subvariegata basi ± ovata v. sæpe conica postea rotundata. *Squamæ* latæ — latiusculæ, exteriores breves ± triangulares ± obtusæ, interiores elongatæ triangulares obtusæ — obtusiusculæ, intimæ acutæ, omnes leviter comatæ apice et dorso ± late fuscæ v. fusco-virescentes, marginibus ± sordide virentibus ± dense et late præsertim apicem versus floccis canis laxis limbatæ, ceterum sparsim — densiuscule floccosæ pilis canescentibus v. obscuris brevibus ± densis — sat confertis hirtæ glandulis minutis obscuris — lutescentibus sat densis — densis obtectæ. *Calathidium* ± obscure luteum. *Ligulæ* glabræ. *Stylus* vivus livescens v. niger, siccus fere ater.

Inv. $\frac{9—10}{4—6}$, D. c. 35, L. m. 2—2,5 mm.

En mycket framstående form, utmärkt genom mörkgröna, vanligen undertill lifligt violetta eller lefverfärgade blad med vexlande tandning, antingen glest och något ojemt tandade med rakare och kortare tänder eller tätare och skarpare tandade med längre, ofta krökta, utstående, eller mestadels framåtrigtade tänder, och af hvilka de yttre rosettbladen vanligen äro ovala till aflånga och trubbiga, de inre och stjelkbladen mera elliptiska eller lancettlika och spetsade, genom enkel eller sammansatt, vanligen föga vid inflorescens med smala, m. l. m. upprätta till utstående, ej sällan böjda, af rikt stjernludd gråa grenar och skaft, hvilka sednare äro m. l. m. rikligt klädda af korta, mörka hår och glandler, genom

vanligen små holkar af brungrå till gröngrå färg och m. l. m. brokiga af rikt ludd i fjällens kanter, men föröfrigt äfven på ryggen af fjällen m. l. m. stjernludna och klädda af täta, korta, vanligen mörka hår och små, mörka eller ljusknappiga glandler, samt genom rätt täta, små korgar med mycket mörka stift. Stjelkens bas och stundom äfven större delen af stjelken samt bladskaften äro oftast mörkare eller ljusare violetta.

Bladen variera ej obetydligt till tandningen. Än erinrar denna form, isynnerhet genom sina tätare, oregelbundet ordnade, smala och något krökta, omvexlande längre och kortare tänder på stjelkbladen, om *H. *irriguum* och *H. *frondosum*, än genom sina glesare eller stundom nästan helbräddade blad, isynnerhet rosettbladen och de öfversta stjelkbladen, om *H. *lepidulum*. Isynnerhet påminna individ med det öfversta stjelkbladet smalt, helbräddadt och tunglikt samt sittande i närheten af inflorescensen om den sednare. För öfrigt äro de yttre bladen vanligen glesare och trubbigare tandade, de inre och stjelkbladen deremot hafva spetsigare men kortare och åtminstone ofvan midten glesare tänder. Stundom anträffas individ med bredare blad. Stjelkbladen äro då ofta till nedre delen långt och ojemt, ofta nästan parflikigt tandade, stundom äfven rosettbladen, af hvilka de yttre ej sällan bli nästan rundade med äggrund eller tvär bas. Någon gång anträffas individ med svagt intryckt bas på några af de yttre bladen; oftare anträffas en sådan form på basen hos något af de öfre stjelkbladen, hvarvid basaltänderna ofta bli något bakåtrigtade. Mycket ofta äro de öfre bladen från midten till basen jembreda, hvarvid basen blir tvär och stundom ser ut att vara halftomfattande. Med ofvannämde tre underarter är den utan tvifvel nära beslägtad men påminner mest om *H. *frondosum* och *H. *irriguum*. Den liknar mycket den förra till habitus och holkfjällens stjernluddskant, den sednare mera till holkens och holkfjällens form och den öfriga hårbeklädnaden, ehuru glandlerna och isynnerhet håren äro betydligt mindre och tätare. Den blir aldrig så mångbladig och sällan så högväxt som den sednare och saknar alltid den blodröda eller rödvioletta färgen på bladspetsarne. Liksom hos denna sednare är ofta något af stjelkbladen af något rhombisk form och derjemte snedt genom starkare utveckling af ena sidan. På några ställen i Småland och Östergötland förekomma former, om hvilka är svårt att afgöra, huruvida de tillhöra denna art eller följande. De hafva på holkarne något mera ludd än följande men mindre än hos typisk *H. *violascens* samt vanligen mörkare holkar, färre hår och mörkare glandler än den sistnämda. Ju mera de till holkarnes utseende närma sig *H. *irriguum* desto mera framträder den för denna karaktäristiska tandningen och bladspetsarnes färg. De bevisa den nära slägtskapen mellan dessa båda former och på samma gång, att dessa ännu ej på alla orter fullt differentierats, ehuru de i sina typiska former och på andra trakter äro väl skilda. Så vidt kändt är sammanträffa bådas utbredningsområden i Östergötland och Småland. Men måhända kunna dessa former likaväl vara hybrider som verkliga mellanformer.

De äro anträffade i *Småland*, Öggestorp s:n, Högåsen (K. JOHANSSON), former stående närmare *H. *irriguum*; *Östergötland*, N. Vi s:n, Siggemålen, former stående närmare hufvudformen.

*H. *violascens* väljer helst friskare eller mindre ofta torrare bergiga eller steniga skogsängar. På en del ställen är den mycket allmän.

Anträffad inom området i *Östergötland*, Gårdeby s:n, Örsby (H. STRÖMFELT); Omberg, Stocklycke; Svanshals s:n. St. Kullen; Rinna s:n, Stortorp; Trehörna s:n, Slangeryd; Sunds s:n, Ång, Sundsö, Sunds Norrgård, Sandbäckstorp, Sunds prestgård, Löfåsa och Graby m. fl. st. (förf.); N. Vi, Urbärget (K. F. DUSÉN), Siggemålen; V. Ryd s:n, Krämarbo (förf.): *Småland*, Askeryds s:n, Bordsjö (förf.); Rogberga s:n, Klefarp, Tenhult, Heljaryd, Mjölaryd och Ingaryd; Öggestorp s:n, Månsarp, Romelsjö och Ljungarp; Ödestuga s:n, Hiegöl; Forserums s:n, Lättarp (allt enl. K. JOHANSSON); Vrigstads s:n (W. A. G. WETTER); Burseryds s:n, Mölneberg (K. A. TH. SETH); Fagerhults s:n, Eskebäck; Kråksmåla s:n, Barkebo (K. J. LÖNNROTH); Drefs s:n, Braås och Lidsjö; Moheda s:n, Brantåsa (G. E. HYLTÉN-CAVALLIUS); Femsjö (K. O. E. STENSTRÖM).

Utom området anträffad i *Skåne*, Ignaberga kalkbrott (G. A:N MALME): *Vestergötland*, Toarps s:n (A. O. OLSSON).

β badioviolaceum K. JOHANSSON in litt. n. var.

Stjelk spädare, hårigare. *Blad* med bredare och trubbigare tandning, undertill brunaktigt violetta. *Inflorescens* kvastlik eller flocklik och fåblomstrig med fina, gråa grenar, klädda af tätt stjernludd med glesa, fina, mörka hår och något talrikare, längre, mörka, gulhufvade glandler. *Holkar* mindre, grönaktigt svartbruna med smalare och spetsigare, i toppen bruna fjäll, de inre i kanterna med några glesa stjernhår, de yttre med något tätare ludd i kanterna, för öfrigt med spridda stjernhår på fjällens midt samt med fina, medelstora, mörka, gulknappiga, temligen talrika glandler och få, mörka, längre hår. *Stift* mörka, nästan svarta.

Liknar hufvudformen till bladen och påminner om följande till de mörka, luddlösa holkarne, men skild från båda genom spädare växt, trubbigare tandning, smärre, både glesare glandelhåriga och håriga holkar samt smalare fjäll. Liknar till holkarne något *H. *barbareæfolium*, hvilken aldrig har hår bland glandlerna och dessutom afviker genom bredare fjäll af grönsvart färg, en annan bladform och bladfärg m. m. Är för öfrigt i karaktärer delvis intermediär mellan hufvudformen och *H. *punctillatum* ALMQU.

Anträffad i *Småland*, torr löfäng i Forserums s:n, Lättarp (K. JOHANSSON).

6. **H. *irriguum** FR.

H. vulgatum — irriguum FR., Symb. p. 117. — H. vulgatum γ irriguum LBG., in Hn. Fl. ed. 11 p. 47 (saltim pro parte). — C. J. LINDEBERG, Hier. Scand. exs. n. 37 (?). — H. irriguum STENSTR., Värml. Arch. 1889. — DAHLST., Herb. Hier. Scand., Cent. II, n. 63.[1]

Caulis elatus, 50—90 ctm. altus gracilis — sat crassus flexuosus sæpe firmus et rigidus 2—5-folius, inferne pilis brevibus sparsis v. densiusculis — densis superne sparsis v. raris scaber v. superne sat glabrescens leviter et apice sparsim — densius stellatus et glandulis solitariis v. raris sæpe obsitus. *Folia basalia* 1—4, exteriora sæpius sub anthesi emarcida ± ovalia — oblongo-ovalia sparsim dentata obtusa, intermedia ± late — anguste oblonga — oblongo-lanceolata sparsim — crebrius dentata obtusa — sat acuta, interiora ± anguste — late lanceolata crebrius et argutius ± inæqualiter haud raro sat profunde et grosse serrato-dentata ±

[1] *H. *irriguum* står af alla till denna artgrupp hörande former närmast *H. anfractum*.

longe acuta, omnia basi ± v. sensim descendentia; *caulina* sensim v. cito decrescentia ± elliptico- v. elongato-lanceolata (sæpe ± oblique) subrhomboidea, infimum ± petiolatum vel in petiolum late alatum sensim descendens, superiora sessilia ± longe decurrentia v. basi contracta sæpe subrotundata affixa, summa lineari-lanceolata, omnia in apicem acutum — cuspidatum ± longe protracta ± crebre et argute serrato-dentata — grosse et ± inæqualiter fere duplicato- et serrato-dentata apicibus in utraque pagina sæpius fusco- v. sanguineo-purpurea, rosularia exteriora interdum subtus violascentia, omnia saturate et pulchre gramineo-viridia, supra breviter et sparsim pilifera v. subglabra, subtus pallidiora rare — sparsim et breviter pilosa in dorsali nervo leviter stellata longius et densiuscule pilosa, ceterum haud v. (caulina summa) leviter stellata, marginibus breviter et sat dense ciliata, petiolis superne præsertim alatis pilis sat longis densiusculis — sat densis hirsutis v. leviter pilosis. *Anthela* ± paniculata simplex — valde composita interdum indeterminata, ramis inferioribus ± distantibus ± erecto-patentibus vix superantibus, superioribus sæpe valde approximatis ± patentibus sæpe ± arcuatis et summis interdum umbellatis ± superantibus ± gracilibus, pedicellis mediocribus v. brevibus sub involucris ± incrassatis acladioque 5—15 mm. longo e viridi ± fusco-canescentibus sparsim — densiuscule superne sat dense floccosis glandulis atris gracilibus parvis — mediocribus inferne raris — sparsis superne ± densis et pilis obscuris v. nigris ± longis solitariis (— sat densis sub involucro) v. subnullis obtectis. *Involucra* sat gracilia mediocria v. parva e viridi fusco-atra basi ovata v. conica postea ± ovato-rotundata. *Squamæ* irregulariter imbricatæ ± elongatæ triangulares, exteriores breves ± obtusæ — obtusiusculæ, interiores obtusæ obtusiusculæ — sat acutæ, intimæ acutæ (v. paucæ cuspidatæ) apice sæpe fusco- v. piceo-coloratæ nudæ vix comatæ, ceterum subnudæ v. marginibus (squam. exteriorum præcipue) levissime stellatæ glandulis gracilibus parvis — longioribus atris v. fuscis dense — sat conferte obtectæ pilis paucis (v. sat densis) obscuris v. nigris vestitæ. *Calathidium* obscure luteum. *Ligulæ* apice glabræ. *Stylus* sat obscurus — coracinus.

Inv. $\frac{9-10}{4-6}$, D. 30—35, L. m. 2 mm.

Denna genom sin habitus och sina karaktärer synnerligen framstående form utmärker sig genom sin höga, vanligen trebladiga stjelk, vanligen m. l. m. bredt lancettlika, ofta groft och ojemt tandade blad med långa, smala, utdraget triangulära, spetsiga eller vid basen nästan jembreda och framåt krökta tänder, m. l. m. regelbundet omvexlande med smärre uddtänder, det nedersta smalare och längre eller kort vingskaftadt, de öfre med m. l. m. långt afsmalnande bas eller de mellersta med temligen bred vidfästning, vanligen tidigt vissnade yttre, m. l. m. trubbade och fåtandade rosettblad, de inre kvarsittande och af stjelkbladens form men grundare tandade, alla oftast i spetsen på båda sidor lifligt purpurfärgade eller brunvioletta till blodröda, oftast rik kvastlik inflorescens med uppåt vanligen närmade grenar och skaft, hvilka äro raka eller m. l. m. böjda, små till medelstora, grönaktigt svarta till svartbruna holkar, klädda af ytterst glest, vanligen knappast märkbart stjernludd, förnämligast i de yttre fjällens kanter och vid deras bas, samt af rikliga, svarta eller svartbruna, temligen små till medelstora, fina glandler, blandade

med få eller ej sällan talrika, mörka, oftast svarta eller kort hvitspetsade hår, samt vanligen mycket mörka stift.

Är mycket nära beslägtad med föregående, hvars högväxtare, flerbladiga former med mera tandade blad den habituelt liknar, men är väl skild genom sina nästan nakna m. l. m. svarta holkar, skarpspetsade, tätare och ofta längre tandade, smalare men större blad och den ofta uppträdande blodröda färgen på bladspetsarne. Denna färg framträder än endast i sjelfva spetsen än sträcker den till hälften eller större delen af bladen. Den uppträder helst och normalt på fuktiga ställen, hvilka denna form föredrager framför torrare, och blir här liflig, ofta blodröd. På torrare ställen försvinner den oftast alldeles samt är, då den någon gång förekommer, mera brunaktig och ofta inskränkt till sjelfva spetsen. På dylika lokaler blir för öfrigt hela växten mera hårig, bladen mattare och holkarne jemte skaften rikligare och längre glandelhåriga med ganska rikligt bland glandlerna inblandade, svarta, långa hår samt fjällen spetsigare och längre (i holkens yngre stadier stundom långt öfverskjutande).[1] På mycket fuktiga eller våta lokaler blir hela växten mera glatt, holkarne mera glänsande och jemte skaften klädda af mindre och ej så tätt sittande glandler, ofta hårlösa eller med färre och korta, fina, inblandade hår. Varierar för öfrigt med stjernluddet framträdande som en ytterst fin strimma i fjällkanterna eller på fuktiga ställen nästan alldeles felande. De inre, mera grönkantade fjällen äro alldeles nakna. Vanligen hafva holkarne konisk, i det upptill förtjockade skaftet nästan öfvergående eller stundom äggrund bas. Fåbladiga exemplar hafva genom glesare tandning, ofta undertill mera violetta blad, glesare inflorescens m. m., större likhet med former af föregående. Stundom äro dessa äfven något rikligare luddiga i kanterna af fjällen (äfven de inre).

Anträffad inom området i *Östergötland*, Åtvids s:n, Karstorp och Slefringe samt Adelsnäs (förf.): *Småland*, Gärdserums s:n, Bossgård (förf.).

Utom området i *Upland*, Löfsta s:n, Svartängen (C. A. E. LENSTRÖM): *Vermland*, sydvestra delen flerestädes (K. O. E. STENSTRÖM). — *Norge*, Kamphaug i Nordmarken (enl. C. J. LINDEBERG). Denna sednare form afviker något bland annat genom alldeles hårlösa holkar och måhända gula stift.

7. **H. *obscuriceps** *n. subsp.*

DAHLST., Hier. exs., fasc. II, n. 72.[2]

Caulis sat elatus gracilis viridis subflexuosus 3—4-folius, inferne sparsim et molliter pilosus et sparsim stellatus sæpe ± violascens, superne rarissime pilosus et parce stellatus, sub anthela subtomentellus. *Folia* læte viridia; *basalia* pauca 2—5, exteriora ovalia — oblonga subintegra — denticulata, interiora ± oblongo-lanceolata — lanceolata inferiore parte ± dentata ad apicem subintegra obtusiuscula — acuta; *caulina* longe distantia cito decrescentia, superiora sessilia, infimum breviter petiolatum, ± oblongo-lanceolata — lanceolata v. superiora ± obtusiuscula — bre-

[1] Dylika former torde vara medelformer till den ytterst närstående *H. *subirriguum* DAHLST., apud. C. O. v. PORAT, Kungsörtraktens Hieracier. Bot. Notis. 1894, sid. 33 och följ. — DAHLST., Herb. Hier. Scand., Cent. V (1893) n. 39, 40. *Anm. under tryckningen.*

[2] Hit hör troligen äfven *H. vulgatum* FR. *var. dentata* LBG. Hier. Scand. exs., fasc. II, n. 72.

viter acuta anguste ovato-lanceolata acute sparsim et breviter supra medium dentata sæpe sinuato-dentata, superiora acutius et ad basin longius dentata; omnia supra subglabra, subtus pallidiora, rare in nervo dorsali magis floccoso densius pilosa, ceterum sparsim stellata, marginibus sat ciliata petiolisque longius et densius pilosa. *Anthela* vulgo parva oligocephala paniculata ± contracta rarius laxa ramis rectis suberectis v. leviter patentibus, inferioribus ± remotis vix æquantibus, superioribus approximatis æquantibus cum acladio 15—20 mm. longo pedicellisque brevibus ± dense albido-tomentosis et pilis brevibus tenellis sparsis — mediocriter densis glandulisque solitariis v. superne raris obsitis. *Involucra* ± atro-viridia v. atra nitentia basi ± ovata. *Squamæ* exteriores breves apice sæpe recurvatæ, interiores longæ latiores ± lanceolatæ — lineares obtusiusculæ, intimæ sæpe subulatæ latius viridi-marginatæ, dorso glandulis obscuris parvis densiusculis — sat densis et pilis ± obscuris raris — sparsis vestitæ, vix stellatæ. *Calathidium* luteum. *Stylus* subluteus v. obscurascens.

Denna form är ytterst svår att diagnosticera, då den ej har några serdeles framstående karaktärer. Närmast ansluter den sig till *H. anfractum* i anseende till habitus och i några karaktärer, men är skild från denna genom sina, om än stundom sparsamt håriga holkar och skaft. Mången gång liknar den ofantligt mycket en del former af *H. *lepidiceps* (hvilken den troligen står närmast), men är från dessa skild genom sina mörka holkar och sin hårighet i inflorescensen. I detta afseende öfverensstämmer den mest med *H. *scanicum*, med hvilken den torde vara beslägtad, ehuru i ringare grad än med de förut nämda. Men från denna sednare, som till habitus och bladform ansluter sig till *H. *pinnatifidum* och äfven genom sin rikliga hårighet i örtståndet och gröfre och tätare glandelhårighet i inflorescensen betydligt närmar sig samma formserie, som *H. *diaphanum* m. fl. tillhöra, och till *H. diaphanoides*, är förhandenvarande form genom sin större glatthet lätt skild och är genom sina allmänna karaktärer närmast att inordna i grannskapet af *H. *lepidiceps*. I naturen har jag alltid med lätthet kunnat skilja den från *H. anfracti* olika former på de ljusare stiften och från *H. *lepidiceps* på de bugtigare och mera bredtandade, bredare och mera kortspetsiga bladen samt på de mörkare och tjockare holkarne med mindre klart grön kant på de inre fjällen och från båda genom de vanligen fina, bland glandlerna inblandade håren på holkar och skaft.

Är anträffad i *Östergötland*, Ydre, Sunds s:n, flerestädes allmän samt i Åtvids s:n, Adelsnäs, Karstorp och Slefringe m. fl. st. (förf.). Dessutom funnen vid Marmorbruket i Qvarsebo socken i samma landskap (S. ALMQUIST m. fl.).

8. **H. *batylepium** *n. subsp.*

H. longicuspis mihi in sched.[1]

Caulis 35—60 ctm. altus sat gracilis firmus 3—5-folius, inferne sparsim et longe pilosus leviter stellatus, superne subglaber v. rare pilosus et sparsim floccosus, apice sat tomentellus glandulis raris v. solitariis obsitus. *Folia basalia* 3—6, ex-

[1] Namnet är redan gifvet af M. BRENNER i »Spridda bidrag till kännedom om Finlands Hieraciumformer II: Acta Soc. pro fauna et flora fennica, IX, n:o 5» åt ett annat Archieracium, hvarföre jag måst välja ett nytt. *Anm. under tryckningen.*

teriora late — anguste ovalia v. oboblonga subintegra v. undulata obtusa, intermedia ± oblongo-lanceolata sparsim et breviter dentata obtusiuscula — breviter acuta, interiora ± late — anguste lanceolata v. elongate lanceolata ± crebre et late ± obtuse — sat acute sæpe irregulariter et sat grosse dentata acuta — cuspidata, omnia longe et anguste petiolata in petiolum ± sensim descendentia; *folia caulina* sursum sat abrupte decrescentia, inferiora sat longe et anguste petiolata, superiora ± sessilia basi ± longe descendente elliptica — anguste lanceolata sparsius et acute dentata v. ± irregulariter et grosse fere patenter duplicato-dentata in apicem longiorem vel breviorem ± integrum acutum — acuminatum contracta, obscure gramineo-viridia, supra breviter et sparsim pilosa, subtus vulgo fere omnia v. saltim exteriora ± intense hepatico-violascentia, sparsim et in nervo dorsali densiuscule stellato densius pilosa, ceterum rare — sparsim floccosa, marginibus breviter et densiuscule ciliata, petiolis pilis brevibus densiusculis hirtis. *Anthela* vulgo parva ± contracta subsimplex v. sat composita ± paniculata interdum subindeterminata, ramis plerumque sat approximatis, superioribus sæpe ± umbellatis ± erecto-patentibus vix v. haud multum superantibus, pedicellis brevibus ± gracilibus apice ± incrassatis acladioque 10—20 mm. longo dense albido-floccosis glandulis ± longis gracillimis nigris v. viridi-lutescentibus (sparsis —) sat densis et interdum pilis nigris solitariis immixtis vestitis. *Involucra* ± gracilia — crassiuscula sat elongata ± cylindrica obscure fusco-virentia basi ± ovata postea truncata. *Squamæ* angustæ ± lineares flores virgineos longe superantes, exteriores obtusiusculæ, interiores ± acutæ v. intimæ subulatæ apice ipso ± fuscæ, omnes ± virescenti-marginatæ nudæ v. exteriores marginibus levissime et basi leviter stellatæ, ceterum glandulis gracillimis longis et minoribus ± æqualiter immixtis nigris v. fusco-virentibus densis partim sæpe in pilos solitarios — sat frequentes transformatis obtectis. *Calathidium* obscure luteum. *Ligulæ* apice glabræ. *Stylus* vivus et siccus ± obscurus.

Inv. $\frac{9-11}{5-6}$, D. 30—35, L. m. 2 mm.

En såväl habituelt som till karaktärer ganska utmärkt form, anslutande sig dels och närmast till *H. irrigui* formkrets dels till de spetsfjälligare formerna af *H. *atronitens var. medians* och dels i anseende till holkarnes och fjällens form till *H. cruentifolium*. Smalbladigare former likna äfven till habitus rätt mycket den sistnämda. Den är utan tvifvel beslägtad med dessa båda. Bredbladiga former erinra äfven till stjelkbladens form om *H. *scanicum*, till hvilken den äfven rätt mycket närmar sig i anseende till holkarnes beklädnad, men från hvilken den är väl skild bland annat genom bladfärgen, de mörka stiften, de spetsiga fjällen m. m. Framförallt utmärkt af sina mörkgröna, glest och kort håriga, undertill starkt violetta blad, sina groft dubbeltandade eller tättandade stjelkblad och de smala, långt utdragna fjällen, hvilka liksom de alltid rikt hvitludna skaften äro klädda af långa och fina samt inblandade kortare, tättsittande glandler och än alldeles sakna eller äga enstaka, stundom talrika, som det synes af glandler transformerade, mörka hår. Bladen variera smalare med glesare och kortare tandning samt längre spets (stundom utdraget spetsade) till bredare med tätare, längre och gröfre, framåtrigtade eller utstående tänder med bugtiga sidor och hvilka omvexla med kortare uddtänder. De äro ofta något rhomboidiska

med kort, skarp, helbräddad spets och ofta med största bredden ofvan midten. Stjelkens bas eller ganska ofta en större del af densamma samt bladskaften äro violetta. Ej sällan äro bladspetsarne på båda sidor af en klarare blodröd eller brunröd färg, hvilken afviker från undersidans dunkelt violetta färg.

Anträffad i *Östergötland*, N. Vi s:n, Kärremåla och Siggemåleu samt Rinna s:n, Stortorp (förf.): *Småland*, Drefs s:n, Böksholm (G. E. HYLTÉN-CAVALLIUS).

Utom området i *Södermanland*, St. Malms s:n (G. A:N MALME).

H. CRUENTIFOLIUM DAHLST. & LÜB. n. sp.

H. vulgatum FR. — angustifolium FR. H. N. II: 9 p. maxima parte et Symb. p. p. — H. *cruentatum LÜB. (STENSTR. Värml. Archier. 1889 p. p.) — H. cruentatum H. G. LÜBECK in sched. (sec. spec. in herb. LÖNNROTHII).[1] — DAHLST., Herb. Hier. Scand., Cent. II, n. 98, 99.

Caulis 40—80 ctm. altus 2—3-folius gracilis sed sat firmus flexuosus, basi sæpius intense et lucide violaceus, totus glaber — glaberrimus v. pilis rarissimis obsitus (in umbrosis interdum ima basi sat pilosus), apice sparsim — densiuscule stellatus. *Folia* obscure viridia, supra præsertim in apricis densissime purpureo-maculata, subtus sæpe omnia v. solum basalia violascenti-hepatica; *basalia* exteriora ovalia — lineari-oblonga denticulata obtusa mucronata, intermedia ± anguste oblonga — lineari-oblonga obtusiuscula — sat acuta, intima anguste lanceolata longe cuspidata sparsim — sat crebre minute et patentim subulato-dentata, omnia in petiolo anguste alato sæpius violaceo sensim et longe descendentia; *caulina* sæpius cito decrescentia sat longe distantia, infimum petiolatum, superiora sessilia minora, inferiora longissima, omnia ± anguste — angustissime lanceolata sæpius longissime cuspidata ± irregulariter minute et patentim subulato-dentata dentibus sæpe subreversis et ad basin paucis longioribus angustissimis interdum evolutis instructa; omnia supra glabra, subtus sparsim pilifera (caulina sæpe fere glabra) et sparsim — densiuscule stellata, in marginibus breviter et densiuscule ciliata, in petiolis et in nervo dorsali vulgo sat longe et sat dense pilosa. *Anthela* paniculata v. superiore parte v. sæpe tota umbellata vulgo simplex — subsimplex 3—5- raro pleio-cephala ± composita, ramis gracilibus sat longis erecto- v. arcuato-patentibus sæpe longe superantibus, inferioribus interdum longe remotis, superioribus v. omnibus sæpius umbellatim approximatis cum acladio 10—15(—20) mm. longo pedicellisque dense canofloccosis epilosis eglandulosisque v. etiam glandulis pilisque obscuris ubique solitariis sæpissime solum sub involucris evolutis obsitis. *Involucra* sat angusta gracilia obscure fuscoviridia — atroviridia v. sat virescentia basi ovata postea ± rotundata. *Squamæ* exteriores breves angustissimæ, interiores e basi latiore lanceolato-lineares in apicem sæpe vinose v. obscure coloratum longissimum acutum — subulatum nudum flores juniores longe superantem incumbentem attenuatæ, dorso et sæpe

[1] Namnet *cruentatum* har ej kunnat upptagas, emedan det förut enl. DE CANDOLLE'S PRODR. användts (af FROELICH) för ett annat Archieracium.

apice obscuriores, ceterum late virescenti-marginatæ, glandulis nigris ± longis densis gracilibus et pilis nigris apice brevi albido sat dense obtectæ, ceterum dorso basique floccis raris adspersæ. *Calathidium* obscure subcroceo-luteum sat radians. *Stylus* in vivo et sicco obscurus.

Inv. $\frac{10-12}{5-6}$, D. 35—40, L. m. 2—2,5 mm.

Är en bland vår floras mest framstående former såväl genom sitt karaktäristiska utseende som genom sina serdeles distinkta karaktärer. Utmärkt af sin nedtill (stundom helt och hållet) liftigt violettröda, upptill vanligen rent gröna och utom understundom vid sjelfva basen alldeles glatta och glänsande stjelk, de oftast på öfversidan utomordentligt tätt purpurfläckade, smala och lång- samt skarpspetsade bladen (utom de yttre rosettbladen, hvilka äro trubbiga), den gerna flocklika inflorescensen med tätt stjernludna, gråhvita grenar, hvilka skarpt afbryta mot de mörkgröna eller grönaktigt brunsvarta, ganska långa holkarne och än äro helt och hållet än delvis utan annan beklädnad eller klädda af spridda, fina glandler och mörka hår, vidare de långt tillspetsade och utdragna holkfjällen, hvilka äro sparsamt klädda af spridda stjernhår, men tätt betäckta af temligen långa glandler och m. l. m. korta, långt svartfotade hår, samt slutligen de mörkt gula (nästan saffransgula) korgarne. Indumentet (utom stjernluddet) på grenar och skaft varierar rätt mycket till riklighet, fördelning och förekomst. Ofta äro de flesta inflorescensgrenar alldeles utan glandler och hår, isynnerhet till sina nedre delar. Ibland äro enstaka grenar så beskaffade till beklädnaden, medan andra äro klädda af öfverallt m. l. m. spridda glandler och hår. Ofta uppträda dessa gruppvis talrikare. Vanligen äro de rikligast utvecklade på akladiet, som aldrig saknar dem. Dernäst förekomma de talrikast straxt under sjelfva holkarne. Bladens tandning är mycket karaktäristiskt genom de korta, vid basen temligen breda men hastigt hopdragna syl- (och glandel-) spetsade, oftast rätt utstående, ibland bakåtkrökta tänderna, hvilkas sidor derjemte äro inbugtade. De omvexla vanligen oregelbundet större och mindre och äro derjemte ojemt fördelade, styckvis tätare styckvis felande, utefter bladsidorna. Hos frodiga exemplar bli de nedersta tänderna på stjelkbladen och inre basalbladen ganska långa och ofta sylsmala samt nedstiga hos de sistnämda understundom ett stycke på bladskaften. Både stjelken, bladens öfversida och äfven undersidan af stjelkbladen äro mycket glatta. Rikligast men aldrig tät är hårigheten på bladskaften och basalbladens medelnerv samt stundom (i skugga) vid stjelkbasen, på hvilka ställen den derjemte är temligen lång och fin. Ibland är den äfven här gles eller saknas nästan. I bladkanten är den kortare och glesare, hvilket ännu mera gäller bladets undersida. Stjernluddet är bäst utbildadt på basalbladens medelnerv, stjelkbladens undersida och stjelkens öfre samt på inflorescensgrenarne. Med afseende på sina slägtskapsförhållanden står denna form onekligen mycket nära föregående former och närmar sig af alla dessa mest *H.* **batylepium*, hvilken på sin något nordligare utbredningszon tyckes vara en vikarierande form. Å andra sidan har den onekligen en nära slägting i den sydnorska *H.* **melanostictum* Dahlst., Hier. exs., fasc. III, n. 49 (= *H. vulgatum v. elegans* Lbg., Hn. Fl. ed. 11 et Hier. Scand. exs. n. 71) och den dermed närbeslägtade *H. coarctatum* Lbg. (Hier. Scand. exs. n. 130 cum descr.). Genom dessa former förbinder

den *H. anfracti* formgrupp med *H. *caligatum* och beslägtade. Till habitus och bladform påminner den ibland om *H. *lepidiceps*.

Ifrågavarande form har ett betydligt sydligare utbredningsområde än sina samslägtingar. I *Skåne* är den på sina ställen ytterligt allmän, allmännare än andra Archieracier och utgör på vissa trakter (enligt G. A:N MALME och K. O. E. STENSTRÖM) en verklig karaktärsväxt, liksom *H. *basifolium* och *H. *vulgatum* i närmast nordligare område eller *H. *læticolor* på en del lokaler i Mälarprovinserna. I Skåne förekommer den ofta tillsammans med *H. *pinnatifidum* och *H. *vulgatum*, men allmännare än dessa båda. Den synes tillhöra bokformationen.

Inom området funnen i *Småland*, Arby s:n, Ålebo (P. HEBERT); Vrigstads s:n (W. A. G. WETTER); Blädinge s:n, Oby (G. E. HYLTÉN-CAVALLIUS); Urshults s:n (G. E. HYLTÉN-CAVALLIUS); Femsjö s:n, fl. st. (E. FRIES), Bollshult (TH. M. FRIES 1851, utdelad dels under namn af H. bifidum KIT. dels under namn af H. vulgatum — angustifolium FR.), Valshult (G. E. HYLTÉN-CAVALLIUS, K. O. E. STENSTRÖM).

Utom området funnen i *Blekinge*, Holmsjö s:n; Spjutsbygds s:n på fl. st. (H. G. LÜBECK); Ronneby (C. G. WESTERLUND); Skaftö (F. SVANLUND): *Skåne*, Ignaberga kalkbrott; V. Vrams s:n (G. A:N MALME); Tullstorps s:n; Röstånga s:n (K. O. E. STENSTRÖM); Farhults s:n (H. O. J. WALLENGREN); Lundertun nära Engelholm och Hallandsås vid Bokesliden (B. LIDFORS); Hallands Väderö (L. M. NEUMAN): *Halland* (K. O. E. STENSTRÖM).

H. ANFRACTUM (Fr.)

Caulis altus — elatus 2—7-folius, inferne sparsim — densiuscule et longe pilosus, medio sparsim pilosus, apice glaber — subglaber, inferne sparsim superne densius floccosus — tomentellus v. tomentosus, basi ± violascens. *Folia* læte — saturate gramineo-viridia — prasino-viridia haud multum pilosa, supra sæpe subglabra nitentia, subtus pallidiora et sæpe leviter v. in nervo dorsali densiuscule floccosa; *basalia* vulgo pauca 1—4 in rosulam ± laxam approximata sparsim denticulata — acute v. obtuse dentata raro ad basin profundius dentata; *caulina* ± remota abrupte decrescentia v. magis approximata sensim in bracteas abeuntia sparsim dentata v. ad basin profundius et crebrius dentata rarius serrato-dentata — subpinnata vulgo angusta. *Anthela* laxa ramis longioribus v. contracta angusta ramis brevibus; ramis pedicellisque dense tomentosis parce v. sparsim glandulosis patentibus magis rectis v. erectis subarcuatis. *Involucra* virescentia — sat atroviridia v. atra sæpe ± nitentia efloccosa v. rare floccosa glandulis brevibus vulgo gracilibus obsita epilosa v. rarissime et vulgo breviter pilosa. *Styli* nigri.

De former, hvilka sammanförts under denna benämning, bilda en mycket naturlig och väl sammanhängande grupp. Alla utmärka de sig genom föga håriga, ofvantill oftast glänsande blad, grönaktiga eller svarta, ofta glänsande holkar med föga synligt eller intet stjernludd och fina, mörka, vanligen korta, glesare eller tätare glandler, hvilka mera sällan äro blandade med få, vanligen mörka och föga framträdande hår, tätt stjernludna glest eller icke glandelhåriga grenar och skaft samt mörka, oftast nästan svarta stift. De gränsa dels till *H. irrigui* formgrupp, t. ex. *H. *hemidiaphanum*, hvilken synes beslägtad med *H. *lepidiceps*, dels till *H. diaphanoides*, till hvilken hufvudmassan af formerna, men framförallt *H. *barbareæfolium* närmar sig och dels till *H. gothicum* (nämligen till *H. *patagi-*

arium m. fl.) förnämligast genom *H. *chlorodes* och *H. *eurycybe* men äfven genom *H. *atronitens* och *H. *subampliatum* (genom hvilken den gränsar till *H. *adampliatum*).

Conspectus subspecierum.

1. *Involucra* dorso v. in marginibus squamarum leviter et sat conspicue stellata.

a. *Squamæ* virides v. virescentes, plurimæ obtusæ — obtusissimæ ± latæ.

Folia caulina angusta in apicem ± longum integrum protracta. *Squamæ* glandulis gracilibus ± longis dense — conferte obsitæ, ubique floccis raris — sparsis in marginibus densioribus adspersæ.

1. *H. *chlorodes* Dahlst.

Folia caulina ± lata acuta. *Squamæ* glandulis longis et mediocribus crassis densiusculis — sat densis et pilis solitariis v. raris nigris obsitæ, dorso rarissime stellatæ.

2. *H. *eurycybe* Dahlst.

b. *Squamæ* ± obscuræ atrovirides, plurimæ angustæ ± acutæ v. latiusculæ ± subobtusæ.

Folia caulina ± lata ovata sparsim — sat crebre serrato-dentata. *Squamæ* lineari-lanceolatæ angustæ acutæ, ubique parce fere ad apicem stellatæ et glandulis gracilibus sat densis obtectæ.

3. *H. *cacuminatum* Dahlst.

Folia caulina sat angusta lanceolata ad basin saltim ± acute longe et inæqualiter pinnato-dentata. *Squamæ* latiusculæ ± lanceolatæ acutæ marginibus levissime sed sat conspicue stellatæ et dorso sæpe rare stellatæ glandulis longis et mediocribus ± gracilibus — validis sat densis obtectæ.

4. *H. *barbareæfolium* Lönnr.

Folia caulina ± anguste et elongate lanceolata — linearia sat longe duplicato- et serrato-dentata. *Squamæ* ± triangulari-lanceolatæ, plurimæ cito in apicem obtusiusculum contractæ dorso et in marginibus exteriorum sæpius levissime stellatæ breviter v. longiuscule ± dense — densiuscule glandulosæ et sæpe pilis tenuissimis canescentibus paucis vestitæ.

5. *H. *anfractum* (Fr. p. p.) Almqu.

2. *Involucra* efloccosa ± atra nitentia.

Folia prasino-viridia breviter acuta — obtusiuscula, caulina 4—7 superiora sæpe subamplectentia latiora, omnia sensim decrescentia ± late et obtuse dentata.

Involucra crassa brevia, squamis latis — latiusculis glandulis gracilibus crassis brevibus ± densis obsitis. *Pedicelli* ± glandulosi.

6. *H.* **subampliatum* Dahlst.

Folia pulchre gramineo-viridia, caulina 2—4 plerumque abrupte decrescentia, superiora vulgo angustiora, inferiora lata, præsertim ad basin crebrius longius et acute dentata ± acuta. *Involucra* parva sæpe gracilia, squamis latiusculis dorso simplici serie glandulis densiusculis — sat densis obsitis. *Pedicelli* vulgo eglandulosi.

7. *H.* **atronitens* Dahlst.

Folia læte viridia, caulina 2—3 longe distantia cito decrescentia basi sparsim et acute interdum longe dentata in apicem longum acutum integrum protracta. *Involucra* ± elongata gracilia, squamis angustis obtusiusculis — acutis glandulis brevibus ± densis obsitis.

8. *H.* **hemidiaphanum* Dahlst.

1. **H. chlorodes** *n. subsp.*

Caulis 35—60 ctm. altus gracilis — crassiusculus 1—4(—5)-folius, inferne pilis longis densiusculis — sat densis obtectus leviter — sparsim stellatus, superne sparsim pilosus v. subglaber et sat floccosus, apice subtomentellus et glandulis solitariis — raris obsitus. *Folia* ± obscure — læte subprasino-viridia, subtus cæsia v. glauca, basalia 2—5 exteriora ± late — anguste oblonga subintegra v. obtuse denticulata — undulata obtusiuscula, intermedia oblongo-lanceolata sat lata — angusta sparsim et subobtuse paucidentata ± acuta, interiora ± anguste lanceolata ad basin v. ad medium sparsim et ± acute dentata in apicem longum acutum integrum contracta, omnia in petiolum sæpe dentibus decurrentibus instructum sensim attenuata; *caulina* infimum v. infima ± angusta petiolata, superiora sessilia vulgo cito v. abrupte decrescentia parva v. magna elongata ± lanceolata — lineari-lanceolata ad medium v. supra ± crebre et acute haud longe subduplicato-dentata v. ad basin modo dentibus paucis sparsis — densioribus minoribus et longis inæqualiter mixtis sæpe pinnato-dentata, ceterum integra et in apicem longum — longissimum cuspidatum v. acutum — obtusiusculum ± æqualiter angustata basi ± contracta v. descendente, omnia supra fere glabra v. rare et breviter pilifera, subtus sparsim et breviter in nervo dorsali sat dense — densiuscule floccoso densius et longius pilosa, ceterum sparsim — densiuscule stellata, marginibus brevissime v. breviter et sat dense ciliata, petiolis ± violaceis sat angustis densiuscule — sat dense hirtis. *Anthela* ± paniculata ampla laxa et ± composita v. magis contracta ± simplex ramis ± rectis basi curvatis patentibus, inferioribus sæpe ± remotis ± longis, superioribus magis magisque patentibus et approximatis sæpe fere umbellatis rectis — sat arcuatis ± longis v. brevibus ± superantibus, pedicellis gracilibus ± brevibus sæpe umbellulam formantibus acladioque 10—30 mm. longo dense canofloccosis glandulis longis —

longissimis nigris inferne sparsis superne densis sub involucris sat confertis obtectis. *Involucra* mediocria sat crassa v. crassiuscula sat viventer atroviridia basi rotundata postea truncata. *Squamæ* latiusculæ — latæ, exteriores breves sublineares — ovato-triangulares ± nigræ marginibus anguste et obscure virentibus, interiores triangulari-lanceolatæ v. lanceolatæ sensim attenuatæ marginibus late viridi-marginatæ dorso angustissimo obscuro v. totæ amoene et dilute gramineo-virides obtusissimæ — obtusæ v. intimæ paucæ acutæ, glandulis nigris (v. obscure virescentibus) longis — longissimis gracilibus dense — conferte obtectæ, ceterum ubique floccis raris — sparsis in marginibus densioribus adspersæ. *Calathidium* ± luteum (sat lætum). *Ligulæ* apice glabræ. *Stylus* vivus et siccus obscurus v. niger.

Inv. $\frac{9—12}{4,5—6}$, D. c. 30, L. m. 2,5 mm.

En serdeles distinkt form, utmärkt af glesbladig stjelk med blad af lifligt grön i lökgrönt dragande färg och undertill vanligen något glaucescenta eller blåaktiga, vanligen få, stora stjelkblad med oftast långt utdragen, helbräddad spets, och hvilka vid basen äro glesare eller tätare, olikformigt och oregelbundet tandade och ofta långflikade, vanligen stora, glest trubbtandade rosettblad med en och annan längre tand, genom de oftast m. l. m. utstående grenarne gles och ganska vid inflorescens (hos magra former dock kort och hopträngd) med medelstora holkar, hvilka vid basen äro svartgröna, men uppåt lifligt och klart gröna, ganska breda, oftast rundtrubbiga fjäll, klädda af ett glest eller mot kanterna något tätare ludd och (liksom de hvitludna skaften) af mörka, långa, ofta tättsittande glander. Korgarne äro ganska ljusa, ungefär som hos *H. *barbareæfolium* eller något ljusare, och stiften ganska mörka. Stjelkbladen äro oftast hos grofväxta individ utböjda och något sneda med långt utdragen, helbräddad spets, hos magrare former (såsom på hedar och torrare backar) smalare, mindre och ofta talrikare samt med tätare och ofta längre fram mot spetsen räckande tandning. Hos sådana former bli stundom alla bladen smalt jembredt lancettlika och inflorescensen liten och hopdragen, hvarigenom de habituelt mycket likna *H. *anfractum* h. f., med hvilken denna form nog är beslägtad, men de skiljas genom sina långa och trubbigare, lifligt gröna inre fjäll, ljusa korgar m. m. De påminna ibland om *H. *frondosum* var. *poliochlorodes*, hvilken dock är lätt skild genom sina små, rikare luddiga holkar med smärre glandler och bredare, långt upp mot spetsen dubbeltandade blad. Är för öfrigt beslägtad med följande och motsvarar jemte denna antagligen *H. *patagiarium*. Står derjemte på gränsen till *H. *diaphanoidis* formområde. De yttre bladen äro ofta lefverfärgade och stjelkbasen samt bladskaften m. l. m. mörkt purpurvioletta. Bladen äro oftast fasta och läderartade, men ej tjocka.

Inom området anträffad i *Östergötland*, Omberg, Stocklycke; Wäderstad s:n, Lindekullen; Rinna s:n, Stortorp; Sunds s:n, Broby (förf.): *Småland*, Sommens jernvägsstation (förf.); Öggestorp s:n, Månsarp, Torp och Rogberga s:n, Tenhult, Ljungarp samt Klefarp (K. JOHANSSON); Vrigstads s:n (W. A. G. WETTER); Wallsjö s:n, Uppåkra samt Dref s:n, Braås (G. E. HYLTÉN-CAVALLIUS); Oskarshamn söder om jernvägsstationen (K. J. LÖNNROTH).

Till denna form ansluter sig följande, hvilken tills vidare uppföres som varietet:

β umbrigenum n. var. — H. vulgatum v. umbrosum C. J. LINDEBERG, Hier. Scand. exs. n. 73. — DAHLST., Herb. Hier. Scand., Cent. II, n. 60.

Stjelkblad i allmänhet talrikare än hos föregående, mera upprätta, dubbeltandade till dubbelsågade med utefter sidorna mera jemt fördelade, spetsigare och rakare samt tätare tänder. Holkar längre och smalare, i mera hopträngd inflorescens. Fjäll smala, längre utdragna, trubbade till spetsiga, för öfrigt som hos föregående, men vanligen med smalare grön kant. Skaften mindre stjernludna. Synes genom bladens tandning och rigtning samt den flerbladigare stjelken, den mera hopdragna inflorescensen och längre holkar m. m. vara mera habituelt skild från föregående än genom verkligt distinkta kararaktärer. Erinrar mycket till bladform om *H.* **anfractum* typ. och *H.* **oinopolepis* G. A:n Malme.

Funnen under en följd af år i Stockholmstrakten på Djurgården (S. Almquist, O. Juel, C. J. Lindeberg och förf.). En form från *Blekinge*, Ronneby (C. G. Westerlund), torde äfven höra hit.

2. **H.** ***eurycybe** n. subsp.

Dahlst., Herb. Hier. Scand., Cent. II, n. 59.

Caulis 30—45 ctm. altus firmus gracilis — crassiusculus 2—4-folius, inferne sparsim v. densiuscule et longe pilosus leviter stellatus, superne rare pilosus — subglaber sparsim floccosus. *Folia* læte gramineo-viridia, subtus pallidiora; *rosularia* pauca vulgo 1—3, exteriora sub anthesi vulgo emarcida ± ovali-elliptica minute et rare denticulata obtusiuscula mucronata, intermedia ± anguste elliptica v. ovato-elliptica sparsim et breviter ± angulato- (v. subruncinato-) dentata et interiora ± lanceolata v. ovato-lanceolata (— subrhomboidea) crebrius et angustius et ad basin magis inæqualiter dentata dentibus sæpe liberis subulatis in petiolum ± longe descendentia v. cuneata, omnia ± acuta; *caulina* vulgo cito decrescentia, infimum (v. infima) longe petiolatum ± ovato-lanceolatum præsertim ad basin dentibus longis sparsis ± patentibus minutisque immixtis irregulariter dentatum basi ± descendente v. breviter cuneata, intermedia breviter petiolata v. sessilia et superiora sessilia longe descendentia magis magisque lanceolata (— subrhomboidea) v. summa linearia lanceolata — acuta dentibus inferiore parte longis — longissimis acutis valde patentibus ± rarius, crebrius — pinnata, ceterum minute denticulata apice breviore — longiore integro basi dentibus subulatis parvis ± crebris longe descendentibus, omnia supra glabra v. rare pilifera, subtus sparsim in nervo dorsali dense floccoso densius et longius pilosa, ceterum præsertim caul. superiora densiuscule — sat dense floccosa. *Anthela* pauciflora paniculata simplex — subsimplex ramis sat longis — brevibus ± remotis v. approximatis rectis — leviter arcuatis ± erectis — erecto-patentibus ± superantibus acladioque 15—35 mm. longo viridibus densiuscule — dense cano-floccosis et glandulis raris — sparsis crassiusculis nigris pilisque paucis obscuris immixtis vestitis. *Involucra* crassa lata ± pulchre et læte viridi-variegata basi rotundata postea truncata. *Squamæ* latæ ± ovato-lanceolatæ, exteriores breves sordide fusco-virides angustius viridimarginatæ, interiores dorso angusto — angustissimo obscuro late et lucide viridi-marginatæ v. totæ virides, omnes obtusæ v. obtusissimæ, intimæ paucæ tantum acutæ, apicibus nudis glabriusculis sæpe rubentes, glandulis longis et mediocri-

bus nigris ± crassis inæqualiter mixtis densiusculis — sat densis et pilis solitariis v. raris nigris firmis vestitæ, ceterum dorso præsertim rarissime stellatæ. *Calathidium* ± luteum. *Ligulæ* apice glabræ. *Stylus* vivus et siccus ± obscurus.

Inv. $\frac{10—12}{6—7}$, D. 30—35, L. m. 2,5—3 mm.

Skild från *H.* **chlorodes*, hvilken den står närmast, genom de stora, breda, egendomligt och ännu mera grönbrokiga holkarne med ännu bredare, oregelbundet tegellagda, trubbiga till rundtrubbiga fjäll, klädda af gröfre, omvexlande långa och korta, mindre tätt hopade glandler samt få inblandade, styfva och tjocka hår, de glest glandelhåriga, men äfven sparsamt håriga, hvitluddiga, men grönare, längre och tjockare skaften i den vanligen enkla inflorescensen, och genom kortare och bredare blad, af hvilka stjelkbladen äro mera utstående och kortare spetsade, det nedre eller stundom de tvenne nedre långt skaftade, alla vid basen med långa, glest sittande, ofta rätt utstående, smala tänder eller flikar (oftast äro ett par basaltänder betydligt längre än de öfriga), omvexlande med smärre uddtänder, men för öfrigt till ofvan midten kortare men skarpt tandade, alla (äfven rosettbladen) med nedlöpande eller de inre rosett- och nedre stjelkbladen stundom med vigglikt-tvär bas. Korgarne äro liksom hos föregående ganska ljusa, vanligen vidare. Korgsamlingen är nästan alltid enkel, än gles med mera utspärrade, än tätare med mera upprätta grenar. Skaften äro temligen grofva och under holkarne något förtjockade. Stjelkens bas och bladskaften äro m. l. m. liftigt violetta, de yttre ofta och stundom några af de öfriga bladen undertill m. l. m. marmoreradt brunvioletta. Framförallt äro stjelkbladen undertill m. l. m. rikligt stjernludna, de öfre ej sällan med små glesa stjernhår på öfversidan.

Påminner mycket till holkarne om *H.* **patagiarium* och torde liksom föregående vara beslägtad med denna underart af *H. gothicum*. Är i habitus och bladform utan vidare lätt skild från densamma.

Anträffad i *Östergötland*, Sunds s:n, Sunds Södergård (förf.) och i *Småland*, Rogberga s:n, Heljaryd (K. JOHANSSON).

3. **H. *cacuminatum** *n. subsp.*

Caulis altus firmus 4—6-folius, inferne longe molliter et sat dense pilosus sat stellatus, superne subglaber et sparsim floccosus. *Folia* obscure gramineo-viridia; *basalia* exteriora ovalia — ovato-elliptica ± late et acute dentata obtusiora, interiora ovato-elliptica — ovato-lanceolata acuta sat crebre subulato-dentata v. serrata sat longe petiolata ± abrupte v. sensim in petiolum decurrentia, *caulina* sat decrescentia, inferiora 2—3 sat petiolata, superiora sessilia, omnia ± ovata — ovato-lanceolata v. interdum late lanceolata dentibus subdivaricatis æqualibus subulatis ± sparsim — sat crebre serrato-dentata, omnia supra fere glabra subtus sparsim et molliter pilosa parce v. non stellata, marginibus sat dense ciliata, petiolis ± alatis longe et sparsim — subdense pilosa. *Anthela* contracta ± paniculata et ± composita v. oligocephala, ramis inferioribus distantibus, superioribus approximatis ± superantibus, omnibus ± erecto-patentibus subrectis, pedicellis brevibus acladioque 10—20 mm.

longo inferne sparsim superne densius floccosis et sub involucris glandulis gracilibus mediocriter longis sparsis atro-viridulis obsitis. *Involucra* sat lata obscure fusco-virentia basi rotundato-truncata. *Squamæ* sat angustæ lineari-lanceolatæ acutiusculæ — acutæ ubique parce (marginibus aliquantulum densius) fere usque ad apicem subnudum glabriusculum stellatæ et glandulis gracilibus atro-viridulis sat dense obtectæ. *Calathidium* ± luteum. *Stylus* vivus ?, siccus obscurus.

Inv. $\frac{10-11}{5-6}$, D. 35, L. m. 2,5 mm.

Utmärkt af sin mångbladiga stjelk med vanligen äggrunda till äggrundt-lancettlika, jemt och skarpt tandade, spetsiga blad, hvilka ofvan äro af rent grön färg och undertill något blåaktiga, och af hvilka de flesta af de nedre oftast äro skaftade, breda holkar med rundad bas af brunaktigt eller svartaktigt grön färg och med temligen smala, jemnbreda, spetsiga fjäll, hvilka liksom de föga stjernludna skaften äro klädda af grönsvarta, fina, men tätare glandelhår samt spridt, i kanterna mera märkbart stjernludd. Stiften äro hos torkade exemplar temligen mörka. Inflorescensen är kvastlik med uppåt småningom kortare internodier och temligen vid med raka och isynnerhet upptill mera utspärrade grenar. Denna form står säkerligen nära *H. *barbareæfolium*, men bladens form och tandning gifva den ett afvikande, egendomligt utseende, hvari den påminner något om flerbladiga och högväxtare former af *H. *cæsiomurorum*. Holkarne påminna rätt mycket om dem hos *H. *lepidiceps*. I habitus liknar den ännu mera den sednare, då den, såsom stundom händer, varierar med mera utdraget lancettlika stjelkblad och smalare, mera aflångt till aflångt-lancettlika basalblad. Denna modifikation varierar stundom med dubbelsågadt tandade blad och liknar då i hög grad *H. *barbareæfolium*. Stjelkens nedre del och bladskaften äro vanligen mörkt brunröda.

Endast anträffad i *Småland* vid Fagerhults herrgård i Fagerhults socken i stenig lundartad äng bland *H. *frondosum* och *H. *lepidiceps* (K. J. LÖNNROTH).

4. **H. *barbareæfolium** LÖNNR. *n. subsp.*

H. vulgatum a. FR. Symb. p. p. et FR. in H. N. II n. 9 p. minore parte ?[1] sub. n. *β* angustifolium. — DAHLST., Hier. exs., fasc. II, n. 71; fasc. IV, n. 88.

Caulis 30—70 ctm. altus (2—)3—6-folius firmus ± gracilis, inferne longe et sparsim — sat dense pilosus leviter stellatus, superne minus pilosus, apice subglaber v. rare pilosus glandulis solitariis obsitus densiuscule — sat dense stellatus. *Folia basalia* 3—6, exteriora ± late — anguste ovalia — ovali-oblonga v. obovato-oblonga sub anthesi sæpe emarcida undulate — obtuse paucidentata obtusa — obtusiuscula, intermedia ± anguste oblonga — lanceolata obtusiuscula — acuta sparsim — densius ± acute dentata, intimum v. interiora ± elongate lanceolata crebre ± inæqualiter ± longe et anguste subduplicato-dentata ad basin sæpe argute et longe dentata —

[1] Till större delen har under detta nummer utdelats H. *cruentifolium. De i FR. Symb. under H. vulgatum citerade exemplaren ur H. N. XIII: 22, tillhöra H. *stipatum STENSTR. (Se STENSTR. l. c., p. 48, noten.)

pinnata dentibus v. laciniis angustis ± liberis in petiolum alatum sensim descendentibus, omnia ceterum ± longe descendentia et sæpe omnia obtusa ± obovata — oblonga; *caulina* cito v. sat decrescentia, infimum sæpe breviter petiolatum ± oblongum — lanceolatum in apicem latum obtusum v. acutum ± longum integrum protractum ad basin ± longe — longissime pinnatifido-partitum v. inæqualiter et longe dentatum, ceterum brevius dentatum v. omnia etiam superiora sessilia ± lanceolata acuta — cuspidata dentibus ± longis angustis sæpe patentibus minutis intermixtis pinnato-dentata (v. argute serrato-dentata), omnia supra pallide et læte viridia et pilis mediocribus tenuibus sparsim pilosa, subtus pallidiora sparsim — densiuscule in nervo dorsali sat floccoso pilis longioribus tenuibus densiusculis obtecta, ceterum leviter (in caulinis densius) floccosa. *Anthela* paniculata subsimplex v. composita contracta, ramis vulgo brevibus, inferioribus paullum remotis, superioribus valde approximatis sæpe subumbellatis ± superantibus, omnibus ± erecto-patentibus sat rectis, pedicellis brevibus acladioque 10—15 mm. longo floccis densis canis glandulis sat gracilibus nigris fusco-viridibus sat longis inferne sparsis superne sat densis obtectis. *Involucra* mediocria sat elongata gracilia ± atroviridia basi ovata — sat conica, postea ovato-rotundata. *Squamæ* latiusculæ, exteriores ± elongato-triangulares et interiores e basi latiore lanceolatæ late viridi-marginatæ apice ± acuto nudo v. subnudo sæpe fuscæ v. piceæ (— purpurascentes), intimæ ± subulatæ, extimæ breves obscuriores ± acutæ, marginibus levissime sed conspicue stellatæ ceterum æque ac interiores dorso sæpe sparsim stellulatæ glandulis longis sparsioribus et brevibus v. mediocribus sat densis ± gracilibus — validis nigris v. fusco-viridibus obtectæ. *Calathidium* ± luteum. *Ligulæ* apice glabræ. *Stylus* primo ± fuscus postremo ± obscurus — niger.

Inv. $\frac{10—11}{4—5}$, D. c. 30, L. m. 2 mm.

En ganska utpräglad form, igenkänd på sin höga, något styfva men vanligen fina, nedtill åtminstone temligen håriga, flerbladiga stjelk med m. l. m. lancettlika, spetsiga blad, alla med m. l. m. djupa, smala och spetsiga, framåtrigtade eller m. l. m. långa, utstående tänder, hvilka stundom i spetsen äro krökta och omvexla med kortare uddtänder, eller alla vid basen smalt och långt, stundom något oregelbundet fliktandade, på de inre rosettblad, som i allmänhet äro af samma form som stjelkbladen men mindre djupt och smalt, fast spetsigt tandade, hvaremot de yttre äro bredare med gles och trubbig, stundom vågig tandning och trubbig eller afhuggen spets, på sin sammandragna kvast med korta grenar och skaft, hvilka äro rikt stjernludna och klädda af m. l. m. långa, upptill temligen talrika glandler, på de smala, m. l. m. mörkgröna eller grönsvarta holkarna med från bred bas utdragna, spetsiga och ofta långt öfverskjutande fjäll, klädda af omvexlande längre och kortare, svarta eller grönsvarta glandler samt på de inre fjällens ryggar försedda med föga eller glest stjernludd (vanligen knappast märkbart) och på de yttres kanter med en svag strimma af ludd men endast vid sjelfva den vanligen koniska holkbasen med rikligare gråhvit stjernhårighet, samt slutligen temligen ljusa, små korgar och i början brunaktiga, sedan vanligen ganska mörka stift. De yttre fjällen äro m. l. m. frånstående med något

utböjda spetsar. I allmänhet äro bladen ljust gräsgröna (på soliga lokaler blekgröna), på den blekare undersidan glest, på de öfre stjelkbladen dock ganska rikt stjernludna. Bladskaften och stjelkbasen, sällan medelnerven, äro svagt violetta. Vanligen äro endast de yttre rosettbladen undertill svagt violettfärgade. Varierar ganska mycket till bladens form och tandning. Fåbladigare former från skuggigare och friskare lokal hafva ofta, isynnerhet på de nedre stjelkbladen, djupt flikad bladbas. De yttre eller stundom alla rosettbladen, någon gång det nedre stjelkbladet, äro hos dessa ofta trubbade, af oval till aflång form och ofta med största bredden ofvan bladets midt. Hos flerbladigare former blir tandningen jemnare, än lång och smal, än ehuru mera sällan kortare och bredare, men vanligen äfven (till utseendet) tätare genom tändernas större likformighet och lika storlek. Stjelkbladen bli hos dessa skarpare spetsade liksom ett större antal af rosettbladen. Dessa mångbladiga, korttandade former tillhöra *subrigidum*-typen och äro alldeles analoga med dylika former af andra arter, t. ex. af *H. *pinnatifidum*. De synes vara allmännare på *Gotland* än de mera fliktandade och fåbladiga formerna. Varierar ej sällan med stjelk och blad rikt korthåriga.

Habituelt påminner denna form ofta genom sin sammandragna korgställning, höga stjelk m. m. om *H. *lepidulum* var. *hæmatolepium*, hvilken den äfven liknar till holkens form, men den afviker genom dennas beklädnad och bladens tandning. Till holkform och tandning liknar den äfven rätt mycket *H. *irriguum*, men är till alla sina karaktärer lätt att skilja från denna. Tydligen är den dock beslägtad med dessa former, liksom med *H. *lepidulum*, såsom redan påpekats af K. J. Lönnroth.[1] Med denna form har den många likheter i bladfärg och bladform, ehuru ej i tandning. Liksom hos *H. *lepidiceps* äro några af de yttre fjällen vid basen förtjockade och något frånstående och de på holkskaften sittande brakteerna på den förtjockade basen försedda med en tydlig, utstående, hornlik knöl, en karaktär, hvilken är synnerligen utmärkande för dessa båda former (framförallt *H. *lepidiceps*) men hvilken dessutom, fastän i ringare grad tillkommer några andra former af *H. irrigui* och *H. anfracti* formgrupper. Från *H. *lepidiceps* är den för öfrigt lätt skild, bland annat genom sin kortgreniga vippa. Å andra sidan är den tydligt beslägtad med *H. *anfractum*, såsom bladens tandning, holkens färg och beklädnad angifva, och synes dessutom sammanbindas genom några nordliga former med *H. *diaphanoides*. Torde att döma af flera likheter i bladens tandning, holkens form och beklädnad m. m. äfven vara beslägtad med *H. *canipes* bland *Subvulgata* och skulle sålunda vara dess motsvarande form inom *Vulgata*.

Inom området anträffad i *Östergötland*, St. Åby s:n, Frösäng (G. A:n Malme); Wäderstads s:n, Lindekullen och Skållerud; Trehörna s:n, Slangeryd; Sunds s:n, Rökulla (förf.); N. Vi s:n, Urberget (K. F. Dusén); Wist s:n, Sturefors (förf.); Åtvids s:n, Adelsnäs, Karstorp och Slefringe (förf.): *Småland*, Gärdserums s:n, Bossgård (förf.); Oskarshamn; Fagerhults s:n (K. J. Lönnroth); Femsjö (E. Fries): *Gotland*, Hangvars s:n, Flenvik; Sanda s:n, mellan vägarne från Klintehamn till Sanda och Westergarn: Klinte s:n, lund mellan Walla södra qviar och vägen från kyrkan till hamnen (K. J. Lönnroth).

Utom området funnen i *Södermanland*, Stora Malms s:n, Brännkärr (G. A:n Malme): *Upland*, Wermdö, Brevik. (A. Magnusson).

[1] Å etiketten till hans till Vet.-Akademien meddelade exemplar samt i manuskript.

Hit ansluter sig följande form:

*H. *oinopolepis* G. A:N MALME in litt. — H. DAHLST., Herb. Hier. Scand., Cent. II, n. 78.

A præcedente diversum foliis minus profunde dentatis basalibus et inferioribus caulinis vulgo supra medium latioribus, inflorescentia laxa ramis longis gracilibus acladium 30—60 mm. longum superantibus distantibus paniculata, pedicellis inferne sparsim stellatis et sparsim glandulosis superne sub involucra densius stellatis et densiuscule glandulosis, involucris latioribus densius glandulosis basi magis stellatis, squamis exterioribus margine dorsoque minus conspicue stellatis omnibus apice ± vinose coloratis sat comosis ligulisque obscurioribus.

Skild hufvudsakligen genom sina betydligt mindre djupt tandade blad, gles korgställning och vid basen smalare, mindre tydligt stjernhåriga fjäll med smala, något trubbade, hårtofsade och m. l. m. vinröda spetsar samt mörkare blommor.[1]

Anträffad i *Södermanland*, Stora Malms s:n, Brännkärr och Sörgölet (G. A:N MALME).

5. H. *anfractum (*Fr. ex. p.*) ALMQU.

H. *anfractum (Fr. ex. p.) ALMQU. in Thed. Fl. et in Stud. pag. XXV.[2] — H. anfractum Fr. in Vet. Ak. Förh. 1856 p. 148 et Epicr. p. 100 p. maxima p. — H. anfractum Fr. H. N. XVI: 10 et Hier. Eur. n. 48 (spec. in horto Ups. educata). — C. J. LINDEBERG, Hier. Scand. exs. n. 133. — DAHLST., Hier. exs., fasc. II, n. 69. — DAHLST., Herb. Hier. Scand., Cent. II, n. 61, 62.

Caulis 35—65 ctm. altus gracilis 2—6-folius, inferne pilis tenuibus longis sat densis — densis obtectus sparsim — sat dense floccosus, superne sparsim pilosus — subglaber sparsim stellatus, apice multum floccosus — subtomentosus. *Folia basalia* 2—6 sæpius ± remote rosulata, exteriora sæpius sub anthesi emarcida elongate ovalia — elliptica obtusiuscula — breviter acuta undulata v. sparsim — crebre et obtuse ± grosse et ± longe — breviter dentata, intermedia ± oblongo- v. ovato-lanceolata — anguste lanceolata ± obtuse — acute et sparsius — crebrius dentata v. sinuata ± acuta, interiora anguste — angustissime (oblongo-lanceolata —) lanceolata ± crebre longe et acute præsertim ad basin duplicato-dentata longe acuta, omnia basi ± cuneata v. in petiolum alatum longe descendentia; *caulina* infimum ± petiolatum, superiora basi angusta sessilia ± elongate lanceolata — lineari-lan-

[1] Sedan jag nedskref detta, har jag funnit, att denna form torde vara ytterst nära slägt med *H. *chlorodes β umbrigenum*, hvilken bildar liksom en mellanlänk mellan denna, *H. *anfractum* och *H. *chlorodes*. Från *β umbrigenum* är ifrågavarande form hufvudsakligast skild genom sina från bredare bas mera tillspetsade fjäll, hvilka äro längre och vid sin bas mera stjernhåriga, samt genom glesare blomsterställning med längre och grönare, d. v. s. mindre rikt stjernhåriga grenar och skaft. Men dessa karaktärer, isynnerhet holkfjällen, synas konstant skilja de nu nämda formerna från hvarandra. H. *chlorodes *β* umbrigenum har alltid kortare, mera jembreda och trubbade fjäll.
Anm. under tryckningen.

[2] Angående artens och namnets historia se S. ALMQUIST Bot. Not. 1880 och Stud. öfver Sl. Hier. 1881. I ofvanstående form inbegriper på sednare stället S. ALMQUIST den något skiljaktiga upländska formen (H. *subampliatum här nedan).

ceolata sat longe duplicato- et serrato-dentata v. præsertim superiora ad basin inciso- v. pinnato-dentata, dentibus ± longis sæpe longissimis angustis inæqualibus sæpe patentibus et curvatis iisdem brevibus v. minutis alternantibus, in apicem ± longum integrum obtusiusculum — acutum attenuata; omnia ± læte v. saturate gramineo-viridia, supra sparsim et breviter pilosa - subglabra, subtus pallidiora sparsim in costa longius et paullo densius pilosa, ceterum subnuda v. caulina in costa sparsim, ceterum rarius stellata, marginibus breviter et sat dense ciliata, petiolis sparsim — sat dense et molliter pilosis. *Anthela* parva ± simplex — sat magna ± composita paniculata, sursum sæpe umbellata, deorsum sæpe indeterminata, ramis inferioribus ± erectis longis v. erecto-patentibus, superioribus magis magisque approximatis — umbellatis magis patentibus, omnibus ± superantibus dense floccosis eglandulosis, pedicellis mediocribus v. brevibus acladioque 10—20 mm. longo dense — densissime albofloccosis et sub involucris glandulis raris — sparsis obtectis. *Involucra* parva brevia crassiuscula ± atroviridia basi rotundata postea truncata. *Squamæ* inæqualiter imbricatæ latæ, exteriores brevissimæ triangulares obtusæ — obtusissimæ obscuræ, interiores ovato — triangulari-lanceolatæ ± virides apice obscuriores cito in apicem obtusum contractæ, intimæ paucæ acutæ, nudæ v. dorso marginibusque exteriorum levissime stellatæ glandulis nigris (minutis) brevibus et longioribus ± crassis (sparsim —) densiuscule — sat dense obtectæ et haud raro pilis paucis obscuris ± longis interdum frequentioribus tenuissimis canescentibus vestitæ. *Calathidium* luteum. *Ligulæ* apice glabræ. *Stylus* vivus et siccus ± obscurus — niger.

Inv. $\frac{8—9}{4—5}$, D. 30—35, L. m. 2,5 mm.

Utmärkt af sina smala, utdraget lancettlika, oftast långspetsade m. l. m. djupt och ojemt parflikadt dubbeltandade, rent gröna blad, små, svartgröna holkar med korta, breda, ojemt tegellagda, till större delen trubbiga fjäll, de yttre mörka, de inre utom på ryggen och ofta i sjelfva spetsen nästan helt och hållet gröna samt nakna eller på ryggen svagt stjernludna liksom de yttre, hvilka äro kort hårtofsade i den nästan tvära och breda mukronerade spetsen samt i kanterna mycket glest vid basen något rikligare klädda af hvitt stjernludd, dessutom klädda af sparsammare till tätare, omvexlande korta och långa, något grofva, mörka glandler och stundom med få, sällan med talrikare, inblandade, mörka hår. Holkskaften och grenarne äro oftast hvitgrå af ytterst tätt stjernludd, de förra med få eller sparsamma, grofva glandler, de sednare utan eller nästan utan all beklädnad af glandler eller hår. Såsom äldre få holkarne vanligen några långa och fina hår, men den varierar äfven med såväl yngre holkar som skaft med enstaka, ytterst fina och ganska långa, m. l. m. hvitspetsade hår. Någon gång får den mycket korta och glesa glandler. Dylika former synas vara utan all konstans och öfvergå utan gräns i hvarandra, och ganska ofta träffas i samma inflorescens holkar med ofvannämda skiljaktigheter i beklädnaden. Holkarne äro i allmänhet nästan nakna, men hos en del former blir stjernluddet i de yttre fjällens kanter och vid basen, stundom äfven på deras midt ganska väl framträdande. Häri liksom i bladform har den en viss likhet med *H.* **barbareæfolium.* Genom de trubbiga fjällen och de inres breda, gröna kanter liknar den rätt mycket *H.* **chlorodes* och *H.* **eurycybe*, men är bland annat väl skild från dessa genom smärre och

mörkare holkar, smalare blad, afvikande bladfärg m. m. Mest karaktäriserande för denna form äro de korta, trubbiga, mot de inres gröna färg starkt afbrytande yttre, mörka fjällen och de mot basen långsamt afsmalnande och smalt fästade stjelkbladen. Inflorescensen är oftast enkel och fågrenig men blir ibland rikt grenad och sammansatt samt nedåt obegränsad. Ofta är den upptill flocklik, än helt och hållet, än blott till öfre delen. Grenarna äro i detta fall ofta stödda af en bladlik brakte eller ett smalt, helbräddadt blad, såsom hos *H. *lepidiceps*. I likhet med föregående äro de på holkskaften sittande brakteerna vid basen försedda med en ansvällning, som dock ej är så framträdande som hos denna. Bladen, hvilka stundom äro mera glest och bugtigt skarptandade, äro nästan aldrig (endast sällan de yttersta) undertill violetta. Stjelken är ibland vid sjelfva basen brunaktig eller svagt purpurfärgad.

Anträffad inom området i *Östergötland*, Sunds s:n, Sandbäckstorp och Sunds Norrgård: *Småland*, Femsjö s:n, Lidsjö; Valshults s:n, Dallaberget, Knapabo m. fl. st. (E. FRIES och TH. M. FRIES, G. E. HYLTÉN-CAVALLIUS); Moheda s:n (G. E. HYLTÉN-CAVALLIUS); Östra Thorsås s:n, Sunnansjö (C. J. JOHANSSON); Hvetlanda s:n (C. J. LINDEBERG); Eksjö s:n, Björkäng och Smedstorp (förf.); Öggestorps s:n, Ljungarp och Romelsjö; Rogberga, Tenhult (K. JOHANSSON), från sednare stället en form med serdeles talrika fina hår på holkarne; Vrigstads s:n (G. WETTER).

6. **H. *subampliatum** n. subsp.

H. anfractum Fr. var. subampliatum DAHLST., Hier. exs., fasc. III, n. 50. — DAHLST., Herb. Hier. Scand., Cent. II, n. 80. — H. anfractum Fr. var. latifolium LBG., Hier. Scand. exs., fasc. III, n. 134. — H. anfractum Fr. var. latifolium STENSTR., Värml. Archier. 1889 (quoad spec. vermlandica).

Caulis altus — elatus 4—7-folius basi violascens densiuscule et longe pilosus, ceterum sparsim et longe pilosus, apice fere glaber, inferne leviter superne densiuscule stellatus — tomentellus, eglandulosus. *Folia* prasino-viridia, supra sparsim — densiuscule inferne longius et sparsius in nervo dorsali densius et molliter pilosa, marginibus rare ciliata, subtus efloccosa, in nervo parce floccosa v. caulina superiora utrinque parce stellulata; *basalia* in rosulam laxam 1—3-foliam approximata, exteriora sæpe sub anthesi emarcida anguste oblonga — anguste ovalia subintegra ± obtusa, intermedia ± oblonga late et obtuse pauci-dentata, intima ± elongata lanceolata ± acuta acutius pauci-dentata; *caulina* inferne magis approximata superne ± distantia longitudine sensim in bracteas decrescentia latitudine vulgo increscentia, inferiora ± lanceolata acuta elongata basi longe descendente angusta, infimum petiolatum reliqua sessilia, superiora magis magisque lanceolata v. ovato-oblonga, summa e basi ovata ± lanceolata ± acuta, superiora v. præsertim summa sæpe etiam intermedia basi ± auriculata v. subamplectente lata sessilia acuta, crebrius et breviter ± late et inæqualiter dentata v. acute — obtuse sinuato-dentata (basi sæpe crebre et irregulariter subincisa). *Anthela* vulgo parva angusta ± contracta paniculata, ramis inferioribus ± distantibus haud superantibus, superioribus brevibus ± approxi-

matis cum pedicellis acladio 5—15 mm. longo brevibus — brevissimis ± arcuatis dense canofloccosis glandulis solitariis (v. nullis) sub involucra raris minutis gracilibus nigris obsitis. *Involucra* brevia crassa — crassiuscula atra — atro-viridia nitentia basi ± rotundata-truncata. *Squamæ* latæ, exteriores brevissimæ subtriangulares obtusiusculæ — subacutæ, intermediæ et intimæ e basi lata ± lanceolatæ acutæ apice epilosæ, ceterum efloccosæ glandulis gracilibus — crassis brevibus (longioribus immixtis) ± densis obsitæ. *Calathidium* obscure luteum parum radians. *Styli* nigri.

En nordligare paralellform till föregående, från hvilken den är tydligt skild genom vanligen högre stjelk med flera, tätare sittande, uppåt kortare, i bredd tilltagande stjelkblad, hvilka i allmänhet äro mera kortspetsade eller trubbade och för öfrigt tätare, lägre och bredare samt oregelbundet och ofta m. l. m. vinkligt och trubbigt bugttandade, de nedre m. l. m. lancettlikt aflånga, ofta med största bredden ofvan midten, de öfre mera äggrundt lancettlika till äggrundt aflånga och med mer eller mindre bred, stundom öronlik och nästan halftomfattande bas, hopdragen, vanligen ännu mera kortgrenig inflorescens med de öfre grenarne ofta m. l. m. utstående och bågböjda samt mörka, nakna eller nästan nakna, något glänsande, korta holkar med visserligen lika breda men spetsigare fjäll, klädda af täta, något gröfre, mörka glandler utan inblandning af hår. Holkskaften äro liksom hos föregående gråa af tätt stjernludd, alldeles utan eller med mer eller mindre talrika, grofva glandler. Sällan förekommer på holkarne ett och annat mörkt och groft hår, mestadels blott på äldre holkar. Serdeles karaktäristiskt för denna form är isynnerhet den mörkt lökgröna bladfärgen och motsatsen mellan de smala och smalskaftade rosettbladen jemte de nedre stjelkbladen och de kortare och bredare öfre eller mellersta stjelkbladen med sin breda, något halftomfattande bas. Stjelkens blad, isynnerhet de öfre, äro ofta af smalt äggrundt-lancettlik form med mera rundad bas eller till sin nedre del ända till basen nästan jembreda. Ofta äro de mellersta nedom midten tydligt hopdragna och derefter ända till basen jembreda samt der ojemt och ofta skarpt tandade, hvarigenom de erinra om bladen hos vissa former af *H. dovrense*. Varierar med nästan helbräddade rosettblad och glest samt kort skarptandade stjelkblad. Stundom äro de öfre stjelkbladen i kanten veckade och bugttandade. Bladen äro vanligen ganska fasta och styfva.

Inom området anträffad i *Östergötland*, Vestra Husby s:n, Korssäter; Gårdeby s:n, Sätra; Vestra Hargs s:n (H. STRÖMFELT); Motala (K. FR. THEDENIUS).

Utom området funnen i *Södermanland*, Kila s:n, Ålberga (S. ALMQUIST); St. Malms s:n, Sörgölet (G. A:N MALME); Stockholmstrakten, Djurgården, ymnig (S. ALMQUIST och förf.): *Upland*, Ålands s:n, Kölfva (S. ALMQUIST); Tibble s:n (S. och O. ALMQUIST); V. Löfsta s:n, Molneboparken (C. A. E. LENSTRÖM): *Dalarne*, St. Tuna s:n, Borlänge (S. ALMQUIST): *Vermland*, Gillberga s:n (K. O. E. STENSTRÖM): *Vestergötland*, Sandhems s:n, Vimla, Klemmestorp (O. NORDSTEDT).

7. **H. *atronitens** *n. subsp.*

DAHLST., Hier. exs., fasc. I, n. 89. — DAHLST., Herb. Hier. Scand., Cent. IV, n. 34.

Caulis altus — elatus gracilis v. sæpe crassiusculus 2—4-folius, inferiore parte ± purpurascens pilis densiusculis — sat densis longis et mollibus obtectus parum

stellatus, superne sparsim et breviter pilosus, apice sparsim — densiuscule stellatus et glandulis solitariis obsitus. *Folia basalia* plerumque in rosulam congesta mediocria — magna, exteriora ± late ovalia — ovali-oblonga v. ± obovato-ovalia — oblonga apice ± rotundato v. obtuso integra — obtuse undulato-dentata, intermedia anguste ovalia — late oblonga v. elliptica — elliptico-lanceolata obtusiuscula — breviter acuta breviter et acute paucidentata, intimum ± late oblongo-lanceolatum — late lanceolatum angustius et acutius paucidentatum breviter — sat longe acutum, omnia marginibus sæpe plicata basi in petiolum alatum sensim descendente, subtus sæpissime præsertim exteriora intense violacea v. hepatica; *caulina* ± late — sat anguste lanceolata sæpe subrhomboidea magna rare et argute v. ad basin crebrius et longius dentata (dentibus sæpe patentibus) in apicem longum — longissimum integrum acutum — cuspidatum attenuata, infimum in petiolum ± brevem alatum argute dentatum sensim attenuatum, superiora basi angusta sensim descendente sessilia; omnia tenuia firma v. mollia supra nitide et pulchre gramineo-viridia glabrescentia, subtus pallidiora et sæpe subglaucescentia breviter et rare in nervo dorsali leviter floccoso sparsim — densiuscule pilosa, ceterum ± rare stellata, marginibus sparsim v. rare ciliata, petiolis sparsim — densiuscule pilosis. *Anthela* plerumque ampla composita paniculata contigua v. apice (interdum tota) umbellata ± discreta, ramis inferioribus ± erecto-patentibus, superioribus magis (sæpe valde) patentibus, omnibus ± rectis v. leviter arcuatis gracilibus ± longis et longe — longissime superantibus pedicellis sat tenuibus sæpe in umbellulam approximatis acladioque 15—30(—50) mm. longo ± dense albido-floccosis eglandulosis v. glandulis solitariis sub involucris interdum raris obsitis. *Involucra* parva nitida ± obscure atro-viridia v. atra basi ovato-rotundata postea ± truncata. *Squamæ* latiusculæ sat regulariter imbricatæ, exteriores ± atræ apice parum comatæ ± ovato-triangulares obtusiusculæ — subacutæ, interiores ± elongate lanceolato-triangulares in apicem ± acutum — subulatum sensim angustatæ v. acuminatæ flores juniores sæpe longe superantes apice sæpe piceæ — obscure purpurascentes, marginibus obscure virescentibus nudæ v. floccis solitariis obsitæ, dorso glandulis mediocribus ± gracilibus atris densiusculis — sat densis simplicem seriem formantibus vestitæ raro etiam pilis paucis atris obsitæ. *Calathidium* obscure luteum. *Ligulæ* apice glabræ. *Stylus* vivus et siccus ± niger.

Inv. $\frac{9—10}{4-5}$, D. c. 35, L. m. 2. mm.

Ehuru tydligen nära beslägtad med föregående underarter, är denna form såväl genom habitus som karaktärer, såsom i bladform och tandning m. m. så skild, att den bör uppfattas som egen underart. Från *H. *anfractum* är den betydligt aflägsnad, men torde att döma af intermediära exemplar från Ålberga i *Södermanland* (S. Almquist) och några andra ställen sammanhänga med föregående underart. Utmärkt genom sina vackert gröna och glänsande, stora och breda blad, af hvilka de yttre rosettbladen äro m. l. m. bredt ovala till aflånga samt glest trubbtandade, de inre och stjelkbladen m. l. m. elliptiskt lancettlika och vanligen glest, mest vid basen, skarptandade samt isynnerhet de öfre stjelkbladen utdragna i lång helbräddad, skarp spets, alla vanligen stora och tunna, de yttre stundom alla liksom stjelken undertill starkt violettfärgade, vid och vanligen sammansatt inflorescens med kvast-

lik eller nästan lika ofta flocklik anordning af alla eller de öfre inflorescensgrenarne, hvilka oftast äro långa och långt samt ojemt öfverskjutande, normalt medelstora, svartglänsande holkar, hvilka skarpt afbryta mot de hvita skaften, samt mörka holkfjäll, hvilka äro utan eller nästan sakna all beklädnad af stjernludd men hafva m. l. m. rikliga, svarta glandler, ordnade i en enkel rad på fjällens ryggar. Stiften äro redan från början ganska mörka eller svarta. Oftast är stjelken fåbladig af *vulgatum*-habitus och vanligen hög och grof, men den varierar flerbladig, ehuru den aldrig eller sällan får *rigidum*-habitus. Stjelkbladen äro oftast endast till nedre delen eller något öfver midten försedda med få, skarpa, längre eller kortare, ofta rätt utstående, vanligen ojemt fördelade och olika långa tänder, men variera dels med tätare dels med längre tandning och bli stundom vid basen något fliktandade. Inflorescensen, hvilken i allmänhet blir gles genom de temligen långa, m. l. m. utstående grenarne, tenderar att bli m. l. m. flocklik, och mycket ofta äro äfven grenarne af andra ordningen eller holkskaften flocklikt anordnade. Oftast äro skaften eller de öfre grenarne m. l. m. bågböjda.

Inom området i *Östergötland*, på flera ställen mycket allmän, såsom i V. Husby s:n, Asveden (H. STRÖMFELT); Jonsbergs s:n, Gränsö (E. ADLERZ); Krokeks s:n, Marmorbruket; Qvarsebo allmän (S. ALMQUIST); Omberg, Vestra Väggar (A. WIRÉN); St. Åby s:n, Vestergården (G. A:N MALME); Wäderstads s:n, Lindekullen; Rinna s:n, Stortorp; Kärna s:n, Malmslätt; Linköping, Sandbäcken; S:t Lars s:n, Walla, Rosenkälla (förf.); Wårdsbergs s:n, Wimarka (A. R. DAHLGREN); Oppeby s:n, Drabo (förf.); Åtvids s:n, Adelsnäs, Karstorp och Slefringe; Sunds s:n, Sandbäckstorp, Sunds Norrgård, Rökulla; N. Vi s:n, Kärremåla och Siggemåla (förf.): *Småland*, Jönköping (C. A. HOLMGREN); Eksjö s:n, Brevik m. fl. st.; Gärdserums s:n, Bossgård (förf.).

Varierar ibland med stora holkar, hvilka stundom jemte skaften hafva rikliga, svarta hår (troligen en tillfällig form eller modifikation). Sådana exemplar äro funna i *Östergötland* vid Rosenkälla i S:t Lars s:n och i Wäderstad s:n, Skållerud.

I Sunds s:n, der den ofta växte blandad med H. *anfractum, visade den sig fullkomligt skild utan alla mellanformer.

Med ofvanstående i södra Östergötland allmänna form sammanhänga medelst mellanformer följande m. l. m. utmärkta former eller modifikationer:

b *elatius, n. f.*

Inflorescens alltid kvastlik, m. l. m. hopdragen och m. l. m. rikblomstrig med korta, snedt utstående, nästan jemnhöga grenar, hvarvid den ofta blir temligen liten och kort men ej sällan temligen bred, än nedåt snart begränsad än mera obegränsad. Grenar och skaft rikt stjernludna men derjemte klädda af glesa, närmare holkarne tätare, små glandler. Holkar ofta mindre än hos föregående men lika mörka med täta glandler och derjemte oftast med en svag men tydlig stjernluddsrand i kanten af de yttre fjällen. Stjelk fin, rak och hög, flerbladig med m. l. m. äggrunda till äggrundt lancettlika, vanligen kortspetsade och temligen tätt och skarpt, längre eller kortare tandade, småningom decrescerande blad. Rosettblad som hos föregående men vanligen smalare, de inre tätare tandade. Bladen äro sällan på undersidan lefverfärgade eller violetta, deremot äro de ofta, isynnerhet några af stjelkbladen, mot spetsen på båda sidor mörkt purpurfärgade eller brunaktiga. I sin typiska gestalt en serdeles utmärkt form genom den höga flerbladiga stjelken, ej sällan

med något *rigidum*-habitus, och tenderar för öfrigt starkt åt *H. *barbareæfolium* genom de mera glandelhåriga skaften och det svagt framträdande luddet i fjällkanterna. Från denna är dock lätt skild genom sin betydligt svagare tandning och isynnerhet genom de mörkare, mindre (kortare) holkarne och den betydligt mörkare blomfärgen. På en del lokaler synes den vara ganska konstant och lätt att urskilja, på andra deremot öfvergår den, som det synes, utan gräns i föregående. Denna form har sällan något hår bland holkarnes glandler.

Anträffad i *Småland*, Vrigstads s:n (G. WETTER); Gärdserums s:n, Bossgård (mycket vacker) (förf.): *Östergötland*, Krokeks s:n, Marmorbruket, Qvarsebo (S. ALMQUIST); Rinna s:n, Stortorp, Halltorp, samt mindre tydlig och genom mellanformer förbunden med föregående i Wist s:n, Sturefors och Wäderstad s:n, Lindekullen (förf.).

c *angustius* n. f.

Har liksom föregående rak, hög, men något grof, flerbladig stjelk. Alla bladen m. l. m. smala, vanligen smalt lancettlika och långa med tandningen ungefär som hos föregående eller något kortare, ofta äfven tätare. Holkar stora, tjocka, svarta till svartgröna, med bred, rundad bas, samlade i en fåblomstrig, liten, kortgrenig och kvastlik eller flocklik inflorescens. Skaft och grenar ganska grå af stjernludd och isynnerhet de förstnämda närmast holkarne med ganska grofva eller tjockskaftade, temligen talrika glandler och ett och annat mörkt hår. Fjäll breda, de yttre ofta trubbade till tvära, de inre m. l. m. trubbspetsade med m. l. m. rikliga, längre och kortare glandelhår och alldeles utan eller endast vid de yttres bas med svagt stjernludd.

Genom sina smala blad har den en ganska stor habituel likhet med *H. *anfractum* men är väl skild från denna genom sin kortare tandning och stora holkar m. m., hvarigenom den äfven lätt kan skiljas från öfriga former af samma artgrupp. Skulle dock endast kunna vara en mera utpräglad ståndartsmodifikation, anslutande sig till föregående.

Anträffad på sterila backar och ljungmarker i *Östergötland*, Wäderstad s:n, Lindekullen (förf.).

d *medians* n. f. — DAHLST., Hier. exs., fasc. II, n. 70.

Utmärkt af få- till flerbladig, rak eller vid basen böjd stjelk med temligen tätt och något ojemt och hvasst, nästan ända mot spetsen tandade blad af m. l. m. äggrundtlancettlik form med kortare eller längre, skarp spets, m. l. m. elliptiskt-lancettlika, hvasst och ojemt tandade inre rosettblad och m. l. m. ovala till elliptiska, trubbtandade yttre blad, kortgrenig, liten, fåblomstrig och kvastlik inflorescens med kort (5—15 mm.) akladium och raka eller något böjda, vanligen temligen glest stjernludna grenar, alldeles utan eller med enstaka till sparsamma, korta glandler, samt temligen stora, korta och flerfjälliga holkar med m. l. m. kortspetsade fjäll. En habituelt och genom de hvasstandade bladen och tjocka holkarne ganska utmärkt form, hvilken såsom det synes dock ej är skarpt begränsad från hufvudformen, utan mången gång genom mellanformer förbunden med den. Synes förekomma i två i hvarandra öfvergående modifikationer, den ena med fåbladig, lägre stjelk, bredare rosettblad och mot sin bas öfvervägande smala stjelkblad, den andra med flerbladig stjelk, smalare och mindre rosettblad och flera af stjelkbladen, isynnerhet de mellersta, föga af-

smalnande i den rätt breda och något öronlikt utvidgade eller nästan halft omfattande basen, påminnande häri om *H. *subampliatum*. Denna form erinrar likaledes häri äfvensom i habitus ej litet om *H. gothicum *adampliatum*. Med denna arts olika former är sannolikt hela *anfractum*-gruppen m. l. m. beslägtad. Den förstnämda modifikationen deremot påminner något om *H. *batylepium* till bladens tandning och tendensen att få öfverskjutande, spetsigare fjäll. En som det synes sjelfständig mellanform till den sistnämda, funnen i Wist s:n, Söderby och Rinna s:n, Stortorp i *Östergötland*, utmärker sig genom längre och mera ojemt hvasstandade, med ofta utstående och bakåt eller framåt krökta tänder försedda blad, hvilka undertill äro intensivt violetta och af hvilka rosettbladen äro stora och stjelkbladen små samt alla skarptandade, gråa inflorescensgrenar, oftast alldeles utan glandler, samt smärre, smalare holkar med spetsigare fjäll, klädda af korta glandler och temligen rikligt inblandade, mörka, korta hår.

Inom området äro de båda nyssnämda modifikationerna anträffade i *Östergötland*, Vestra Hargs s:n, Svinsäter (H. STRÖMFELT); Trehörna s:n, Slangeryd; Wäderstad s:n, Lindekullen (förf.); Åtvid s:n, Åtvidaberg, Adelsnäs och Karstorp: *Småland*, Gärdserums s:n, Bossgård (förf.).

8. **H. *hemidiaphanum** *n. subsp.*

DAHLST., Hier. exs., fasc. I, n. 88. — DAHLST., Herb. Hier. Scand., Cent. II, n. 81, 82.

Caulis elatus sat gracilis subflexuosus 2—3-folius, inferne ± violascens molliter et sat dense pilosus rare stellatus, medio sat dense pilosus et stellatus, apice rare pilosus parce glandulosus et densiuscule floccosus. *Folia* ± læte viridia; *basalia* plurima ± oboblonga sparsim acute v. undulate dentata obtusa — obtusissima basi in petiolo alato anguste et longe descendentia, intimum magis lanceolatum et sæpe ± acutum sparsim et angustius dentatum; *caulina* longe distantia cito decrescentia, infimum sæpe oboblongum obtusum, superiora oboblonga v. rhomboideo-lanceolata — lanceolata et in apicem ± longum integrum acutum protracta, ceterum sparsim et acute dentata — denticulata v. sæpe dentibus binis v. quaternis ± curvatis et subulatis ima basi maxime evolutis instructa, summum sæpe lineare integerrimum subulatum; omnia supra fere glabra subtus sparsim pilosa in marginibus et in costa, quæ sparsim v. rare est stellata, petiolisque densius et longius pilosa. *Anthela* plerumque parva et oligocephala paniculata v. superiore parte umbellata simplex v. subcomposita, ramis inferioribus ± remotis, superioribus sæpe valde approximatis ± arcuato adscendentibus ± superantibus cum acladio 15—20 mm. longo pedicellisque brevibus ± tomentosis et glandulis brevibus gracillimis densiuscule — sat dense obtectis. *Involucra* gracilia fusco-viridia v. ± fusco-nitentia nuda basi ± turbinata, postea ovato-rotundata. *Squamæ* imbricatæ, exteriores angustæ breves lineares obtusæ, intermediæ latiores obtusiusculæ, interiores simul latissimæ fuscoviride marginatæ longæ lineari-lanceolatæ acutæ apice sæpe piceæ et intimæ paucæ subulatæ, omnes nudæ et glandulis brevibus gracilibus obscuris ±

dense obtectæ. *Calathidium* læte luteum sat radians. *Stylus* livescens, siccus sat obscurus.

Inv. $\frac{10—11}{5—6}$, D. 35—38, L. m. 1,5—2 mm.

Denna form karaktäriseras af sina brunaktigt grönsvarta och glänsande holkar med de inre fjällen helt och hållet grönaktiga eller bredt och orent grönkantade, de öfriga svartgröna med brun anstrykning, alla klädda af täta och fina samt små glandler, men utan hår eller stjernludd, hög, vågböjd, föga tät- men mjukhårig stjelk med glest sittande, ofta stora stjelkblad, hvilka uppåt hastigt aftaga i storlek och bredd, samt oftast långskaftade, smalt omvändt aflånga och rundtrubbade, ofta grundt och glest trubb- eller bugttandade rosettblad med småningom i skaften afsmalnande bas. Ofta är det nedre stjelkbladet, hvilket vanligen är skaftadt, af samma form som de yttre och inre rosettbladen, men stundom är det inre af de basala bladen m. l. m. lancettlikt och spetsadt och då äger samma förhållande rum med alla stjelkbladen. Hos magra exemplar äro dessa ungefär till midten glest och kort men temligen spetsigt tandade, hos frodigare exemplar äro vid basen af bladen ett till två par tänder starkt utvecklade på de öfrigas bekostnad samt långa och spetsiga, stundom krökta. Från midten är bladet helbräddadt ända ut i den långa och skarpa spetsen. Det öfversta bladet är oftast alldeles helbräddadt och sylspetsadt. Bladen variera för öfrigt bredt till smalt lancettlika med småningom hopdragen eller, då basaltänderna äro långa, ofta vigglik bas. De yttre basalbladen, hvilka stundom äro bredt ovala, äro undertill liksom nedre delen af stjelken violettfärgade.

Habituelt påminner denna form rätt mycket om *H. *lepidiceps*, med hvilken den torde vara slägt. Med denna har den dessutom mycket gemensamt i holkarnes utbildning och beklädnad. Den skiljes ganska lätt genom sin afvikande bladform, de smalare fjällen och de tätare samt smärre glandlerna. Med afseende på dessa erinrar den om *H. *diaphanum* eller om *H. *glaucovirens*. Sannolikt är den äfven beslägtad med dessa sednare, isynnerhet den sistnämda, hvilken den mycket liknar till bladens tandning. Den torde sammanbinda dessa former med *H. *lepidiceps*.

Anträffad i *Östergötland* i Vånga s:n vid Gränsholmen, der jag fann den ymnigt på såväl öppna som beskuggade ställen i granskog; Åtvids s:n, Åtvidaberg.

Utom området anträffad i *Södermanland*, Jacobsbergs s:n, Vinterviken (förf.); Stora Malms s:n (G. A:N MALME); Vesterljungs s:n, Luckbohl, Dalby och Ekebonäs (A. EKSTRÖM); Wårdinge s:n flerestädes (A. TORSSANDER).

H. DIAPHANOIDES (LBG.).

Caulis ± altus — elatus gracilis — crassus 2—5-folius, basi ± dense et longe pilosus, superne sparsim — sat dense pilosus sparsim stellatus, apicem versus magis magisque floccosus, sub anthela ± tomentosus et glandulis solitariis — raris obsitus. *Folia* ± saturate viridia, subtus sparsim præsertim ad nervos et in petiolis ± densiuscule v. dense et longe pilosa, supra ± pilosa et immaculata v. maculata; *caulina* abrupte v. sensim decrescentia sparsim — sat dense dentata v. argute et inæqualiter serrato-dentata basin versus sæpe longe et acute ± irregulariter pinnato-

dentata; *basalia* 2—5 in rosulam approximata sæpius minus profunde sparsim — crebre dentata ± lata. *Anthela* ± composita paniculata v. ramoso-paniculata v. ± simplex ramis ± longis patentibus canofloccosis et glandulis sparsis — densis ± longis validis obsitis. *Involucra* ± elongata gracilia — valida, squamis latiusculis — latis glandulis longis — longissimis densis — densissimis obtectis, efloccosis vel marginibus dense et sat late floccoso-limbatis. *Styli* nigri v. ferruginei.

Hit höra tvenne rätt närstående underarter, hvilka dessutom förenas genom en intermediär varietet. Oaktadt sin nära slägtskap äro dock de båda underarterna skarpt markerade genom tydliga och framstående karaktärer. Från andra af områdets glandelhåriga former af *Vulgata genuina* utmärka de sig genom sina ytterst rikliga, kraftiga och långa glandler på holkar och skaft. De synas, ehuru temligen fristående, beslägtade dels med *H. anfractum* dels med *H. pinnatifidum* och närstående, och äro inom området temligen isolerade, men i nordligare Skandinavien förekommer en stor rikedom af beslägtade former, hvilka dels stå den ena dels den andra af dessa bägge former nära, dels äro intermediära eller i en del fall till sina karaktärer närma sig andra formgrupper.

Conspectus subspecierum.

1. *Folia* angustiora sparsius et ad basin sæpe profunde et irregulariter dentata, supra numquam maculata. *Squamæ* efloccosæ v. exteriores floccis solitariis adspersæ.
   1. *H. *diaphanoides* Lbg.

2. *Folia* latiora crebrius dentata supra ± nigro-maculata. *Squamæ* marginibus dense — densissime et sat late floccoso-limbatæ dorso rare stellatæ.
   2. *H. *ornatum* Dahlst.

1. H. *diaphanoides Lbg.

H. murorum γ medium Lbg. in Blytt, Norges Flora 1874 p. 652. — H. murorum ζ medium Lbg i Hn. Fl. ed. 11 p. 43. — C. J. Lindeberg, Hier. Scand. exs. n. 123. — H. diaphanoides Lbg., Hier. Bidr. 1882 p. 11. — H. diaphanoides Lbg (Stenstr., Värml. Arch. 1889). — Dahlst., Hier. exs., fasc. I, n. 86. — Dahlst., Herb. Hier. Scand., Cent. II, n. 84.

Caulis 35—90(—100) ctm. altus sat gracilis — crassus 2—5-folius, basi sat longe et (sparsim —) densiuscule v. sat dense pilosus, superne sparsim pilosus et leviter — densiuscule stellatus, apice sparsim — densius floccosus et glandulis nigris ± longis raris obsitus. *Folia basalia* 2—5 ± rosulata, exteriora ± elliptica — ovalia v. ovali — obovato-oblonga rare et minute denticulata ± obtusa, intermedia ± late — anguste ovalia — ovato-lanceolata v. plerumque ± lanceolata — oblonga (oblongo-lanceolata) ± obtusiuscula v. acuta ± sparsim — crebrius minute v. grosse

sæpe ± patenter et inæqualiter dentata, intima vulgo ± lanceolata v. interdum obovato- v. lingulato-lanceolata sæpe præsertim ad basin magis pinnato-dentata ± acuta, omnia in petiolum brevem alatum v. interdum angustum sæpe dentibus et laciniis instructum ± longe descendentia; *caulina* abrupte v. sensim decrescentia ± remota, omnia sessilia v. infimum breviter — sat longe petiolatum ± lanceolata v. ovato-lanceolata basi ± longe v. breviter attenuata sparsim — sat dense et breviter v. præsertim ad basin longe et argute ± irregulariter pinnato- et duplicato-dentata, superiora sæpe ad basin modo sparsim et interdum longissime et inæqualiter (2—3-) dentata v. pinnata superiore parte subintegra — integerrima ± longe acuta — cuspidata; omnia saturate gramineo-viridia, supra breviter et sparsim pilosa (v. subglabra) subtus pallidiora (interdum subglaucescentia v. cæsitia) pilis sparsis — densiusculis in nervo dorsali rare floccoso densioribus et longioribus vestita, marginibus densiuscule — sat dense ciliata, petiolis pilis ± longis mollibus ± densis villosis. *Anthela* ± composita (raro subsimplex) paniculata v. ramoso-paniculata superne haud raro umbellata, ramis inferioribus ± remotis, superioribus magis magisque et summis sæpe valde approximatis, omnibus ± longis et ± patentibus ± arcuatis et ± superantibus, pedicellis mediocribus acladioque 10—20(—40) mm. longo ± dense canofloccosis glandulis nigris longis — longissimis validis sat densis — densis obtectis. *Involucra* elongata ± gracilia cylindrica basi ± ovata postea rotundata atra — atrovirentia ± nitida. *Squamæ* ± lineari-lanceolatæ latiusculæ — sat latæ, exteriores obscuræ breves ± obtusæ, interiores ± æquales obtusæ — obtusiusculæ, intimæ paucæ acutæ apice v. totæ nudæ, ceterum exteriores præsertim interdum floccis tenuissimis solitariis adspersæ, vulgo basi leviter stellatæ, glandulis nigris validis longis — longissimis immixtis brevioribus dense — densissime obtectæ. *Calathidium* obscure luteum. *Ligulæ* apice glabræ. *Stylus* vivus ± ferrugineus, siccus ± obscurus.

Inv. $\frac{10—12(—13)}{5—7}$, D. 35—40, L. m. 3 mm.

En bland Skandinaviens allmännare Hieraciumformer, hvilken i sydligare delar af landet håller sig synnerligen konstant utan att framvisa några mera framträdande varieteter, ehuru den till följd af lokalens inflytande kan få ett temligen vexlande utseende likväl utan förändring af sina egentliga karaktärer. Svagt utpräglade lokala raser förekomma visserligen men äro utan konstans och sålunda omöjliga att sinsemellan begränsa. Oafsedt dylika smärre skiljaktigheter utmärker den sig öfverallt genom sina mörka, vanligen glänsande och temligen långa jemte skaften, hvilka dessutom äro rikt stjernludna, rikt och långt glandelhåriga holkar utan stjernludd eller endast med svaga spår deraf på holkens nedre del, förnämligast vid sjelfva basen och i kanten af ytterfjällen, m. l. m. långa, nästan jembreda och temligen breda, öfvervägande trubbiga fjäll, lifligt gröna, vanligen lancettlika och åtminstone vid basen m. l. m. (oftast djupt) tandade, spetsiga stjelkblad och inre rosettblad samt oftast aflånga till aflångt lancettlika, få- och korttandade yttre rosettblad. Holkarne påminna mycket till utseendet om dem hos *H. *serratifrons*. Ofta sträcker sig likheten derhän, att det är nästan omöjligt att endast på holkarne skilja de båda formerna från hvarandra. Med nyssnämda form (hörande till *Subvulgata*) är den sannolikt

rätt nära beslägtad och är att anse som dess motsvarande *vulgatum*-form. De yttre fjällen äro liksom hos nyssnämda form korta och trubbiga samt afbryta genom sin mörka färg mot de inre, nästan jemnhöga, nedåt grönare fjällen. Till holkarne varierar den mellan tvänne ytterligheter. Hos den ena äro de korta och tjocka med korta, trubbigare, ej öfvernående fjäll, hos den andra långa och smala med m. l. m. långt öfverskjutande, spetsigare fjäll. Till örtståndet varierar den med fåbladig stjelk och afbrutet decrescerande stjelkblad eller med mångbladig stjelk och uppåt småningom i storlek aftagande blad. Dessa variera dessutom rätt mycket till form och tandning. Ofta äro stjelkbladen, isynnerhet hos grofväxta exemplar, till sin nedre del ojemt och långt parflikadt tandade med rätt utstående eller stundom något bakåtböjda tänder. Vanligen äro något eller några par tänder eller flikar vid sjelfva bladbasen betydligt längre än de öfriga, och ofta äro tänderna på ena sidan starkare utvecklade. Men bladen variera äfven med tätare och finare samt mera regelbunden tandning, hvilken då ej sällan sträcker öfver skifvans midt. Vanligen är öfre hälften af bladet nästan eller helt och hållet helbräddad och utdragen i en kortare eller längre, skarp spets. De inre rosettbladen likna oftast de nedre stjelkbladen, men kunna äfven vara af samma form som de yttre. Rosettbladen variera i allmänhet ännu mera än stjelkbladen och förete en mångfald af former. Än äro de mera ovala eller aflånga, oftast med största bredden ofvan midten och trubbiga, än äro de mera lancettlika, breda eller smala, och stundom äggrundt lancettlika till aflånga. Vanligen äro de kort och glest tandade. Stundom bli de genom på midten mera framstående tandning nästan rhombiska. För öfrigt variera bladen efter lokalen från mera glatta till rikt och temligen tätt håriga. Stjelkens nedre del, bladskaften och äfven bladkanten samt bladens undersida äro oftast m. l. m. rikhåriga. Bladskaften och stjelkbasen äro m. l. m. rödbruna till purpurfärgade. Stundom äro isynnerhet de yttre bladen undertill lefverfärgade till violetta.

I norra Skandinavien, isynnerhet i fjälltrakterna och deras grannskap, varierar den betydligt mera än söderut och är splittrad i en mängd delvis väl, delvis svagt utpräglade varieteter, af hvilka en del i olika rigtningar leda öfver till närstående former. Dock förekommer den här beskrifna hufvudformen ganska typisk äfven i nordliga trakter. Söderut är den deremot mera konstant.

Anträffad inom området i *Östergötland*, Omberg, Stocklycke; Svanshals s:n, Stora Kullen; Ödeshögs s:n, Stora Åby Vestergård (G. A:N MALME); Väderstads s:n, Bossgård, Lindekullen, Torpa, Skållerud; Trehörna s:n, Slangeryd; Rinna s:n, Stortorp; Sunds s:n, Sundsö, Sunds Södergård, Graby, Sandbäckstorp m. fl. st. allmän; Torpa s:n, Torpön; N. Vi s:n, Siggemålen och Kärremåla; V. Ryd s:n, Krämarbo; Oppeby s:n, Drabo; Åtvids s:n, Karstorp m. fl. st. (förf.); V. Eneby s:n, Hofby (N. C. KINDBERG): *Småland*, Grenna (C. J. LINDEBERG); Vireda s:n (H. NILSSON); Öggestorps s:n, Ljungarp; Rogberga s:n, Tenhult och Heljaryd (K. JOHANSSON); Eksjö s:n, Brevik m. fl. st. (förf.); Fagerhults s:n, Fagerhult (K. J. LÖNNROTH); Barkaryd; Burseryds s:n (K. A. TH. SETH); Femsjö (TH. M. FRIES). Ej anträffad på Gotland.

Utom området funnen i *Blekinge*, Ronneby (C. G. WESTERLUND): *Vestergötland*, Toarps s:n flerestädes (A. O. OLSSON): *Nerike*, Tysslinge s:n, Hökerskulla (A. CALLMÉ): *Södermanland*, St. Malms s:n (G. A:N MALME): *Vermland*, Gillberga och Borgviks socknar (K. O. E. STENSTRÖM); Arvika (E. HOLMGREN): *Dalarne*, Traustrands, Särna och Venjans socknar (K. P. HÄGERSTRÖM): *Jemtland*, Dysjön (C. F. SUNDBERG): *Ångermanland*, Tåsjöberget (FR. LÖNNKVIST). — I *Norge* insamlad i Torpen flerestädes såsom vid Finden, Hugelien m. fl. st.; Etnedalen, Tousåsen (förf.); Dovre; Finnmarken.

Exemplaren i J. P. NORRLIN, Hier. exs. n. 129 under namn af *H. tenebrosum* tillhöra nog ofvan beskrifna form, till hvilken de under det af NORRLIN gifna namnet kunna föras som en något afvikande varietet, skild bland annat genom något glesare och gröfre glandler på holkar och skaft samt trubbigare och mera glänsande holkfjäll. Jemför för öfrigt NORRL. Bidr. etc. p. 106. Hit höra äfven exemplaren i mina Hieracia exsiccata, fasc. I, n. 87.

Funnen i *Norge* vid Singsaas (J. P. NORRLIN) och i Torpen vid Hugelien och Kinn (förf.).

Såsom en mellanform till följande kan uppfattas:

β atricapillum LÖNNR. in sched.

? H. vulgatum — sessilifolium FR. Symb. (sec. LÖNNR. in sched.)

Stjelk grof och nedtill rikligt hårig. Stjelkblad oskaftade, de öfre breda, alla med m. l. m. bred bas; rosettblad ofta mycket kort skaftade med bredt vingade skaft. Alla bladen glest uddtandade och ej sällan något vinkliga samt isynnerhet de öfre stjelkbladen vid basen med en och annan längre tand, öfverallt rikligare och längre håriga än hos föregående. Inflorescensen som hos föregående, men med grofva, tjocka grenar och under holkarne förtjockade skaft samt med gröfre glandler. Holkar korta, tjocka med breda, mera triangulära fjäll, i kanterna sparsamt men tydligt stjernludna, för öfrigt med spridda stjernhår och tättsittande, omvexlande långa och korta, grofva glandler. Habituelt utmärkt genom alla delars groflek; till utseendet och bladens form samt tandning mest närmande sig föregående, till holkarnes form och beklädnad (stjernluddet i fjällens kanter) påminnande om följande. Bladen äro dock som hos föregående alldeles ofläckade.

Anträffad i *Småland*, Fagerhults s:n nära Eskebäck (K. J. LÖNNROTH).

2. **H. *ornatum** *n. subsp.*

DAHLST., Hier. exs., fasc. II, n. 81. — DAHLST., Herb. Hier. Scand., Cent. II, n. 69, 70.

Caulis 35—70 ctm. altus crassus v. crassiusculus, inferne ± dense superne sat dense hirtus, a medio rare apicem versus magis magisque floccosus, sub anthela sat tomentosus et glandulis solitariis obsitus, 3—5-folius. *Folia* saturate viridia, supra adiposa et ut plurimum pulchre fusco-maculata, subtus pallidiora (— cinerascentia); *basalia* ± ovali-oblonga — oblongo-lanceolata v. late lanceolata in petiolum ± decurrentia, exteriora obtusa, interiora acuta, omnia ± crebre et acute sæpius æqualiter denticulata — dentata, supra breve et sparsim — densiuscule, subtus sat dense pilosa, in nervo dorsali petiolisque anguste alatis pilis longis ± villosa; *caulina*, infimum petiolatum, superiora sessilia, ovato-lanceolata v. late lanceolata sparsius — crebrius ± argute et inæqualiter serrato-dentata basin versus sæpe longius et subulate dentata deorsum ± attenuata et in apicem integrum acutum breviter — sat longe protracta ± pilosa et subtus sparsim floccosa. *Anthela* ± paniculata, superiore

parte sæpe umbellata ± composita v. simplex ramis sat longis superantibus ± erecto-patentibus sæpe leviter arcuatis cum pedicellis brevibus acladioque 15—40 mm. longo cano-viridibus et ± dense tomentosis, ceterum glandulis mediocribus — sat longis ± validis sparsim — (superne) sat dense obtectis. *Involucra* atra — atroviridia cano-variegata sat elongata valida. *Squamæ* latiusculæ v. latæ, exteriores breves lineares angustiores, interiores lanceolatæ obtusæ — obtusiusculæ, intimæ paucæ acutæ, omnes ± sordide viridi-marginatæ dorso glandulis nigricantibus ± longis iisdem brevioribus æqualiter immixtis dense — densissime obtectæ, marginibus inferne sparsius superne usque ad apicem comatulum floccis albis densis — densissimis sat late limbatæ, ceterum rare stellatæ. *Calathidium* vitellinum v. fere croceum radians. *Stylus* vivus et siccus fere niger.

Inv. $\frac{10—11}{5—6}$, D. 35, L. m. 3 mm.

Denna form, hvilken är en bland områdets vackraste och mest distinkta, utmärker sig genom sina mörkgröna, ganska håriga, skarptandade, ofvantill något fettglänsande och mörkfläckiga blad, grof, hårig, till större eller mindre delen violettfärgad stjelk och mörka, serdeles rikt glandelhåriga holkar, hvilka äro karaktäristiskt brokiga af stjernludd, som bildar en nedtill smalare, upptill mot de trubbiga och hårtofsade fjällens spetsar allt bredare, skarpt framträdande, hvit kant. Holkskaft och inflorescensgrenarne äro grön-grå eller hvitludna af tätt stjernludd och klädda af m. l. m. långa, nedåt glesa, uppåt tätare glandler samt afbryta skarpt genom sin ljusa färg mot den mörka och rundade eller något tvära holkbasen. Bladen äro liksom stjelken ofta mot spetsarne på båda sidor violettfärgade. De variera till formen, isynnerhet stjelkbladen, från bredt äggrunda till utdraget lancettlika. Stjelkbladen äro alltid till sin öfre del helbräddade och utdragna i en kortare eller längre, skarp spets, basalbladen deremot äro ofta till största delen m. l. m. trubbade, eller de inre kortspetsade, och ej sällan med största bredden ofvan midten samt medelmåttigt skaftade med kort, nedlöpande bas. Alla bladen äro oftast tätt och ganska regelbundet, skarpt och kort tandade, men bli stundom, synnerligast de öfre stjelkbladen, vid sin bas mera ojemt samt långt och smalt fliktandade. Holkfjällen, som vanligen äro m. l. m. lancettlika och trubbade, variera ibland triangulärt-lancettlika och äro då ofta mera spetsade. Är för öfrigt mycket konstant. I några afseenden såsom till holkarne liknar den något den vermländska *H. *ceramotum* Stenstr., hvilken dock alltid är lätt skild genom alla delars större glatthet, mera utdragna, ojemnare och längre, groftandade blad, hvilka äro blekgröna, och aldrig äro fläckiga, samt rikligare ludd äfven på holkfjällens midt, hvarigenom kantens luddrand ej framträder så tydligt. Till holkarne har förhandenvarande form en ej ringa likhet med *H. *variicolor*, hvilken den dessutom liknar till de vegetativa delarnes beklädnad, bladens färg och fläckighet m. m. Sannolikt äro dessa båda former beslägtade, ehuru de i morfologiskt hänseende tillhöra olika typer.

Inom området funnen i *Östergötland* i Sunds s:n, Sunds Södergård på fuktig mark, ofta på Sphagnum-tufvor, vidare i V. Ryds s:n, Krämarbo (förf.) samt i *Småland*, Eksjö s:n, Brevik och Kulla, Smedstorp m. fl. st. (förf.); Rogberga s:n vid Tenhult; Forserums s:n vid Alarp; Öggestorps s:n vid Ljungarp (K. Johansson); Askeryds s:n, Bordsjö (förf.).

Utom området anträffad i *Vestergötland* på Kinnekulle (K. O. E. Stenström).

H. DIAPHANUM (Fr.).

Caulis altus — elatus 2—6-folius, inferne ± obscure violascens sparsim — sat dense et longe pilosus, superne sparsim — rare pilosus, basi sæpe sparsim stellatus et apice sparsim floccosus v. sat tomentellus, sæpe a medio glandulis brevibus raris obsitus. *Folia* læte viridia supra glauco-viridia v. prasino-viridia, subtus subglaucescentia, supra rare pilosa v. fere glabra immaculata v. maculata, subtus sparsim — sat dense pilosa; *basalia* angusta — lata subintegra v. sparsim — crebrius dentata; *caulina* cito decrescentia sparsim dentata — sat crebre serrato-dentata ad basin interdum longius dentata. *Anthela* parva sublaxa ± paniculata ramis ± erectis erecto-patentibus v. ± divaricatis ± tomentosis et glandulis nigris brevibus sparsis — crebris obtectis. *Involucra* parva v. mediocria crassa — crassiuscula atra — atro-viridia efloccosa v. fere efloccosa glandulis brevibus dense — conferte obtecta. *Styli* lutei.

Hit höra trenne närbeslägtade former, hvilka inom gruppen stå temligen isolerade, utmärkta af sina korta glandler på holkar och skaft samt normalt gula stift. Af dessa former tenderar *H. *glaucovirens* åt *H. pinnatifidum* (serskildt åt *H. *punctillatum*), hvaremot *H. *diaphanum* (hufvudformen) i mycket närmar sig *H. gothicum*. *H. diaphanum β pseudodiaphanum*, hvilken i flera afseenden är intermediär mellan båda, närmar sig äfven något *H. pinnatifidi* formgrupp. Måhända vore det rättast att betrakta densamma som egen underart, synnerligast som den har vidsträcktare utbredning och allmännare förekomst än de båda öfriga.

Conspectus subspecierum.

1. *Folia* angusta læte viridia et subtus glauco-viridia, supra sæpe ± maculata. *Caulis* gracilis elatus. *Squamæ* angustæ lineares breves.
   1. *H. *glaucovirens* Dahlst.

2. *Folia* lata saturate v. prasino-viridia, subtus subglaucescentia v. fere cæsio-viridia, supra numquam maculata. *Caulis* ± robustus altus. *Squamæ* ± latæ triangulari-lanceolatæ (sæpe protractæ).
   2. *H. *diaphanum* Fr.

1. H. *glaucovirens Dahlst.

H. *glaucovirens Dahlst. apud. Stenstr., Verml. Archier. 1889. — H. vulgatum var. integrifolia Lbg., Hier. Scand. exs. n. 72 p. p. (e Vestrogothia). — Dahlst., Hier. exs., fasc. III, n. 48. — Dahlst., Herb. Hier. Scand., Cent. II, n. 66.

Caulis 30—80 ctm. altus 2—3(—4)-folius sat gracilis, inferne sat dense v. sparsim pilis (c. 2 mm.) longis obtectus sparsim stellatus, superne sparsim v. rare

pilosus et pilis brevibus sæpe scaber sat stellatus, apice pilis raris obsitus sat floccosus — sat tomentellus. *Folia* supra læte viridia, subtus glauco-viridia: *basalia* exteriora ± ovalia — elliptica obtusa, intermedia ± late — anguste lanceolata et intima ± lanceolata sæpe longe et argute acuta v. omnia sat anguste lanceolata sat longe et anguste petiolata, omnia marginibus ± integra v. brevissime et sparsim denticulata v. etiam in spec. validioribus dentibus raris humilibus antrorsum versis instructa; *caulina* lanceolata — anguste lanceolata longe remota cito decrescentia, infimum ± petiolatum, reliqua sessilia sparsim denticulata — breviter dentata v. in spec. validioribus basin versus uno alterove dente longiore prædita; omnia supra rare pilifera v. fere glabra, subtus sparsim in marginibus et in nervo dorsali petiolisque sat dense et breviter pilosa et densiuscule (caulinum summum etiam in pagina superiore) stellata. *Anthela* sæpe parva sublaxa ± paniculata v. apice interdum subumbellata simplex — subcomposita, ramis inferioribus magis remotis, superioribus ± approximatis ± superantibus, acladio (2—)5—20(—30) mm. longo pedicellisque brevibus ± dense cano-tomentosis et glandulis nigris brevibus in ramis sparsis in pedicellis (præsertim sub involucris) densis — densissimis obtectis. *Involucra* parva brevia fusco-atra v. atro-viridia crassiuscula basi ± rotundato-ovata postea subtruncata. *Squamæ* angustæ lineares, exteriores breves v. brevissimæ, interiores et intimæ subæquilongæ et ± late et pure viridi-marginatæ (præsertim intermediæ) apicibus piceæ et sæpius minute albido-comatæ, omnes obtusæ — obtusiusculæ v. intimæ acutæ glandulis brevibus apice sæpe subluridis ceterum atris præsertim basin versus dense — densissime obtectæ. *Calathidium* parvum sat obscure luteum. *Stylus* vivus luteus, siccus interdum fusco-luteus.

Inv. $\frac{9—10}{5—5,5}$, D. c. 30, L. m. c. 2 mm.

En vacker form, utmärkt af sin höga, smala, nedtill brunvioletta och ganska rikligt samt fint långhåriga, uppåt glest och kortare håriga samt ganska stjernhåriga stjelk, hvilken vanligen har 2—3 långt åtskilda, oftast ytterst smala (smalt lancettlika) blad af isynnerhet undertill blåaktigt grön färg, samt af små holkar, hvilkas smala, grön- till brunsvarta fjäll hafva (isynnerhet de mellersta) rena och mörkgröna kanter och nästan alla äro trubbade till rundtrubbiga med (isynnerhet de yttre) fint hvithåriga spetsar, som skarpt framträda på den mörka botten, samt hvilka äro beklädda af nedtill oliklånga, upptill korta, ytterst täta, mörka glandler med ofta gulaktiga knappar, hvilka förläna holken ett punkteradt utseende, samt af i lefvande tillstånd rent gula stift. De yttersta fjällen hafva i kanten och på ryggen vanligen mot basen några spridda stjernhår. Nederst på holken sammansmälta de ljusa hårtofsarne oftast mer eller mindre. Skaften äro rikligt stjernhåriga men ofta ganska gröna samt temligen rikligt, isynnerhet uppåt, beklädda af korta, mer eller mindre mörka glandler. Inflorescensen är kvastlik, ofta något utbredd, vanligen fåblomstrig (3—5). Basalbladen äro vanligen smala, lancettlika, de yttre trubbade (liknande dem hos *H. *diaphanum* till formen), oftast nästan helbräddade med korta, glandellika tänder eller med glesa och grunda, framåtriktade tänder och äro ofta långskaftade med föga violettanlupna skaft. De variera dessutom liksom stjelkbladen med längre tandning, och stundom hafva de sednare ett par större spetsiga tänder vid basen. De äro för öfrigt

hårigare i sol och glattare i skugga. Håren äro korta och sitta tätast på medelnervens undersida och i kanterna. De inre rosettbladen äro undertill ganska rikligt stjernhåriga liksom stjelkbladen, hvilka ofta äro ännu tätare stjernludna, det öfversta äfven på öfversidan. I spetsen äro ofta både basal- och stjelkbladen rödbruna eller ljust purpurfärgade och stundom på undersidan eller båda sidor fläckiga af något mörkare färg. Är mycket närbeslägtad både med *H. *punctillatum* och följande.

Anträffad i *Östergötland*, V. Ryds s:n, Krämarbo, sparsamt på öppnare backmark i löfängar, och vid Tunarp på ungefär liknande lokal; Sunds s:n, Graby i aspdunge samt i Rinna s:n vid Stortorp i löfskog (förf.): vidare i *Småland*, Näfvelsjö s:n mellan Broby och Hulta samt i Forserums s:n, Horsarp, å torr ängsbacke (K. JOHANSSON).

Utom området funnen i *Dalsland*, Örs s:n (A. FRYXELL): *Vermland*, Gillberga m. fl. st. (K. O. E. STENSTRÖM) samt Arvika (E. HOLMGREN): *Helsingland*, Söderhamn (A. MAGNUSSON).

2. **H. *diaphanum** Fr.

H. diaphanum Fr. Nov. 1819. — H. diaphanum Fr. v. pratense Fr. Nov. Fl. Suec. Mant. II, p. 46. — H. diaphanum Fr. Symb. (ex. p.). — H. diaphanum Fr. Epicr. — H. diaphanum Fr. Herb. Norm. II: 11. — H. diaphanum Lbg., Hier. Scand. exs. n. 35 et Hn. Fl. ed. 11 (exclus. var.).

Caulis 30—60 ctm. altus rectus et firmus 3—5(—6)-folius, inferne violascens sparsim et longe pilosus, superne pilis brevibus subscaber vix v. apice ipso sparsim stellatus a medio glandulis solitariis superne raris — sparsis obsitus. *Folia* saturate viridia, subtus subglaucescentia, tenuia firma; *basalia* florendi tempore 2—3, exteriora ovalia — late oblonga obtusiuscula, interiora oblongo — ovato-lanceolata ± acuta, omnia sparsim — crebrius et sat argute denticulata; *caulina* cito decrescentia ± ovato-lanceolata — lanceolata acuta — cuspidata æqualiter, sat crebre et argute serrato-dentata, superiora (præsertim in spec. validioribus) ad basin sæpius longius et subulate dentata, infimum v. infima petiolata, summa sessilia, omnia supra rare pilosa v. fere glabra, subtus rare — sparsim in nervo dorsali marginibusque crebrius et longius pilosa, ceterum vix nisi in nervo dorsali stellata. *Anthela* ± contracta sæpius parva subindeterminata, ramis divaricatis v. erecto-patentibus, inferioribus remotis sat brevibus, superioribus approximatis (interdum fere umbellatis) ± superantibus cum acladio 15—20 mm. longo pedicellisque brevibus viridi-canescentibus sat dense tomentosis et glandulis minutis crebris — creberrimis obtectis. *Involucra* brevia crassa atroviridia nitentia basi ± ovata postea rotundato-truncata. *Squamæ* regulariter imbricatæ multiseriales latæ, exteriores nigræ ex ovata basi fere triangulares apice conspicue albo-comatulæ, intermediæ et interiores triangulari-lanceolatæ v. late lanceolatæ dorso ± lato nigræ ± late et pure viridi-marginatæ obtusæ v. obtusissimæ, intimæ obtusiusculæ — acutæ, totæ nudæ, ceterum glandulis nigris mediocriter longis brevibus frequentioribus immixtis sparsim — densiuscule obtectæ. *Calathidium* sat obscure luteum. *Stylus* vivus luteus, siccus leviter fuscescens.

α genuinum.

Denna form har en mycket utmärkande habitus och är lätt att igenkänna från närstående på ofvan angifna karaktärer. Från följande varietet, med hvilken den dock har ytterst stor likhet och till hvilken på sina ställen mellanformer synas förekomma, är den skild genom sin flerbladigare, något *rigidum*-artadt utbildade stjelk, sina mindre stjernhåriga blad och sina bredare, glänsande grönsvarta holkar med breda och trubbiga fjäll. De nyssnämnda mellanformerna förekomma ej på samma trakter som denna och måhända är ifrågavarande form, hvilken är känd från ett ytterst inskränkt område, endast en lokal modifikation af följande, hvilken deremot i södra Sverige är mycket allmän och som ofvan sagts ganska lätt kan serskiljas möjligen som underart, åtminstone som varietet. Till de trubbigare fjällen och den lilla, hvita hårtofsen på de yttres (någon gång äfven på de inres) spetsar liknar den här beskrifna hufvudformen ej så litet *H. *glaucovirens*, med hvilken den tydligen är slägt. Från denna är den dock lätt skild genom sina breda blad och bredfjälliga holkar. Till dessa sednare åter påminner den ej litet om bredfjälliga underarter af *H. gothicum* Fr. och torde stå i samma förhållande till dessa ännu mera accipitrinskt utvecklade former, som *H. *smolandicum* till *H. *macrotonum* eller *H. *vulgatum* till *H. *vulgatiforme* etc.

Formen är sedan Fries' tid då och då påträffad i *Småland* vid Valshult i Femsjö (af C. J. Lindeberg m. fl., sednast 1890 af K. O. E. Stenström) men är ännu ej funnen utom detta område.

H. diaphanum v. stenolepis Lbg. exs. hör synbarligen ej till denna art utan åtm. ex parte snarare till *Oreadea*, hvilket örtståndets och holkarnes indument utvisar. Sannolikt förleddes Fries af liknande former (exempelvis var. *curtum* Fr. Symb. från Skrimsfjeld i Norge) att jemte dessa föra äfven den småländska formen till *Oreadea*.

β pseudodiaphanum n. var.

H. *diaphanum Stenstr., Verml. Archier. 1889 (exclus. synon.). — H. *diaphanum f. vulgaris Dahlst., Hier. exs. fasc. II, n:is 76, 77, fasc. IV, n. 89. — Dahlst., Herb. Hier. Scand. Cent. II, n, 67, 83.

Caulis 30—50 ctm. altus gracilis — crassiusculus subflexuosus sat firmus 1—3-folius, inferne obscure fusco-violascens pilis albis sparsis — densiusculis hirtus fere efloccosus, superne subglaber sparsim stellatus et glandulis solitariis — sparsis obsitus. *Folia* saturate et fere prasino-viridia, subtus fere cæsio-glauca; *basalia* 2—5, exteriora in pagina inferiore sæpe ± violascentia parva ovalia obtusa, intermedia ± ovali — ovato-oblonga v. ± oblongo — ovato-lanceolata breviter acuta, intima sæpe ± anguste lanceolata vulgo longe acuta, omnia intimis exceptis subintegra v. breviter denticulata — argute dentata v. omnia late et breviter dentata; *caulina* inferiora v. infimum petiolata, summa sessilia, ovato-lanceolata — lanceolata minute serrato-dentata v. argutius et longius raro ad basin irregulariter dentata ± acuminata — cuspidata (apice sæpe longo integro), omnia supra pilis brevibus sparsis — raris obtecta, subtus brevissime et densiuscule in nervo dorsali sat dense floccoso longius et densius pilosa, ceterum sparsim — sat dense stellata, marginibus sat crebre ciliata, in petiolis alatis violascentibus molliter et

longe pilosa. *Anthela* paniculata ± composita sæpe sat divaricata, ramis ± distantibus, inferioribus erecto-patentibus subrectis, superioribus sæpe valde arcuato-patentibus, omnibus ± superantibus cum pedicellis brevibus ± approximatis acladioque 8—20 mm. longo sat dense floccosis et glandulis brevibus nigris sparsis v. sub involucris densis — sat confertis obtectis. *Involucra* mediocria crassa — crassiuscula ± atroviridia basi ± rotundato-obtusa, postea truncata. *Squamæ* exteriores angustæ sublineares obtusiusculæ, interiores ± triangulari-lanceolatæ sensim in apicem obtusiusculum — sat acutum sæpe sat longe protractæ, intimæ paucæ acutæ — subalatæ, omnes dorso ± nigræ, intermediæ et intimæ ± late viridimarginatæ, apicibus ± sed vulgo parum conspicue comatæ, inferne rare stellatæ, ceterum nudæ et glandulis brevibus inæquilongis nigris densis — confertis obtectæ. *Calathidium* sat obscure luteum. *Stylus* vulgo luteus (v. siccitate ± fuscescens).

Inv. $\frac{9-12}{5-6}$, D. c. 35, L. m. 2—2,5 mm.

Utmärkt af sin 2—3-bladiga, ganska styfva, nedtill mörkt och karaktäristiskt brunvioletta stjelk, mörka, i lökgrönt skiftande, undertill ganska stjernludna och temligen breda, stundom helbräddade, vanligen fintandade blad, mörka holkar i vanligen gles och isynnerhet upptill utspärrad inflorescens och hvilka med undantag af de yttre fjällens kanter och baser, hvilka äro spridt stjernludna, samt de hårtofsade spetsarne äro alldeles nakna men tätt beklädda af små eller inblandade medellånga, mörka glandler, samt slutligen i lefvande tillstånd vanligen gula stift. Bladen, hvilka äro betydligt dunklare gröna än hos hufvudformen och *H. *glaucovirens*, äro oftast fintandade men variera med bredare och vanligen glesare samt vid basen längre tänder (i frisk skugga); stundom bli stjelkbladen vid sin bas något ojemt och glest groftandade. Det inre bladet i rosetten är liksom oftast stjelkbladen, hvilka äro längre och smalare än hos hufvudformen, ofta betydligt smalare och längre än de öfriga basalbladen samt har jemte stjelkbladen ofta långt utdragen, helbräddad spets. Korgarne äro i allmänhet längre än hos hufvudformen och ofta mera gröna, derigenom att de inre och mellersta fjällen hafva bredare och ljusare gröna kanter. Fjällen äro vanligen också längre och smalare än hos denna samt mera triangulärt-lancettlika och bli mera trubbiga, då de äro kortare, men spetsigare, då de äro längre. De afsmalna småningom med raka kanter från den bredare basen och äro i spetsen mera hårtofsade än hos hufvudformen. Stiften äro vanligen gula, men Gotlands-exemplar äga oftast mörka stift. Från föregående afviker den utom i nyssnämda karaktärer äfven i habitus genom sina färre och smalare stjelkblad och sina under blomningen till större antal persisterande basalblad. Till holkarne erinra de trubbfjälliga formerna om hufvudformen. Exemplar från Dalsland äro fullkomligt intermediära och skulle lika gerna kunna föras till den ena som den andra. Former med smalare blad och smärre holkar erinra något om *H. *glaucovirens* men äro lätt skilda genom sina bredare grönkantade, ej jemnbreda utan vid basen bredare och för öfrigt spetsiga fjäll samt sin lökgröna, mörkare bladfärg. Exemplar med mycket breda, gröna fjällkanter påminna om *H. *chlorodes*. Med denna torde ifrågavarande form vara i någon mån beslägtad. Slutligen må nämnas, att späda former med nästan helbräddade, smala blad från Gotland af denna var. och analoga former af *H. *barbareæfolium* i förvillande grad likna hvarandra och nästan endast kunna skiljas genom glandlernas olika täthet och längd

på holkar och skaft, blomfärgen och holkarnes dimensioner. Detta synes tyda på att ifrågavarande forms slägtskap med de anfractum-artade formerna ej heller är så aflägsen.

Denna biform är mycket allmännare spridd än hufvudformen. På sina ställen förekommer den i ytterst rikligt individantal.

Inom området är den anträffad i *Östergötland*, Vestra Husby s:n, Korssäter (H. STRÖMFELT); Kärna s:n, Malmskogen och Kärna mosse; Omberg, Stocklycke; Väderstads s:n. Lindekullen; Svanshals s:n, St. Kullen; Wists s:n, Sturefors, Hamra och Vessentorp; Oppeby s:n, Drabo; V. Ryds s:n, Krämarbo; Sunds s:n, Graby (förf.): *Småland*, Sommens jernvägsstation; Askeryds s:n, Bordsjö (förf.); Vrigstads s:n (A. KALLSTENIUS); Burseryds s:n. Mölneberg (K. A. TH. SETH); Eksjö s:n, Brevik, Kulla m. fl. st. (förf.); Målilla s:n; Mörlunda s:n, Haddetorp; Madesjö s:n, Mellan-Örsjö (K. J. LÖNNROTH); Moheda s:n; Drefs s:n, Grenna stämma (G. E. HYLTÉN-CAVALLIUS); Östra Thorsås s:n, Romelsjö (C. J. JOHANSSON): *Gotland*, Rute s:n, Gerungs (K. J. LÖNNROTH); Lärbro s:n; Lokrume s:n; Tingstäde s:n (S. ALMQUIST); Lummelunds s:n, Etebol (K. JOHANSSON); Bro s:n (T. WESTERGREN): Vesterhejde s:n, Vibble (K. JOHANSSON); Hejde s:n, Gervalls (FR. E. AHLFVENGREN); Vänge s:n, Bjerges (K. JOHANSSON); Sanda s:n; Klinte s:n, Valla (K. J. LÖNNROTH): *Öland*, Borgholm (S. ALMQUIST).

Utom området anträffad i *Blekinge*, Ronneby (C. G. WESTERLUND): *Bohuslän*, Koön (S. ALMQUIST): *Dalsland*, Gunnarsnäs (V. B. WITTROCK, A. FRYXELL): *Vermland*, Gillberga och Borgviks socknar (K. O. E. STENSTRÖM); Sunds s:n, Arvika (E. HOLMGREN): *Dalarne*, Lima s:n, Tandsjö fäbodvall (K. P. HÄGERSTRÖM): *Upland*, Rindö (O. JUEL); Vermdö (A. MAGNUSSON).

H. GOTHICUM (FR.)

Caulis altus — elatus gracilis — crassiusculus sæpe strictus et rigidus basi ± violascens densiuscule — dense pilosus leviter stellatus, superne sparsim pilosus — subglaber sparsim floccosus — tomentellus (3—)7—9(—16) folius. *Folia* ± saturate viridia, supra sparsim pilosa — subglabra sæpe leviter stellata, subtus rare — sparsim v. densiuscule pilosa sæpe leviter — sparsim stellata; *caulina* vulgo sensim rarius cito decrescentia sæpius sparsim — acute raro crebrius dentata v. basi sæpe ± anguste ovata — descendente 3—4-dentata; *basalia* nunc in rosulam 3—4-foliam approximata nunc ± remota et sæpe sub anthesi emarcida angustiora — latiora sparsim — sat crebre vulgo haud profunde dentata v. pauca ± longe 2—3-dentata. *Anthela* nunc laxa amplior nunc magis contracta angustior ± paniculata v. corymboso-paniculata sæpe ± indeterminata, ramis ± rectis tomentosis fere eglandulosis v. ± glandulosis et sæpe etiam rare — sparsim pilosis. *Involucra* mediocria — magna atro- v. sat viridia, squamis sæpius pluriserialibus ± glandulosis et sæpe etiam ± obscure pilosis, interdum ubique v. in marginibus ± floccosis. *Styli* ± nigri v. atri.

Hithörande former utmärka sig alla med afseende på örtståndet genom sin utbildning efter *subrigidum*-typen och mången gång äfven genom starkt utpräglad *rigidum*-habitus, vidare genom sina flerfjälliga holkar, hvarigenom de habituelt erinra om *H. rigidum*, ehuru de med afseende på fjällens anordning ej tillhöra denna formgrupp. Holkarne äro vanligen svarta och glänsande med m. l. m. rikliga glandler, ofta med inblandade hår, sällan med rikligare hårighet. Ehuru flertalet äro nära besläktade, äro de sannolikt ej att anse som en fullt naturlig grupp, utan de olika formerna äro till en stor del att upp-

fatta som *subrigidum*-artadt utbildade paralellformer till olika former af *H. anfractum*. De förhålla sig till denna arts former ungefär som *H. *macrotonum* till *H. *smolandicum* eller *H. *subpunctillatum* till *H. *punctillatum* etc. Så synes *H. *patagiarium* alldeles motsvara *H. *chlorodes* och dess var. *β ampliatifrons H. *eurycybe*. Likaledes synes *H. *gothicum* och *H. *adampliatum* med sina former motsvara *H. *atronitens* med sina varieteter.

Conspectus subspecierum.

A. *Squamæ* glandulosæ epilosæ (v. ad summum etiam pilis solitariis obtectæ).

1. *Folia* ± lata.

Squamæ involucri ± viridis valde obtusæ, dorso parce floccosæ marginibus late viridibus efloccosæ v. basin versus floccis obsitæ dense — densiuscule glandulosæ. *Caulis* 4—6-folius; *folia caulina* cito decrescentia ± remota sæpe ad basin magis approximata ± crebre et argute dentata v. sæpius ad basin longe — longissime 3—4-dentata.

1. *H. *patagiarium* K. Johanss.

2. *Folia* angusta.

Squamæ involucri atroviridis acutæ, dorso floccis sparsis in marginibus anguste viridibus densioribus et sæpius limbum ± conspicuum præsertim apices versus formantibus obtectæ densiuscule — sat dense glandulosæ rarissime et breviter pilosæ. *Caulis* 5—9-folius; *folia caulina* quam basalia vulgo latiora sensim decrescentia longe cuspidata sparsim subulato-dentata v. longe 2—3-dentata.

2. *H. *flocculosum* Dahlst.

Squamæ involucri atroviridis v. atri obtusæ — obtusiusculæ vix viridi-marginatæ efloccosæ dense — sat dense glandulosæ pilis solitariis v. nullis obsitæ. *Caulis* 8—16-folius; *folia caulina* quam basalia vulgo angustiora ± inæqualiter et longe subulato-dentata dentibus 2—3 sæpe longioribus.

3. *H. *perangustum* Dahlst.

B. *Squamæ* ± glandulosæ et pilis raris — sparsis immixtis obsitæ.

Caulis robustus 7—9-folius; *folia caulina* lata erecta sensim decrescentia sparsim — sat crebre et inæqualiter dentibus sæpe 2—3 longis — longissimis prædita. *Squamæ* involucri ± magni atroviridis — atri obtusiusculæ — obtusæ dense — conferte nigroglandulosæ rare pilosæ.

4. *H. *gothicum* Fr.

Caulis gracilis 5—9-folius; *folia caulina* angusta patentia sensim decrescentia sparsim — crebre et inæqualiter sæpe 3—4-dentata. *Squamæ* involucri

mediocris atri — atroviridis obtusiusculæ — obtusæ sparsim — sat densiuscule glandulosæ rare — sparsim pilosæ.

5. *H.* **tenuiceps* Dahlst.

Caulis sat gracilis 3—6-folius; *folia caulina* remota cito et sæpe abrupte decrescentia ± lata sparsim et irregulariter dentata et sæpe dentibus 2—3 longis — longissimis instructa. *Squamæ* involucri mediocri atroviridis obtusiusculæ — subacutæ rare — sparsim glandulosæ pilis solitariis — raris obsitæ.

6. *H.* **adampliatum* Dahlst.

C. *Squamæ* ± pilosæ et rare glandulosæ efloccosæ (v. sparsim ad basin densius stellatæ).

Caulis 5—7-folius ± robustus; *folia caulina* sensim decrescentia ± lata ± æqualiter et late dentata. *Squamæ* involucri atroviridis — atri sat magni obtusiusculæ — subacutæ sparsim — densiusculæ pilosæ et glandulis raris — solitariis obsitæ efloccosæ (v. in var. sparsim ad basin densius stellatæ).

7. *H.* **gothiciforme* Dahlst.
(c. var. *β subvulgatum.*)

1. **H.** **patagiarium* K. Johansson in litt.

Caulis 40—75 ctm. altus sat rigidus gracilis — crassiusculus strictus v. leviter flexuosus 4—6-folius, inferne obscure — dilute violaceus pilis longis mollibus densiusculis — sat densis obsitus sparsim stellatus, superne rare — sparsim stellatus fere epilosus, apice sparsim floccosus — tomentellus, ubique scaber. *Folia* saturate viridia, supra rare — sparsim pilosa v. glabrescentia levissime stellata, subtus pallidiora subcæsia rare — sparsim pilosa levissime — sparsim stellata in nervo mediano densiuscule — sat dense floccoso pilis ± longis albis densis — sat densiusculis obtecta; *basalia* nunc in rosulam 3—4-foliam approximata nunc magis remota et sæpe sub anthesi emarcida, exteriora sub anthesi raro persistentia ovalia — elliptico-obovata integra vel ± crebre et obtuse dentata, intermedia oblongo — lanceolato-ovalia subintegra — rare denticulata v. crebrius et profundius ± obtuse dentata ± obtusa, interiora longa sub anthesi vulgo persistentia ± anguste oblongo-lanceolata — lanceolata sparsim et acute denticulata v. longius et crebrius dentata in apicem ± longum integrum protracta, omnia mediocriter v. longe et sat anguste petiolata; *caulina* cito decrescentia nunc æqualiter per caulem disposita nunc ad basin magis approximata inter se ± remota, infima longissima vulgo internodiis longiora ± anguste lanceolata v. superiora ± linearia, infimum sæpe ± petiolatum, intermedia basi longe cuneata angusta, superiora basi brevius cuneata sessilia sat crebre et argute dentata v. vulgo ad basin longe — longissime 3—4-dentata dentibus angustis acutis antrorsum vergentibus, omnia in apicem longissimum ± integrum acutum attenuata. *Anthela* parva simplex ± contracta v. sat magna laxa ± composita ramis sat

approximatis v. inferioribus ± longe remotis sat erectis rectis v. basi leviter curvatis superioribus magis patentibus et leviter curvatis densiuscule stellatis superne tomentellis et interdum glandulis solitariis, obsitis pedicellis brevibus v. mediocribus gracilibus apice incrassatis acladioque 10—15 mm. longo tomentosis glandulis raris v. sub involucris sparsis vestitis. *Involucra* magna robusta sat longa inferne fere atra apice pulchre viridi-variegata basi ± rotundata postea truncata. *Squamæ* latæ, exteriores triangulares obtusiusculæ — obtusæ fere atræ, interiores dorso atro late et viventer viridi-marginatæ in apicem latum rotundato-obtusum ± comatulum viridem v. sæpe leviter vinosum — pulchre roseo-purpureum attenuatæ, fere efloccosæ v. extimæ floccis raris obsitæ, ceterum dorso basique glandulis nigris mediocribus densiusculis — sat densis obtectæ. *Calathidium* sat obscure luteum. *Ligulæ* apice glabræ. *Stylus* obscurus (fuscescens).

Inv. $\frac{10—11}{6—7}$, D. 30—35, L. m. 2—2,5 mm.

Denna serdeles vackra och prydliga form igenkännes med lätthet på sina stora, upptill lifligt grönbrokiga holkar med breda, nästan jemnbreda eller föga afsmalnande, rundtrubbiga fjäll. De yttre fjällen äro nästan alldeles svarta af mer eller mindre triangulär form, något frånstående och ej så bredt trubbade som de inre, hvilka endast äga en smal, mörk rygg men mycket breda, lifligt gröna kanter. I den runda spetsen äro de vanligen svagt vinröda, någon gång lifligt rosenröda. Glandlerna, hvilka på de inre fjällen bilda en nästan enkel rad och på de yttre sitta i flera rader, äro vanligen alldeles svarta och väl framträdande. För öfrigt saknar holken nästan all annan beklädnad utom på de yttre fjällen, hvilka vid sjelfva basen och ibland på ryggen hafva spridda stjernhår. Oftast äro likväl spetsarne af fjällen kort hårtofsade af hvita hår. Utmärkande för formen äro för öfrigt de smala stjelkbladen med långt utdragen, helbräddad, skarp spets och nedom midten vanligen 3—4 långa och smala, framåtrigtade eller vid basen ibland utstående, temligen glesa tänder, hvilka ej sällan sitta oregelbundet och ibland omvexla med korta, fina uddtänder. Tandningen är vanligen längst och glesast hos fåbladiga former. Hos flerbladigare individer äro tänderna ofta kortare men alltid skarpa och sitta ej sällan tätare. Hos fåbladiga former sitta de nedre bladen nära hvarandra, de öfre deremot glest och äro smala äfven vid basen. Hos flerbladiga individ äro bladen mera jemt fördelade och de öfre äga vanligen bredare, vigglik bas. De aftaga vanligen hastigt eller med plötsligt afbrott i storlek uppåt inflorescensen. Hos individer med få stjelkblad äro basalbladen samlade till en rosett och mera djupt och vackert tandade med något vågig brädd, hvaremot de hos mångbladiga exemplar äro mera aflägsnade från hvarandra och mer eller mindre helbräddade, eller äro de vid blomningen afvissnade, åtminstone de yttre. Hos de förra är inflorescensen vanligen glesare med långa grenar, hos de sednare mera hopdragen. Med *H.* **chlorodes* företer den många likheter, serdeles med afseende på de grönbrokiga holkarne och de trubbiga fjällen, men är skild bland annat genom sin flerbladigare stjelk, rakare och mera framåtrigtade, glesare tandning samt svagare glandelhårighet på holkar och skaft. Den är utan tvifvel nära slägt med nyssnämnda form och att anse som en *subrigidum*-artadt utvecklad paralellform till densamma.

Inom området anträffad i *Östergötland*, V. Ryds s:n, Tunarp (förf.): *Småland*, Rogberga s:n, Tenhult vid Ljungarp och mellan Fagerslätt och torpet Betlehem m. fl. st.; Öggestorps s:n, Månsarp (K. JOHANSSON); Mörlunda s:n, Haddetorp; Kråksmåla s:n, Grönskåra; Madesjö s:n, mellan Orrebäck och Ellebäck (K. J. LÖNNROTH); Drefs s:n; Moheda s:n, Lidsjö; Skatelöfs s:n, Sunnanvik (G. E. HYLTÉN-CAVALLIUS).

Utom området funnen i *Vestergötland*, Toarps s:n, Bygd (A. O. OLSON).

β ampliatifrons n. var.

Foliis superioribus basi latiusculis breviter cuneato-rotundatis semiamplectentibus minus elongatis, involucris ad basin etiam viridi-variegatis dorso minus glandulosis et inter glandulas pilis solitariis obsitis ceterum rare — sparsim v. ad basin sat densiuscule stellatis, ligulisque pallidioribus a præcedente distinctum.

Öfverensstämmer med föregående till de grönbrokiga holkarne, hvilka äro ganska gröna äfven vid sjelfva basen, och de rundtrubbiga fjällen. Dessa äro dock något bredare vid basen och hastigare afsmalnande samt kortare och äro klädda af ljusare och kortare, vanligen glesare glandler med enstaka eller spridda, inblandade hår samt äro för öfrigt på ryggen spridt och vid sjelfva basen tätare stjernhåriga. Äfven i kanterna finnas spridda stjernhår, hvilka på de yttre fjällen stundom bli tätare. På skaften äro glandlerna talrikare än hos föregående och blandade med enstaka till spridda hår. Bladen äro vanligen kortare med mindre utdragen spets och stjelkbladen talrikare, ända till 8, samt småningom öfvergående i brakteerna. De öfre hafva vanligen ganska bred rundadt-vigglik och något litet omfattande bas. Basalbladen äro vid blomningen vanligen afvissnade, eljest nästan helbräddade eller glest tandade. Inflorescensen är liten och fåblomstrig samt temligen hopdragen.

Erinrar på en gång om *H. *eurycybe* och *H. *frondosum* LÖNNR. *β poliochlorodes*, men är lätt skild från båda genom bladen och de större holkarne. Med den förstnämda är den utan tvifvel beslägtad och torde förhålla sig till den som hufvudformen till *H. *chlorodes*. Har äfven vissa likheter med *H. *flocculosum* till holkarne, men är skild genom deras gröna färg, deras breda, trubbiga fjäll, de breda och kortspetsade öfre bladen m. m.

Funnen i *Småland*, Öggestorps s:n, Månsarp (K. JOHANSSON) och i Madesjö s:n mellan Orrebäck och Ellebäck (K. J. LÖNNROTH).

2. **H. *flocculosum** n. subsp.

DAHLST. Hier. exs., fasc. III, n. 53.

Caulis 40—80 ctm. altus gracilis — crassiusculus ± flexuosus 5—9-folius, inferne ± obscure violaceus breviter et ± densiuscule pilosus leviter stellatus, superne sparsim pilosus et rare stellatus apice fere epilosus sparsim floccosus — tomentellus. *Folia* saturate viridia v. gramineo-viridia, supra breviter et sparsim pilosa vix v. superiora levissime stellulata, subtus pallide viridia v. aliquantulum cæsio-viridia breviter et densiuscule — sparsim pilosa rare — rarissime stellata, in nervo mediano sparsim floccoso pilis longioribus aliquantulum densioribus obsita; *basalia* florendi tempore 1—3 v.

vulgo exteriora v. omnia sub anthesi emarcida, extima anguste oblongo-lanceolata v. anguste elliptica rare denticulata obtusiuscula, interiora anguste — angustissime lanceolata sparsim subulato-dentata acuta — acutissima ± anguste petiolata; *caulina* erecta vulgo quam basalia aliquantulum latiora, infimum vel infima ± petiolata, reliqua sessilia sensim in bracteas decrescentia, inferiora ± elongate lanceolata v. leviter rhomboideo-lanceolata basi longe cuneata superiora angustissime lanceolata — fere linearia basi cuneata v. summa basi magis abrupte rotundata anguste ovato-lanceolata, omnia longe cuspidata nunc apice longo — longissimo nunc breviore integro, sparsim et subulate dentata v. ad basin dentibus 2—3 longis angustis acutis instructa. *Anthela* simplex v. ± composita sat contracta v. laxa interdum deorsum indeterminata, ramis inferioribus nunc ± distantibus nunc approximatis ± erecto-patentibus, superioribus ± approximatis ± patentibus et curvatis v. omnibus approximatis interdum subumbellatis tomentellis — tomentosis glandulis pilisque solitariis v. sæpius nullis obsitis, pedicellis brevibus acladioque 15—25 mm. longo cano-tomentosis glandulis nigris raris — sparsis et pilis raris — solitariis v. nullis obsitis. *Involucra* sat magna — mediocria atroviridia v. basi fere atra et superne leviter viridi-variegata sat crassiuscula basi rotundata postea truncata. *Squamæ* pluriseriales latiusculæ, exteriores anguste triangulares obscuræ laxæ obtusæ apice albido-comatæ, interiores e basi latiore ± lanceolatæ in apicem leviter comatum obtusum — obtusiusculum sensim attenuatæ ± anguste virescenti-marginatæ, glandulis brevibus et mediocribus (usque sat longis) nigris densiusculis — sat densis et pilis brevibus raris v. nullis obtectæ, ceterum dorso floccis sparsis in marginibus frequentioribus et sæpe limbum angustum passim abruptum ad apicem sæpe latiorem albidum formantibus obtectæ. *Calathidium* sat obscure luteum. *Ligulæ* apice glabræ. *Stylus* fusco-viride postremo sat nigrescens.

En ganska framstående form, utmärkt af sin höga ej serdeles grofva stjelk, smala och långa, få- och skarptandade, långspetsade stjelkblad och inre rosettblad, mestadels stora, grönsvarta holkar, klädda af glest, i kanterna och mot spetsen af fjällen tätare, oftast i en mer eller mindre tydlig rand samladt stjernludd och för öfrigt af temligen tättsittande, vanligen mörka, ungefär likformigt blandade medellånga och korta samt färre, långa glandler jemte spridda eller enstaka, korta hår, samt vanligen hopträngd, i toppen utbredd inflorescens med jemnhöga eller föga öfverskjutande grenar. Skaften äro vanligen klädda af spridda eller upptill något talrikare, korta glandler och ibland enstaka eller sparsamma, längre eller kortare hår samt afbryta skarpt genom sin täta beklädnad af hvitt stjernludd mot den mörkfärgade, ofta nästan svarta holkbasen. Straxt under holkarne sitta oftast ett par brakteer, hvilka omedelbart öfvergå i de yttre, något frånstående fjällen. De inre äro vanligen smalt, sällan bredare grönkantade och äro småningom hopdragna i en smal, trubbad eller något skarp spets. Stjernluddet varierar temligen mycket i anordning och tydlighet. Ibland är det öfverallt nästan likformigt spridt och endast obetydligt framträdande mot kanterna, ibland bildar det en tydligt framträdande, smalare eller bredare rand i fjällens kanter, men som ibland är styckvis afbruten. Ofta blir det tätare mot spetsarne, der det sammanflyter med de der befintliga fina, ljusa håren, hvilka ej sällan gå långt ned på midten

af fjällen. Vanligen äro basalbladen ej samlade till någon egentlig rosett och oftast äro endast de inre qvarsittande vid blomningen, hvaremot de yttre eller stundom alla tidigt afvissna. Stjelkbladen äro karaktäristiska genom sin smalt lancettlika form, sina långt utdragna, skarpa och oftast långt ned helbräddade spetsar samt sina oftast glesa och syllika, kortare eller smalt triangulära, spetsiga, framåtrigtade tänder, af hvilka stundom på alla eller vanligen på de mellersta och öfre bladen 2—3 af basaltänderna på hvardera sidan äro längre än de öfriga eller nästan ensamt utvecklade. Tandningen varierar dock rätt mycket till tätheten och likaså äro stundom tänderna regelbundet och jemnt fördelade samt föga olikstora, ibland mera oregelbundet anordnade och olikstora, isynnerhet då tandningen är glesare. De nedre bladen sitta i allmänhet temligen tätt och äro vanligen eller nästan alltid längre än internodierna; de öfre sitta oftast glesare. Än hafva dessa liksom de nedre smal och lång vigglik bas och äro mera lancettlika eller lineärt-lancettlika, än blir basen bredare och mera rundadt eller tvärt vigglik och formen på bladen utdraget äggrundt lancettlik. Sjelfva basen blir dock aldrig omfattande som hos flera af de föregående formerna. De nedre äro liksom alltid basalbladen oftast smalskaftade men med kortare skaft än hos dessa. Stjelkbladen äro alltid starkt uppåtrigtade och bidraga härigenom och genom sina långa skarpa spetsar att gifva växten ett karaktäristiskt utseende. Synes vara nära slägt med följande och isynnerhet med *β ampliatifrons*, hvilken äfven skulle kunna uppfattas som var. af denna.

Inom området anträffad i *Östergötland*, Vestra Ryds s:n, Tunarp (förf.): *Småland*, Gärdserums s:n, Bossgård (förf.); Rogberga s:n, Ingaryd och Tenhult (K. Johansson); Fagerhults s:n, nära Eskebäck; Wirserums s:n, nära kyrkan; Kråksmåla s:n, Barkebo (K. J. Lönnroth); Skatelöfs s:n, Sunnanvik; Femsjö s:n, torpet Nyby (G. E. Hyltén-Cavallius).

Utom området insamlad i *Vestergötland*, Toarps s:n, Bygd och Nygård (A. O. Olsson).

3. **H. *perangustum** n. subsp.

H. boreale Fr. b. angustifolium Fr. H. N. II: 13 p. m. p. et in sched. — H. rigidum Hn —? pullum (subgothicum) Fr. Symb. p. 174 p. p.

Caulis 50—75 ctm. altus sat gracilis rigidus strictus v. leviter flexuosus 8—16-folius, inferne v. totus purpurascens scaber, inferiore parte pilis brevibus firmis sparsis — densiusculis v. sat densis hirtus, superne rare pilifer — glaber basi densius apice sparsim ceterum rare stellatus. *Folia* supra saturate viridia glabra et leviter — sat stellata, subtus pallida subglaucescentia pilis brevibus sparsis scabra leviter — sat dense stellata, in nervo mediano floccoso densius et longius pilosa, marginibus sparsim et breviter — brevissime ciliata scabriuscula, firma et sæpe coriacea; *basalia* 3—4 in rosulam conferta v. ± remota sæpe sub anthesi emarcida breve — brevissime et late petiolata, exteriora ovalia — elliptica v. oblongo-ovalia obtusa — obtusiuscula subintegra v. sparsim denticulata, interiora ± lanceolata acutiuscula — acuta sparsim dentata; *caulina* inferiora valde approximata internodiis longiora anguste — angustissime lanceolata sparsim sat crebre et anguste dentata dentibus basalibus 3—4 præsertim longioribus ± erectis — patentibus, sæpe ir-

regulariter dentata, superiora magis remota anguste lanceolata — linearia inæqualiter et longe subulato-dentata dentibus 2—3 sæpe longioribus angustis curvatis, summa linearia bracteolata longe remota subulato-dentata, omnia valde acuta — subulata basi angusta ± cuneata sessilia et sensim decrescentia. *Anthela* parva simplex v. magna ± composita corymboso-paniculata deorsum ± indeterminata vulgo contracta et sat angusta rarius laxa et apice amplior, ramis inferioribus ± distantibus erectis — erecto-patentibus strictis vix superantibus, superioribus sæpe valde approximatis divaricato-patentibus brevioribus æquantibus vel longioribus ± superantibus, omnibus ± gracilibus ± tomentellis, pedicellis gracillimis mediocribus — brevibus acladioque (10—)15—35 mm. longo cano-tomentosis pilis canis brevibus — mediocribus sparsis v. raris — nullis et superne præsertim glandulis nigris brevibus solitariis — raris usque sparsis obsitis. *Involucra* mediocria atroviridia nigricantia nitentia crassiuscula basi ovata postea rotundato-truncata. *Squamæ* pluriseriales sat regulariter imbricatæ, exteriores latæ lineares v. triangulares obtusæ laxæ sæpius brevissime albido-comatæ, intermediæ triangulari-lanceolatæ et intimæ lanceolatæ obtusæ — obtusiusculæ, intimæ paucæ acutæ apice epilosæ, omnes nigricantes v. interiores marginibus virescentes efloccosæ dorso glandulis nigris parvis et mediocribus densiusculis — sat densis fere simplicem seriem formantibus pilis nigris solitariis interdum immixtis obtectæ. *Calathidium* sat obscure luteum subradians. *Ligulæ* apice glabræ. *Stylus* coracinus.

Utmärkt af sin höga, raka, mångbladiga stjelk, de många småningom i brakteer öfvergående, mycket smalt lancettlika till liniesmala skarpt och långt spetsade stjelkbladen, hvilka äro oskaftade med smal och lång, vigglikt hopdragen bas och skarpt, smalt och långt tandade af olikstora, tätare eller glesare tänder, af hvilka vanligen 2—3 på hvardera sidan äro längre än de öfriga och ofta serdeles smala, isynnerhet på de öfre bladen, samt ofta krökta och lika långa som bladbredden, uppåt tätare, hopträngd inflorescens med ganska utstående grenar, hvilken nedåt är obegränsad genom de från de öfre bladvecken utgående, vanligen ej långa, men liksom de nedre egentliga inflorescensgrenarne, uppräta och raka grenarne, de medelstora, svartglänsande, svarta eller grönaktiga, mångfjälliga holkarne med utstående och utböjda yttre fjäll, hvilka liksom holken för öfrigt äro ganska rikt glandelhåriga men utan eller med enstaka enkelhår och alldeles utan stjernludd samt slutligen nästan alldeles svarta stift. De nedre stjelkbladen äro vanligen mycket tätt sittande, ofta dubbelt längre än internodierna och smalt lancettlika. Upptill sitta de allt glesare och glesare och bli samtidigt mindre och smalare, slutligen liniesmala men äga äfven på stjelkens öfre del långa, smala och ofta sylhvassa tänder. Basalbladen saknas vanligen vid blomningen, då de oftast äro afvissnade, men äro eljest i allmänhet samlade i en 2—3-bladig rosett och kortskaftade, breda, trubbiga samt lågt och glest eller knappt märkbart tandade utom det innersta, hvilket liknar de nedre stjelkbladen. Är mycket nära beslägtad med följande, med hvilken den till de flesta karaktärer öfverensstämmer, men är i långt högre grad *rigidum*-artadt utbildad än denna, från hvilken den framförallt skiljes genom sina talrikare och smalare stjelkblad samt mindre och svagare glandelhåriga holkar. Genom de upprätta, nedre grenarne blir inflorescensen temligen smal

men i toppen något utbredd genom de utstående tätt närmade, öfre grenarne. Härigenom och genom den raka, smala stjelken och de starkt uppåtrigtade, smala bladen får den en egendomlig habitus, som genast skiljer den från *H.* **tenuiceps*, hvilken den för öfrigt rätt mycket liknar.

Anträffad i *Småland*, Drefs s:n, Böksholm (G. E. HYLTÉN-CAVALLIUS) samt i Femsjö s:n, Bålshult och vid Thorsaberg m. fl. st. i Lidhults s:n (E. P. och TH. M. FRIES); Madesjö s:n, Mellan-Örsjö (K. J. LÖNNROTH).

Vid Sunnanvik i Skatelöfs s:n i *Småland* (G. E. HYLTÉN-CAVALLIUS) finnes en fåbladigare form med helare blad och något större holkar, hvilken med afseende på dessa mera närmar sig föregående och följande.

4. **H. *gothicum** (FR. ex. p.).

H. boreale var. latifolia FR. Mant. II, p. 49, ex. p. — H. gothicum FR. Symb. p. 121 p. p. — H. gothicum FR. Epier. p. minore parte. — H. boreale FR. *α* latifolium FR. H. N. II: 12 p. p.[1]

Caulis 50—70 ctm. altus firmus et rigidus crassus ± flexuosus 7—9-folius, inferne obscure violascens sparsim v. densiuscule pilosus rare stellatus, superne sparsim pilosus — subglaber v. glaber rare — sparsim stellatus, apice sat floccosus — subtomentellus epilosus et eglandulosus. *Folia* saturate viridia, subtus pallidiora leviter glaucescentia rare — sparsim pilosa, supra subglabra v. pilis raris obsita, marginibus leviter involutis breve — brevissime et densiuscule ciliata; *basalia* 1—2 in rosulam laxam approximata v. sat remota vulgo autem sub anthesi emarcida, exteriora ± oblonga obtusa sparsim dentata v. undulato-dentata, interiora ± lanceolata ± longe acuta sparsim nunc leviter nunc longe 2—3-dentata, omnia breviter et late petiolata basi cuneata, efloccosa v. interiora in nervo mediano floccosa; *caulina* approximata internodiis longiora ± ovato-lanceolata v. late — anguste lanceolata, omnia basi angusta cuneata sessilia dentibus angustis acutis triangularibus patentibus — arrectis sparsis — sat crebris inæqualibus, sæpe 2—3 longioribus — longissimis, instructa breviter — sat longe acuta, apice ipso ± integra vel denticulata,

[1] I en del exemplar af H. N. ingår äfven eller är ensamt utdelad under detta nummer en form med rikliga holkar (såsom i Riksmuseets i Stockholm exemplar), hvilken jag längre fram upptagit under namn af *H.* **gothiciforme*. I Mant. II och Symb. synes FRIES med hufvudformen af *gothicum* hufvudsakligast afsett en form med öfvervägande eller enbart glandelhåriga holkar, bäst öfverensstämmande med ofvan beskrifna form, vid hvilken jag vill fixera namnet. Derigenom att FRIES i H. N. förde dessa former till *H. boreale* och såväl der som sedermera vid sina bestämningar förvexlat dessa båda, till det yttre liknande former och på samma sätt förfarit med andra former af *H. gothicum* samt derjemte i sina sednare bestämningar utdelat under detta namn liknande former af *H. rigidum* (coll.) och *H. dovrense* (coll.) m. fl. (enl. best. i Riksmusei herbarium), har han gifvit anledning till mångfaldiga misstydningar af denna art, hvilken han likväl från början synes ha väl känt till och uppfattat, ehuru han visserligen ej skarpt urskilde dess olika former, utan under namnem *latifolium*, *angustifolium* och *pumilum* förenade analoga former af dess olika, i naturen skilda underarter. Genom denna osäkerhet, som vidlådde FRIES' sednare bestämningar, har i utlandet en hel mängd former kommit att gå under namnet *gothicum*, hvilka ej alls höra dit. Så har CAS. ARVÈT-TOUVET i *Notes sur quelques plantes des Alpes précédés d'une revue des Hieracia Scand. exsiccata etc.* till *H. gothicum* hänfört bland andra *H. sparsifolium* LBG. (Hier. Scand. exs. 48), *H. rigidum* Hn. *var. sinuatum* LBG. (Hier. Scand. exs. 78), *H. sparsifolium* LBG. (Hier. Scand. exs. 80), *H. Friesii* Hn., LBG. (Hier. Scand. exs. 81), H. Friesii Hn. v. vestitum LBG. (Hier. Scand. exs. 82), *H. sparsifolium* LBG. *v. diminutum* LBG. (Hier. Scand. exs. 138), *H. Friesii* Hn. *v. alpestre* LBG. (Hier. Scand. exs. 139), *H. Friesii* Hn. *v. basifolium* LBG. (Hier. Scand. exs. 140), hvilka alla ej alls tillhöra H. gothicum i FRIES' ursprungliga mening (jfr Mant. och Symb.) utan *H. sparsifolium* LBG. (coll.) och *H. rigidum* Hn. (coll.).

subtus in nervo mediano sat floccosa, ceterum rare vel in superioribus in utraque pagina sparsim stellata. *Anthela* paniculata — corymboso-paniculata simplex v. sat composita et polycephala indeterminata, ramis ± strictis v. basi curvatis erecto-patentibus, inferioribus ± remotis, superioribus approximatis et haud raro umbellate dispositis magis patentibus ± tomentellis — tomentosis vulgo epilosis semper eglandulosis, pedicellis gracilibus mediocribus acladioque 20—25 mm. longo canotomentosis rare — sparsim pilis brevibus et (v.) glandulis parvis — mediocribus nigris (interdum sat frequentibus) obsitis. *Involucra* sat magna nigricantia v. atro-viridia ± nitentia basi ovata postea rotundato-truncata. *Squamæ* latiusculæ multiseriales sat regulariter imbricatæ, extimæ breves laxæ et exteriores ± lanceolato-lineares obtusæ, intermediæ ± ovato-lanceolatæ obtusiusculæ — obtusæ et interiores ± lanceolatæ obtusiusculæ — subacutæ, intimæ paucæ acutæ, plurimæ nigricantes v. interiores dorso apiceque nigro v. fusco sordide viridi-marginatæ apice haud comatæ, efloccosæ v. dorso floccis solitariis adspersæ, glandulis parvis et longis nigris æqualiter mixtis densis — sat confertis et pilis mediocribus solitariis — raris nigris v. interdum apice breviter albidis obtectæ. *Calathidium* sat obscure luteum leviter radians. *Ligulæ* apice glabræ. *Stylus* viridi-fuscescens postremo sat niger.

Under detta namn upptages här den form, hvilken E. Fries såväl i Herb. Norm. som enskildt till större delen utdelat under namn af *H. gothicum* eller *H. gothicum α latifolium* och hvilken diagnosen i Symbolæ p. 121 till största delen afser. Af denna framgår nämligen tydligt att Fries, ehuru han under namn af *H. gothicum* äfven utdelat en form med rikhåriga holkar, vid uppgörandet af beskrifningen haft en rikligt glandelhårig form med breda, långt tandade blad för ögonen, hvarföre på grund häraf denna form otvifvelaktigt bör uppfattas, oafsedt dess utpräglade karaktärer, som typ för arten. Omkring denna har jag grupperat såväl öfriga, af Fries med denna förvexlade eller såsom varieteter hit förda, beslägtade former som några andra, hvilka Fries ej synes ha känt till.

Ifrågavarande form utmärker sig framförallt genom sin styfva, grofva, mångbladiga stjelk, de oskaftade, spetsiga stjelkbladen (endast det nedersta är ibland bredt vingskaftadt), hvilka hafva smal, vigglik bas och ej ens på stjelkens öfre del tendera att bli omfattande samt på midten äro groft och skarpt långtandade med vanligen 2—3 tänder längre än de öfriga, genom mörka, svartgröna eller nästan svarta (vid torkning vanligen alldeles svarta) något glänsande holkar, hvilka äro mångfjälliga med de yttre fjällen vanligen i spetsarne utböjda, alla m. l. m. trubbiga eller de inre kortspetsade, och klädda af m. l. m. rikliga, svarta, dels långa dels korta glandler och sparsamma eller enstaka, vanligen svarta mera sällan hvitspetsade hår, men för öfrigt alldeles utan eller med några få, föga märkbara spridda stjernhår och hvilkas fjäll i spetsarne äro glatta. Skaften äro rikt stjernludna än med än utan spridda hår men vanligen upptill med sparsammare till talrikare svarta glandelhår. Grenarne äro deremot vanligen alldeles utan hår och glandler men temligen stjernludna. Inflorescensen är än enkel och liten än stor och sammansatt, nedåt obegränsad genom de från öfre bladvecken utgående grenarne. Hos rikgreniga och frodiga exemplar äro de öfre grenarne ofta flocklikt närmade. Basalbladen äro ibland vid blomningen förhanden och till formen m. l. m. aflånga, trubbiga, bugtigt och glest tandade, utom de inre,

hvilka likna stjelkbladen. Ibland äro de rosettlikt närmade, ibland mera aflägsnade från hvarandra, beroende på lokalen, och oftast vid blomningen afvissnade. De äro vanligen utan stjernhår, utom de inre, hvilka äga spridt ludd på medelnervens undersida. Stjelkbladens medelnerv är deremot vanligen temligen rikt stjernluden och stjernluddet, som för öfrigt på undersidan är spridt, tilltar på de öfre bladen och blir hos dessa äfven märkbart på öfversidan. Bladen äro i sjelfva kanten vanligen något nedvikta. Är mest beslägtad med *H. *adampliatum* och har jemte denna af alla *H. gothici* former största slägtskapen med *H. anfracti* formgrupp, inom hvilken *H. *atronitens* och *H. *cacuminatum* komma den närmast. Från *H. *diaphanum*, hvilken den stundom liknar, är den skild bland annat genom sina mörka stift.

Anträffad inom området i *Småland*, Femsjö s:n vid Valshult och Elmås (E. P. och TH. M. FRIES samt G. E. HYLTÉN-CAVALLIUS).

5. **H. *tenuiceps** n. subsp.

Caulis 45—75 ctm. altus strictus v. leviter flexuosus tenuis 5—9-folius, inferne ± violaceus pilis ± longis mollibus patentibus densiusculis — densis hirtus leviter stellatus, superne sparsim — rare pilosus rare stellatus, apice epilosus sparsim v. rare floccosus. *Folia* obscure v. prasino-viridia tenuia, supra pilis mediocribus firmis densiusculis — sparsis vestita — subglabra, subtus leviter cæsio-viridia densiuscule — sparsim pilosa rare stellata, in nervo dorsali sparsim stellata longiuscule et frequentius pilosa marginibus præsertim ad basin longe et sparsim — densiuscule ciliata; *basalia* plerumque sub anthesi emarcida v. 1—2 interiora persistentia ± lanceolata sparsim et irregulariter ± acute dentata; *caulina* sensim decrescentia vulgo sat patentia anguste — latiuscule lanceolata, superiora anguste ovato-lanceolata in apicem brevem — sat longum ± integrum acutum attenuata basi ± cuneata sessilia inferiore parte sparsim et breviter — longe sæpe irregulariter 3—4-dentata. *Inflorescentia* simplex v. ± composita paniculata deorsum sæpe indeterminata, ramis inferioribus remotis erecto-patentibus, superioribus approximatis ± patentibus et curvatis gracilibus ± tomentellis v. sparsim floccosis epilosis, pedicellis gracillimis mediocribus curvatis acladioque 5—10 mm. longo tomentellis — sat tomentosis glabris v. pilis solitariis — raris et interdum glandulis solitariis obsitis. *Involucra* mediocria crassiuscula nigricantia — atro-viridia basi rotundata postea truncata. *Squamæ* sat pluriseriales ± latæ sat imbricatæ, exteriores fere nigræ ± laxæ anguste — sat late triangulares obtusæ — obtusiusculæ, interiores triangulari-lanceolatæ cito in apicem sat angustum ± obtusum — obtusiusculum v. subacutum attenuatæ et marginibus apicem versus ± virides v. virescentes efloccosæ v. exteriores ima basi sparsim stellatæ ceteræque interdum floccis solitariis obsitæ, ceterum glandulis nigris parvis — sat longis gracilibus sparsis — sat densiusculis et pilis nigris v. apice albidis raris — sparsis obsitæ. *Calathidium* ± obscure luteum radians. *Ligulæ* apice glabræ. *Stylus* fuscoviride v. viridi-nigrescens.

Utmärkt af sin späda, raka eller vågböjda, flerbladiga stjelk med utstående, små, spetsiga, tunna och något i lökgrönt dragande blad med vanligen glesa, triangulära eller lancettlika och längre, skarpspetsade tänder, fina, hos mångblomstriga former något bågböjda grenar och skaft med nedtill glest, upptill tätt stjernludd utan eller med få hår och en och annan glandel samt små, svartgröna eller svarta, temligen fina holkar med breda, triangulära till triangulärt-lancettlika fjäll, hvilka äro hastigt utlöpande i en smal, vanligen trubbad spets och klädda af glesa till medeltäta, oregelbundet omvexlande långa och korta glandler jemte inblandade mörka eller något hvitspetsade, glesa till sparsamma hår men vanligen utan eller endast med spridda, vid de yttres bas någon gång rikligare stjernhår. Utmärkande äro för öfrigt de något styfva, vid basen tjocka håren, hvilka äro utspärrade och rikligast samlade vid stjelkens bas och vid bladfästena, på undersidan af medelnerven samt i bladkanterna, isynnerhet nedåt basen. Stjelkbladen sitta temligen tätt men äro sällan längre än internodierna utan vanligen af deras längd eller kortare. De äro temligen små och nedtill snedt, upptill rätt utstående eller t. o. m. något nedåtböjda och framkalla härigenom ett karaktäristiskt utseende, genom hvilket denna form lätt skiljes från sina närmaste slägtingar. Den torde stå närmast *H. *perangustum* och *H. *gothiciforme.*

Anträffad endast i *Småland*, Femsjö s:n, Lilla Valshult vid torpet Nyby (G. E. HYLTÉN-CAVALLIUS), men här i rikligt antal.

6. **H. *adampliatum** n. subsp.

DAHLST., Hier. exs. fasc. III, n. 54, 55.

Caulis 40—60 ctm. altus ± gracilis strictus v. leviter flexuosus 3—6-folius, inferne ± obscure violaceus pilis mediocribus patentibus densiusculis — sat densis hirtus, superne magis magisque stellatus sparsim — rare pilosus, apice sat tomentellus fere epilosus, eglandulosus. *Folia* saturate viridia tenuia et haud raro sat firma subcoriacea, supra glabra albidopunctata et leviter vel sparsim stellata, subtus aliquantulum cæsia breviter et sparsim pilosa leviter stellata — sparsim floccosa, in nervo mediano sparsim — sat dense floccoso densius et longius pilosa, marginibus pilis mediocribus — brevibus sparsim — densiuscule ciliata; *basalia* vulgo 2—3 in rosulam laxam approximata v. sat remota haud raro sub anthesi emarcida, exteriora ± anguste — late ovalia — obovata, intermedia obovato-oblonga — oblonga ± obtusa, intimum ± late — anguste lanceolatum — obovato-lanceolatum acutum, omnia sparsim — sat crebre ± obtuse — acute denticulata v. intimum argute sparsidentatum, omnia basi cuneata in petiolum brevem — brevissimum latum attenuata; *caulina* sat remota v. ima ± approximata cito et sæpe abrupte in bracteas decrescentia sessilia basi cuneata v. ovata et sæpe dilatata semiamplectente præsertim in fol. superioribus v. infimum breve et late petiolatum basi petioli sæpe auriculato-semiamplectente, lanceolata — elliptico-lanceolata v. oboblongo-lanceolata, superiora sæpe aliquantulum contorta magis distantia sæpe latiora ovato-lanceolata v. etiam magis

approximata angustiora, intermedia sæpe infra medium constricta et subpanduræformia, omnia acuta — cuspidata sparsim et irregulariter et argute dentata dentibus sæpe patentibus et antrorsum v. retrorsum curvatis angustis acutissimis 2—3 in utraque latere longis — longissimis instructa et sæpe, præsertim superiora, densius pinnatifida, omnia usque ad basin dentata. *Anthela* ± paniculata vulgo simplex interdum sat composita brevis sed sat ampla interdum indeterminata, ramis inferioribus magis strictis remotis, superioribus approximatis sæpe subumbellatis erecto-patentibus — sat patentibus mediocriter longis superantibus tomentellis fere epilosis — glabris eglandulosis, pedicellis brevibus — mediocribus acladioque (3—)5—15(—20) mm. longo tomentosis vulgo epilosis et eglandulosis v. glandulis minutis solitariis sub involucris interdum raris obsitis. *Involucra* sat crassa — crassa atroviridia nigricantia basi rotundata postea rotundato-truncata — truncata. *Squamæ* pluriseriales sat latæ, exteriores ± laxiusculæ ± anguste triangulares et intermediæ triangulari-lanceolatæ ± obtusæ et obscuræ, interiores ± elongate triangulares — lanceolatæ obtusæ — obtusiusculæ v. subacutæ, intimæ ± acutæ ± virescenti-marginatæ apice glabræ v. leviter comatæ piceæ efloccosæ v. floccis solitariis obsitæ, exteriores sæpe in marginibus levissime stellato-limbatæ, ceterum glandulis minutis — parvis sæpe paullo conspicuis raris — sparsis v. passim densiusculis et pilis nullis v. parvis solitariis, raro sparsis obsitæ. *Calathidium* sat obscure luteum subradians — radians. *Ligulæ* apice glabræ. *Stylus* virescens — sat niger.

Inv. $\frac{10—12}{6—7}$, D. c. 35, L. m. circ. 2,5 mm.

En mycket vacker och i många afseenden, framförallt genom bladens utseende, egendomlig form. Normalt äro nämligen de mellersta, stundom äfven de öfre bladen, oskaftade med bred, rundad eller tvär, men äfven kort vigglik bas och äro ofta vid sjelfva fästet återigen något utvidgade. Ofta äro de nedom midten jembreda ända till den halft omfattande, breda basen eller från midten småningom afsmalnande. Ibland äro de vid eller nedom midten tvärt hopdragna och derefter jembreda eller smalt vigglika och vid den halftomfattande basen något öronlikt utvidgade. Härigenom får denna form ett starkt tycke med vissa former af *H. dovrense* Fr. och genom holkarnes utseende äfven med former af *Foliosa* Fr. Tydligen tillhör den dock *Vulgata*. Af alla *H. gothici* former äger den kanske största slägtskapen med *H. anfracti* formgrupp. Af former, hörande till denna grupp kommer *H. *atronitens* och isynnerhet dess ytterlighetsform d *medians* men äfven *H. *subampliatum* den närmast. Dessa sistnämda former hafva äfven samma tendens att få bred, utvidgad och något omfattande bladbas. Spädare former af närvarande form äro ofta endast genom glesare glandler på holkarne, bredare och talrikare holkfjäll och rakare glesare tandning skiljbara från exemplar af *H. *atronitens* d *medians*. Dock är ifrågavarande form i allmänhet mera *rigidum*-artadt utbildad. Stjelkbladen äro i allmänhet flera, nästan alla oskaftade, med glesare och i allmänhet regelbundnare tandning. Tänderna äga mera raka sidor samt äro spetsigare och den fria bladkanten mellan dem är rakare. Dock varierar den med ojemnare tandning i det nagra, vanligen 3—4 tänder på hvardera sidan, äro längre än de öfriga. Vanligen äro tänderna temligen jemt fördelade och langa samt hvassa. De uppträda pa stjelkbladen ända ned till fästet samt äro

vanligen på bladets nedre del och midt längst och smalast. Än äro de framåtrigtade, än rätt utstående och någon gång äro enstaka tänder starkt bakåtrigtade. De öfversta, smalare och mindre stjelkbladen äro än lancettlika, isynnerhet hos mångbladiga former, än hafva de mera äggrund bas men äro sällan med sjelfva bladfästet halftomfattande. Ofta äro de i kanten veckade och något vridna. Vanligen äro de nedre 2—3 bladen stora och väl utvecklade, isynnerhet hos skuggformer, hvarefter bladen hastigt eller omedelbart öfvergå i brakteerna. Hos mångbladigare former och hos dem, som växa på öppna, soliga lokaler, äro bladen oftare småningom uppåt decrescerande. Basalbladen äro oftast vid blomningen kvarsittande och ej sällan till ett antal af 2—3 närmade till en rosett. De hafva korta, bredt vingade skaft och äro glestandade, de yttre trubbade och med trubbiga, de inre med spetsigare och kortare tänder. De äro vanligen, isynnerhet de yttre, breda och de mellersta och inre äro i allmänhet stora. De yttersta och ibland äfven de öfriga och några af stjelkbladen äro violettfärgade på undersidan. I skugga äro bladen tunna men temligen fasta, på soliga lokaler deremot nästan läderartade och tjockare. Holkfjällen äro än mörka, de inre med smal, blekgrön, finpunkterad rand, än mycket gröna och ofta mycket breda, isynnerhet de yttre, hvilka ej sällan äro bredt triangulära och trubbiga. De innersta äro mera spetsiga. Holkbasen är vanligen mycket tvär och knotig, på midten nedlöpande i det upptill förtjockade, fåfjälliga skaftet. Stjernludd saknas nästan alldeles utom i kanterna af de yttre fjällen, der det uppträder som en ytterst smal strimma. För öfrigt består beklädnaden af glandelhår, hvilka ej sitta synnerligen tätt och ofta äro små och nästan alldeles försvinnande eller svåra att se. Ofta äro glandlerna blandade med sparsamma eller hos skuggformer något talrikare, korta hår, men vanligen saknas de på flertalet af fjällen eller äro de genom sin mörka färg och korthet föga synliga. De starkt hvitludna öfre delerna af holkskaften, hvilka vanligen sakna beklädnad af glandler och hår men stundom äga, isynnerhet upptill, ett färre antal af de förra, hvilka dock vanligen äro förkrympta och svåra att upptäcka, samt någon gång enstaka af de sednare, afbryta genom sin ljusa färg skarpt mot de svartgröna eller nästan svarta holkarne, hvilka vanligen äro samlade i en enkel, sällan sammansatt, oftast hopträngd, kvastlik korgställning. De öfre grenarne äro ofta mycket utstående och stundom flocklikt närmade till hvarandra. Stiftet är vanligen grönsvart eller brungrönt och mörknar betydligt vid afblomstringen och vid pressning. Är såsom ofvan nämnts en synnerligen intressant form för de likheter den erbjuder med *Alpestria* Fr. och *Foliosa* Fr., inom hvilken sednare grupp den ej obetydligt erinrar om *H. crocatum*. Dessa likheter äro likväl att tyda mera såsom analogi än såsom beroende på slägtskap. Från *H. *subpunctillatum*, hvilken den ibland liknar, är den skild bland annat genom glesare glandler och mörka stift.

Inom området anträffad i *Östergötland*, Qvarsebo (S. Almquist); Wist s:n, Sturefors; Åtvids s:n, Åtvidaberg, Adelsnäs, Slefringe och Karstorp, öfverallt ymnig (förf.): *Småland*, Gärdserums s:n, Qvistrum och Bossgård samt vid Almvik, på alla dessa ställen ytterst ymnig (förf.).

Smalbladigare former än vanligt, med tätare tandade blad men eljest ej skilda, äro anträffade i *Småland*, Madesjö s:n, mellan Orrebäck och Ellebäck (K. J. Lönnroth).

En smalbladigare form är sparsamt anträffad flerestädes i Åtvids s:n i *Östergötland:*

b *submedians* n. f.

Den är skild bland annat genom smalare, lancettlika till nästan jembreda stjelkblad, af hvilka de mellersta hafva något tvär till kort vigglik bas, något tätare, smalare och vanligen långa och krökta tänder, i någon mån smalare och längre holkar med smalare, mera jembreda fjäll samt något mörkare korgar. Stjelkbladen äro alltid smalare än basalbladen, hvilka äro temligen långtandade och ofta bilda en 3—7-bladig rosett. Stjelken är högre och rakare än hos föregående och ofta flerbladigare. Påminnar rätt mycket om *H. *perangustum* och *H. *atronitens* d *medians* och torde bilda en mellanlänk till dessa båda. Torde vara en väl skild varietet, men behöfver närmare undersökas i naturen, för att dess förhållande till nyssnämda former skall kunna med säkerhet afgöras. Är emellertid ej identisk med hufvudformens smalbladiga modifikationer.

7. **H. *gothiciforme** n. subsp.

H. boreale Fr., *α* latifolium Fr., H. N. II: 12 p., p. et in sched. — H. gothicum Fr., Symb. et Epicr. p. p. — H. gothicum Fr. — pumilum Fr., in sched. p. p. (formæ reductæ).

Caulis 35—60 ctm. altus crassiusculus ± flexuosus 5—7-folius ± scaber, inferne ± violascens pilis densiusculis — sat densis hirsutus sparsim stellatus, superne rare pilosus — subglaber rare stellatus, apice tomentosus — tomentellus epilosus. *Folia* saturate viridia firma, supra sparsim — densiuscule pilosa (inferiora) v. subglabra (superiora) rare — sparsim stellulata, subtus aliquantulum cæsio-viridia densiuscule v. sparsim pilosa rare — sparsim stellata, in nervo dorsali sat dense floccoso pilis longis densis — densiusculis obtecta, marginibus pilis brevibus — mediocribus sat dense ciliata; *basalia* breviter et late petiolata sub anthesi sæpe emarcida v. 2—3(—4) in rosulam conferta, exteriora ± ovata — elliptica parva subintegra — denticulata basi abrupte decurrentia v. rotundato-truncata ± obtusa, interiora longiora integra v. ad basin anguste cuneatam rare dentata anguste oblonga — lanceolata ± acuta; *caulina* sensim in bracteas decrescentia, inferiora longiora ± lanceolata, intermedia magis magisque ovato-lanceolata — ovata breviora, summa parva — minuta iterum angustiora, omnia sessilia ± acuta — acuminata ± crebre dentata, intermedia sæpe longe et omnia ± æqualiter dentata, dentibus acutis breviter — elongate triangularibus — lanceolatis ± porrectis — sat patentibus. *Anthela* simplex — composita paniculata vulgo maxime contracta v. deorsum subindeterminata, ramis sæpe fere umbellatis gracilibus canotomentosis fere epilosis, pedicellis brevibus — mediocribus acladioque 5—20 mm. longo canotomentosis et pilis albis mediocribus — sat longis raris — sparsis v. superne densiusculis glandulis interdum solitariis sub involucris immixtis vestitis. *Involucra* sat magna crassiuscula — sat elongata nigricantia v. obscure atroviridia basi ovato-rotundata postea rotundato-truncata. *Squamæ* pluriseriales latiusculæ, exteriores nigræ late lineares — ovato-triangulares

obtusæ levissime albido-comatæ, interiores ovato — triangulari-lanceolatæ sensim in apicem obtusiusculum — subacutum epilosum et vulgo piceum attenuatæ angustæ virescenti-marginatæ v. intimæ fere totæ virescentes efloccosæ v. dorso floccis raris — solitariis basi sæpe frequentioribus obsitæ, cæterum pilis crassis obscuris apice ± longe albidis mediocribus — sat longis sparsis — densiusculis et glandulis nigris parvis — mediocribus solitariis — raris (v. sparsis) obsitæ. *Calathidium* obscure luteum subradians. *Ligulæ* apice glabræ. *Stylus* viridi-fuscus postremo valde nigrescens.

Utmärkt af sin styfva, nedtill temligen rikhåriga, sträfva stjelk, sina små och breda yttre men smala och långa inre fåtandade eller helbräddade basalblad, sina smalare nedre men förhållandevis mycket breda, äggrundt lancettlika eller nästan äggrunda, kortspetsade öfre stjelkblad, af hvilka de på midten af stjelken sittande ofta hafva rundad bas och tendera att bli halftomfattande, den täta och jemna tandningen af kortare triangulära eller på de öfre bladen mera triangulärt lancettlika, långa och snedt framåt eller temligen starkt utåtrigtade tänder, den temligen hopträngda, än smala, än något utbredda inflorescensen med tättsittande och ofta flocklikt närmade, hvitgråa grenar och något håriga skaft, de mörka, nästan svarta holkarne med medeltäta till större delen af sin längd mörka och vid basen tjocka hår, blandade med små, vanligen sparsamma, svarta glandler men med föga eller intet stjernludd samt slutligen nästan svarta stift. Bladen äro temligen korta, äfven de nedre kortare än internodierna. Varierar med bredare eller smalare blad, men stjelkbladen tilltaga vanligen i bredd samt aftaga i storlek uppåt. De inre rosettbladen äro i förhållande till sin längd smalast af alla bladen, hvaremot de yttre äro breda, äggrunda eller elliptiska. Ofta hafva några af mellersta stjelkbladen nästan tvär bas, men vanligen är den något vigglik (eller rundad). Vanligen äro basalbladen föga tandade eller nästan helbräddade. De mellersta och öfre bladen hafva i allmänhet längst tandning, isynnerhet vid sin bas, der tänderna bli ungefär lika långa som halfva bladets bredd. Hårigheten på holkarne vexlar från något gles till ganska riklig. De yttre fjällen äro oftast mer eller mindre frånstående och öfvergå i de straxt under holkarne, på de upptill förtjockade skaften utvecklade 2—3 brakteerna. Inflorescensen är vanligen hopträngd, kortgrenig och kvastlik eller stundom nästan eller helt och hållet flocklik, ofta genom de mera upprätta skaften smal eller hos flerblomstrigare exemplar något vidare med mera utstående skaft. Vanligen är den väl begränsad, hos frodigare exemplar dock ofta något obegränsad. Synes närmast slägt med *H.* **adampliatum* men påminner till holkarne äfven något om *H.* **orarium* och närstående. Habituelt är den deremot ytterst lik *H.* **gothicum*, med hvilken den af FRIES ofta förvexlats, men är lätt skild genom sina håriga holkar och bredare, mera kortspetsade blad.

Inom området funnen i *Småland*, Femsjö s:n, Lilla Valshult (E. FRIES, bestämd till H. gothicum — latifolium och pumilum, G. E. HYLTÉN-CAVALLIUS); Skatelöfs s:n, Vrankunge och Sunnanvik (G. E. HYLTÉN-CAVALLIUS); Burseryds s:n, Ödeslyckan (K. A. TH. SETH): *Östergötland*, St. Johannes s:n, Hageby (J. HULTING).

Utom området i *Vestergötland*, Sandhems s:n, Saxtorp (O. NORDSTEDT), något närmande sig i habitus till följande form.

f *pilosius*.

Foliis caulinis paucioribus angustioribus longius acutis, involucris pilosioribus pedicellisque magis pilosis et glandulis solitariis v. raris obsitis diversum.

Anträffad i *Småland*, Drefs s:n, Böksholm (G. E. HYLTÉN-CAVALLIUS). Möjligen är den blott en modifikation, ehuru habituelt och i bladform rätt afvikande.

β subvulgatum n. var.

Folia basalia sub anthesi emarcida v. in rosulam 2—5-foliam approximata ± elliptica — elliptico-lanceolata ± acute et subdensiuscule dentata — denticulata; *caulina* per caulem sparsa 3—5 ad basin magis approximata, superne ± remota ceterum cito — abrupte decrescentia ± lanceolata — lineari-lanceolata ± longe acuta sparsim — densiuscule et acute interdum ± longe (præsertim ad basin) et irregulariter 3—4-dentata. *Anthela* simplex — sat composita, ramis superioribus ± patentibus curvatis omnibus canotomentosis sparsim — densiuscule pilosis et glandulis parvis — minutis raris — sparsis v. solitariis obsitis. *Involucra* minora dilutius atroviridia. *Squamæ* latius virescenti-marginatæ obtusæ apice præsertim exteriores albocomatæ ceterum ubique floccis sparsis vel ad basin in marginibus et apices versus frequentioribus obsitæ pilis mediocribus sparsis — densiusculis glandulis raris — sparsis vulgo parvis obtectæ.

Liknar i allmänna karaktärer men mindre i habitus föregående, med hvilken den måhända är mindre beslägtad än utseendet anger. Från densamma är den skild bland annat genom fåbladigare stjelk, mera långspetsade och oftare smalare stjelkblad, sparsammare beklädnad af hår och glandler men deremot rikligare stjernludd på holkarne, hvilka äro mindre, mera grågröna och fåfjälligare. Stjelkbladen, isynnerhet de mellersta, hafva ofta tvär till ytterst kort vigglik bas. Erinrar i habitus ofta om *H. *gothicum* och ibland om *H. *vulgatiforme* och *H. *vulgatum*, af hvilka båda sednare den isynnerhet liknar den förstnämda till holkarne, men den är skild genom det spridda och ojemt fördelade (ej tätare och jemnare anordnade) stjernluddet, hvilket är mycket sparsamt på de inre fjällen utom mot de hårtofsade spetsarne, men mera rikligt mot kanterna och spetsarne af de yttre fjällen, samt genom sparsammare hår och rikligare glandler och för öfrigt genom rätt talrika glandler bland skaftens hår, äfvensom tunnare, ofvan mera glatta blad m. m. Är måhända närmare beslägtad med de båda sednare eller bildar den en mellanlänk mellan dessa och de hårigare formerna af *H. gothicum*.

Funnen i *Småland*, Burseruds s:n, Mölneberg, Ödeslyckan och Långmark (K. A. TH. SETH); Femsjö sn, Lilla Valshult (E. FRIES, under namn af *H. gothicum* och *H. gothicum — latifolium*, och G. E. HYLTÉN-CAVALLIUS).

II. OREADEA Fr.

Holkar vanligen stora och breda, klädda af kort svartfotade, vanligen styfva hår, kortare eller längre, mörka glandler och obetydligt eller sparsamt, föga framträdande stjernludd samt af talrika, rödgula, nästan omärkliga, glänsande mikroglandler. De yttre holkfjällen äro vanligen korta, smala, mörka och tilltryckta, oftast fåradiga, de mellersta m. l. m. bredt blekkantade, vanligen smalspetsade och hårtofsade, de inre äro till ett större eller mindre antal vanligen sylspetsade. *Achenier* stora, i allmänhet större än hos föregående afdelning, svartbruna. *Ligulæ* oftast, serdeles de yttre, i toppen korthåriga. *Stiftet* alltid rent gult. *Stjelk* mer eller mindre bladig med till större delen oskaftade, läderartade och styfva, m. l. m. blågröna (eller blekgröna), undertill blågrå blad. Stjelkens bas, basalbladens skaft, bladkanternas nedre del och bladfästena klädda af glesare eller talrikare, långa, något styfva, borstlika och glänsande samt oftast tydligt tandade hår. *Innovationen* sker genom på hösten m. l. m. utvecklade bladrosetter eller genom slutna knoppar.

Inom inflorescensen uppträda de tre hufvudslagen af hårbildningar: enkla hår, glandler och stjernludd, men de äro inom hela gruppen föga karaktäristiskt utpräglade hos de olika formerna och förete ej på långt när den rika omvexling i form, storlek, färg och fördelning (dekorativ anordning), som är ett så utmärkande drag hos flertalet former inom föregående grupp. Stjernluddet är vanligen rikligt på inflorescensgrenarne men är i allmänhet på holkarne föga framträdande. Det förekommer alltid, om än sparsamt, strödt öfver fjällens hela yta, endast i sällsyntare fall och företrädesvis hos äfven i andra afseenden väl utpräglade former är det förhanden såsom en svagt markerad strimma i kanterna eller mot spetsarne af fjällen. Hos andra former, der det är rikligare utveckladt, är det jemnt fördeladt öfver hela fjällets yta. Glandelhåren äro endast hos några former väl markerade och bli då oftast ensamt herskande. I allmänhet äro de små, föga utbildade och hos olika former obetydligt afvikande i form och färg och ej heller i betydande grad med afseende på rikligheten. De förekomma oftast i blandning med enkla hår, hvilka i allmänhet äga kort, tjock, svart bas och m. l. m. långa gråa spetsar samt vid macroskopiskt betraktande äro de mest framträdande. Äfven dessa variera hos de olika formerna i jemförelse med former af föregående grupp, föga till storlek, riklighet, färg och anordning m. m. Karaktärer för skiljande af de olika formerna lemnar dock i första rummet hårighetens riklighet, då dess längd och färg ofta äro underkastade betydliga variationer hos samma art. Ej sällan påträffas af olika former, äfven de typiskt hårfattiga, individ med en och annan eller stundom alla holkar klädda af ovanligt långa och borstiga hår, hvilket ibland på samma lokal inträffar med hela grupper af individ. I några fall synas dessa förändringar bero af sjukliga missbildningar hos holken, t. ex. genom angrepp af insektslarver, men i andra fall kan ingen dylik orsak till förändringen spåras.

Hos alla former synas håren inom trängre eller vidare gränser kunna delvis ersätta glandlerna. Hos alla hithörande former uppträda de alltid rikligare och bättre utbildade

på skaft och holkar vid och efter afblomstringen samt saknas i detta stadium ej ens hos de normalt blott glandelhåriga formerna. För hela gruppen egendomligt, och hvari den liknar *Alpina*, är uppträdandet på holkfjällen af de talrika, rödgula, glänsande mikroglandlerna, hvarigenom holken äfven efter pressning får ett karaktäristiskt utseende och synes beströdd liksom af små glasklara kristaller. Karaktäristiska äro äfven örtståndets borstiga och styfva m. l. m. tydligt tandade hår.

Af hvad med afseende på holkarne yttrats synes, att indumentet sålunda endast i andra rummet kan användas till serskiljande af de olika formerna, emedan det ej blott i allmänhet är ringa differentieradt och äger en föga i ögonen fallande anordning, utan äfven hos hvarje form är underkastadt variation inom jemförelsevis vida gränser samt lätt tar intryck af yttre förhållanden.

Deremot lemna växtsättet och innovationen, bladens anordning, form och tandning, holkfjällens form, färg och deras längd i förhållande till de outslagna blommorna, holkens form och byggnad, holkbasens beskaffenhet samt korgarnes vidd och täthet, blommornas färg och ciliering m. m. här liksom annorstädes inom slägtet många goda och delvis utmärkta karaktärer, till hvilka hänvisas under de olika formerna.

Holkarnes fjäll öfvergå vid basen utan gräns i de upptill förtjockade holkskaftens fåtaliga och smala brakteer. Häruti liksom i de sinsemellan i allmänhet svagt differentierade lågblads-, örtblads- och högbladsregionerna visar sig gruppen stå på ett lägre morfologiskt utvecklingsstadium än föregående.

Rotstocken, hvilken är m. l. m. snedt uppstigande, bildar ett ofta rikt förgrenadt, vanligen sammanträngdt sympodium af korta leder. Den vegetativa förökningen eller rättare nybildningen (innovationen) sker hos största antalet hithörande former genom slutna än tunna än tjocka knoppar, hvilka vid slutet af en vegetationsperiod utbildas i de nedre basalbladens och lågbladens veck. En del af dessa knoppar förbli hvilande i flera år och anträffas sålunda äfven på äldre skottgenerationer samt utveckla sig endast under serdeles gynsamma omständigheter eller vid förlust af de yngre skottgenerationerna. Men jemte detta innovationssätt utvecklas ej sällan på hösten från de öfre basalbladens veck små bladrosetter. Dessa äro vanligen obetydliga, 1—3-bladiga, med små, ofullständigt utbildade, vanligen styft borsthåriga blad, hvilka omedelbart öfvergå i de nedanför sittande lågbladen. Detta inträffar normalt under blida höstar eller på genom värme och fuktighet gynnande lokaler, hvarvid äfven de i de mellersta basalbladens veck sittande knopparne kunna proleptiskt utveckla sig. Ibland utväxa redan tidigt på eftersommaren och vid höstens början de öfre bladrosetterna till stora, med fullständigare utbildade örtblad försedda rosetter, hvilka ibland öfvervintra gröna men vanligen vid vinterns inbrott hafva de yttre och flesta bladen afvissnade. Detta förhållande inträffar oftast hos den mångformiga och mindre differentierade *H. saxifragum*, hvilken kan anses som gruppens i utveckling stadda centrum. Hos denna utväxa de eljest normalt först på våren. Å andra sidan synes det gifvas former, t. ex. de hvilka sluta sig kring *H. Schmidtii*, hvilka normalt öfvervintra med m. l. m. utbildade bladrosetter. Denna sednare grupp af former äger också i sin morfologiska utbildning största öfverensstämmelsen med *silvaticum*-typen. Deremot äga de normalt med slutna öfvervintringsknoppar försedda formerna t. ex. *H. norvegicum* i morfologiskt afseende den största öfverensstämmelsen med *rigidum*-typen. De öfriga vackla mellan dessa ytterlighets-

typer men kunna ej subsumeras vare sig under *vulgatum*-, *subrigidum*- eller *cæsium*-typen. Morfologiskt stå de lägre än alla dessa, men torde stå närmast *cæsium*-typen.

Derigenom att normalt flere såväl högre upp som längre ned på rhizomet sittande och äfven fleråriga, hvilande knoppar under en vegetationsperiod utväxa i hastig följd efter hvarandra, blir växtsättet ofta tufvigt och blomningen utsträckt till en längre tid.

Stjelken är hos former med öfvervintrande bladrosetter 0—1-bladig, men blir flerbladigare i samma mån som öfvervintringen genom slutna knoppar blir förherrskande. Inflorescensen blir i det förra fallet gles och mer eller mindre gaffelgrenad, men blir i sednare fallet uppåt allt mer hopträngd och kvastlik samt nedåt m. l. m. obegränsad och rikgrenig.

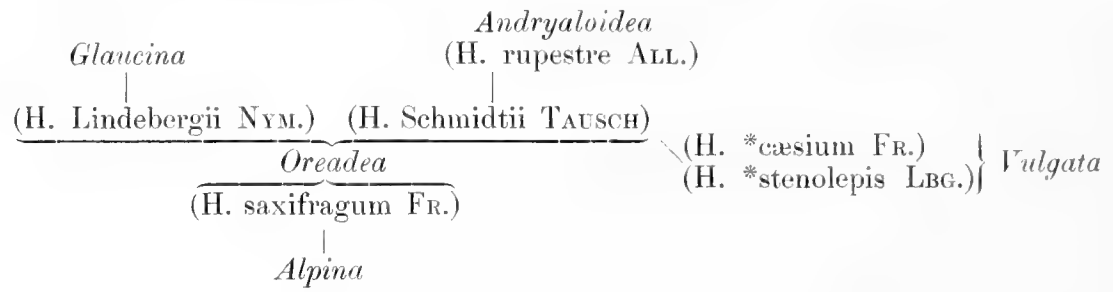
Bladen äro hos några former helbräddade, hos andra glestandade och bli m. l. m. utprägladt tretandade ju mera *rigidum*-typen blir förherskande. Ofta äro de vågbräddade och i spetsen veckade. Basalbladen äro alltid m. l. m. skaftade, men hafva nedlöpande skifva och vingade, slidlikt omfattande skaft. Såsom ofvan är nämdt, äro de än samlade i en m. l. m. mångbladig rosett, än sitta de med kortare eller längre internodier aflägsnade från hvarandra och äro då oftast vid blomningstiden afvissnade. Stjelkbladen äro aldrig med bred bas omfattande, men äga visserligen hos en del former nedlöpande och afsmalnande men vid sjelfva fästpunkten öronlikt utvidgad och delvis omfattande bas. Vanligen äro de nedersta skaftade, men stundom alla oskaftade och de öfre då småningom öfvergående i inflorescensens brakteer.

Hithörande former förekomma på berg och klippor, helst på brantare afsatser och oftast vid sjö-, flod- eller hafsstränder. De äro äfven allmännare i kuststrakterna än inuti landet.

Med afseende på slägtskapsförhållandena är denna grupp i vissa afseenden tydligen nära beslägtad med *Vulgata*, serskildt undergrupperna *Cæsia* och *Subcæsia*. Exempelvis äga sådana former som *H. Schmidtii* en stor och sannolikt ej tillfällig, ensamt på analogi, utan otvifvelaktigt äfven på slägtskap beroende likhet med *H. *cæsium* Fr. och närstående t. ex. *H. *stenolepis* Lbg., *H. *plumuligerum* m. fl., en likhet, hvilken föranledde Fr. att föra en form af den första till *Oreadea* under *H. bifidum* Koch (i Symb. p. 96; se äfven förut under *H. cæsium* Fr.!). Men liksom vissa former af *Subcæsia* äro af denna grupp just *H. Schmidtii* och närbeslägtade befryndade med *Andryaloidea*, nämligen med *H. rupestre* All. — *H. Schmidtii*, *H. *cæsium*, *H. *stenolepis* och *H. rupestre* äro sålunda de former, genom hvilka nyssnämda grupper tangera hvarandra. *H. Lindebergii* Nym. synes äfven vara en föreningslänk mellan *Oreadea* och *Glaucina*, hvilken sednare grupp A. Peter för öfrigt visat vara sammanbunden genom medelformer med *Vulgata*. Hvad de mera *rigidum*-artadt utbildade formerna af gruppen beträffar, hafva de en så stor analogi med *Rigida* och äfven mången gång med vissa rigidiforma arter af *Cæsia* och *Vulgata genuina*, att man mången gång känner sig frestad att tyda denna likhet som slägtskap, ehuru den med största sannolikhet endast beror på analogi. De centrala formerna af *Oreadea* såsom *H. *saxifragum* Fr., hafva deremot i många af sina former en stor likhet och, såsom äfven vissa, hela gruppen tillkommande karaktärer, såsom holkarnes mikroglandler, bland annat utvisa, äfven en otvetydig slägtskap med former af *Alpina*, hvilka

de derjemte likna i den svaga differentieringen mellan lågblads-, örtblads- och högbladsregionerna.

Gruppens slägtskapsförhållanden visas af följande schema:



Conspectus specierum et subspecierum.

A. *Caulis* rari-(1—5)-folius, foliis angustis — latis subintegris v. ± latis basi ± inæqualiter dentatis. *Folia caulina* superiora nunc parum evoluta linearia nunc majora cito v. abrupte in bracteas decrescentia, inferiora sub anthesi in rosulam ± grandi- et latifoliam ± conferta. *Inflorescentia* laxa oligocephala, sæpius subfurcata longa et ampla — v. subcontracta et magis determinata.

1. *Involucra* juniora omnino *epilosa* uberrime et *valide* glandulosa.

a. *Folia* lata.

H. extensum Lüb.

b. Folia *angusta* ± linearia.

H. extensiforme Dahlst.

2. *Involucra* juniora ± *pilosa* multum v. sparsim ± *breviter* glandulosa.

a. *Involucra* cano — fusco-viridia v. fuscoatra, *squamis* ± longis pallide marginatis. *Flocci* sparsi — sat densi.

*H. *saxifragum* Fr.

b. *Involucra* nitentia atroviridia, *squamis* brevibus ± saturate viridi-marginatis. *Flocci* rarissimi v. nulli.

*H. *petrophilum* Lönnr.

B. *Caulis* multi-(5—12)-folius, foliis angustis ± linearibus v. latioribus lanceolatis basi ± æqualiter et sæpe longe 3—4-dentatis. *Folia caulina* vulgo bene evoluta, superiora sensim in bracteas decrescentia, inferiora sub anthesi emarcida v. ± remota parva et angustiora. *Inflorescentia* superne ± contracta polycephala, ramis ex axillis foliorum caulinorum sæpe usque ab axillis basalium ortis magis indeterminata.

1. *Folia* late lanceolata, breviora. *Involucra* obscura, *squamis* latis glandulis et pilis majoribus floccis rarioribus obsitis.

H. norvegicum Fr. **rufescens* Fr.

2. *Folia* angustissime lanceolata — linearia, longa. *Involucra* diluta, *squamis* angustis glandulis parvis v. minutis pilis parvis floccis sat uberibus obsitis.

H. Lindebergii Nym.

(3. *Folia* angusta. *Involucra* obscura glandulis uberibus obsita.

H. extensiforme Dahlst.)

H. EXTENSUM Lüb.

H. extensum Lüb., Lbg. in Hn. Flora ed. 11, p. 42.

Caulis 20—50 ctm. altus crassiusculus — gracilis sat firmus 1—3-folius, inferiore parte pilis longis — longissimis (5—8 mm.) ± densis pilosus — villosus, medio pilis sparsioribus — raris, superiore parte sæpe a medio pilis nullis sed glandulis raris sparsis vestitus, rare stellatus — efloccosus. *Folia rosularia* 3—7, exteriora ovato-oblonga — oblongo-lingulata v. anguste elliptica integerrima obtusa, intermedia ± late — anguste lanceolata acuminata integra — minute denticulata, interiora ± anguste lanceolata denticulata v. ad basin sparsim dentata ± longe acuta, omnia in petiolis plerumque elongatis et in marginibus longe et ± dense pilosa, supra primo ubique sat dense deinde ad margines pilosa ceterum punctata, subtus sparsim in costa dense et longe pilifera rarissime stellata — efloccosa, in pag. superiore (glaucescenti-) prasino-viridia — subglaucescentia (siccitate sæpe lutescentia), subtus glaucescentia — canescenti-glauca. *Folia caulina* 1—3 sessilia v. in petiolum alatum decurrentia, infimum sæpe petiolatum, lanceolata — lineari-lanceolata cuspidata, marginibus sæpe plicata integra — denticulata, abrupte in bracteas 1—3, inferiores sæpe lineares foliaceas, abeuntia. *Anthela* 3—10-cephala laxa, paniculata v. subfurcata, ramis inferioribus distantibus brevibus, superioribus magis patentibus rectis — leviter arcuatis ± superantibus sparsim stellatis et glandulosis, acladio 10—50 mm. longo pedicellisque superne ± incrassatis et squamis 2—3 linearibus albidis v. dilutis obsitis sat dense floccosis glandulis brevioribus et longioribus densis — sat confertis obtectis. *Involucra* sat magna — magna lata et crassa basi ovoidea deinde truncata obscura. *Squamæ* plurimæ sat latæ, exteriores breves sublaxæ in petiolo incrassato decurrentes, intermediæ longiores basi 1,5—1,25 mm. latæ triangulari-lanceolatæ obtusiusculæ — acutæ, interiores lanceolatæ acutæ v. obtusiusculæ ± late et sordide fuscoviridi-marginatæ, intimæ paucæ cuspidatæ nigro-fuscescentes, glandulis validis nigris — fuscis densis — confertis obtectæ floccis in squamis exterioribus paucis — sparsis ceterum nullis v. in marginibus raris et mox evanescentibus obsitæ, pilis obscuris raris passim (in interioribus) v. nullis vestitæ, in apicibus breviter albocomatæ. *Calathidium* magnum radians.

Ligulæ marginales apice glabræ v. levissime ciliatæ, interiores subglabræ, æqualiter dentatæ. *Stylus* luteus.

Inv. $\frac{11-13}{7-8}$, D. 35—45, L. m. 3 mm.

En af de mera utmärkta formerna inom gruppen, lätt igenkänd på sina stora, breda, brunsvarta eller brungröna, rikt och kraftigt glandelhåriga holkar och den på stjelkens nedre del, på bladskaften (bladfästena) och bladkanten samt ryggnerven rikliga och långa hårigheten. Håren äro på stjelken rikligast och tätast till ungefär det öfre af de väl utvecklade stjelkbladen, men bli derefter på den af nedtill bladlika eller helt och hållet normala brakteer klädda öfre delen af stjelken glesa och försvinna vanligen nästan alldeles vid den nedersta, mera utvecklade inflorescensgrenen. Ifrån att uppträda spridda straxt nedom denna, tilltaga glandlerna deremot i mängd och täthet uppåt och äro talrikast på korgskaften och akladiet, hvilka äfven äro rikligast stjernludna. Stjernhåren aftaga hastigt nedåt i mängd och äro spridda eller saknas på stjelkens nedre del. På holkarne anträffas de, isynnerhet mot kanterna, normalt på de yttre fjällen och äro äfven förhanden men snart försvinnande eller dolda af glandler och mikroglandler på de inre; sällan och mest hos lågväxta och småblomstriga solformer äro de tydligare framträdande och spridda eller glest strödda öfver fjällens hela yta. På holkskaften saknas hår alldeles, äfvensom normalt på holkarne t. o. m. på de äldre och afblomstrade. Tillfälligtvis uppträda hos ett och annat individ, mestadels på äldre holkar, på några af de inre fjällen några få, längre och grofva, mörka hår.

Blomställningen är vanligen fåblomstrig, kvastlik eller gaffelgrenad, men blir stundom flerblomstrig och ökad med grenar från de nedre brakteerna. De nedre grenarne äro aflägsnade och utgå ofta från eller något öfver stjelkens midt, äro mera upprätta och bilda skarpare vinkel mot stammen samt äro ofta korta. De öfre utgå i allt större och större vinkel samt öfverskjuta vanligen akladiet. Sjelfva korgskaften äro vanligen korta. Hos mångblomstriga former blir akladiet kort, hos fåblomstriga ofta långt.

Rosettbladen äro normalt af m. l. m. lancettlik form, oftast långskaftade, helbräddade och långspetsiga, men variera med korta skaft och bredare skifva samt äro, isynnerhet hos frodiga exemplar, småtandade och vågbräddade till glest groftandade; vanligen är tandningen längst hos de inre bladen och nedre stjelkbladen, isynnerhet vid basen, och ofta nedstigande på de vingade bladskaften. Förökningen synes äga rum både med ofullständiga knoppar och öfvervintrande rosetter; åtminstone äro de sednare hos höstexemplar förhanden i de inre rosettbladvecken, liksom man hos många basala rosetter nederst kan iakttaga fjällika lågblad, närmast följda af smärre ovala till tunglikt lancettlika blad, tydande på en utveckling ur öfvervintrande knoppar. På äldre delar af rotstocken träffas nästan alltid några små, hvilande knoppar.

Inom området är denna form med säkerhet funnen i *Småland*, vid Grenna (HÅRD).

Utom området endast känd från *Blekinge*, der den flerestädes såsom vid Ronneby, Djupadal m. fl. lokaler (H. G. LÜBECK, C. G. WESTERLUND), vid Karlskrona (Sjuhälla m. fl. st.) och Vämö (H. G. LÜBECK) samt vid Lyckeby (J. E. ZETTERSTEDT) är rikligt och ofta funnen.

I samband härmed anser jag mig äfven böra omnämna en ganska egendomlig, ännu föga känd form, för hvilken jag föreslår namnet:

H. extensiforme n. spec.

Utmärker sig genom högväxt, 4—8-bladig stjelk med längre eller kortare, småningom decrescerande, smalt lancettlika till liniesmala blad, till eller något öfver midten m. l. m. sparsamt tandade af smala, kortare eller längre, olikstora, rätt utstående, i spetsen något framåtböjda tänder och utdragna i en kortare eller ofta ganska lång, helbräddad spets, genom få rosettblad, hvilka äro af smalt aflång till lancettlik form, vågbräddade och glest men temligen långt spetstandade, eller endast vid den långsamt nedlöpande basen med ett par större tänder, liksom stjelkens nedre del, på bladskaften och i kanterna samt på medelnerven temligen rikt långhåriga, samt genom temligen rik, nedåt obegränsad, något sammansatt korgställning med utspärrade grenar, af hvilka de nedre äro korta och mera aflägsnade, de öfre närmade hvarandra och öfverskjutande det korta, 5—10 mm. långa akladiet. Sjelfva grenarne äro liksom internodierna glest stjernludna, ytterst sparsamt småhåriga och m. l. m. glest glandelhåriga. Glandlerna och stjernluddet tilltaga uppåt i riklighet och de förra äro på holkskaften rikliga till tätt hopade, brunaktiga och af medellängd, det sednare ganska tätt och gråaktigt. Genom båda hårslagen och skaftens egen mörkare färg, få de sednare ett brungrått utseende. Holkarne äro korta och temligen breda $\left(\frac{10—11}{6—7}\right)$ med något äggrund eller rundad, slutligen nästan tvär bas, egendomligt brungröna. Fjällen äro mångradiga, korta af m. l. m. lancettlik form, afsmalnande i en m. l. m. kort och m. l. m. trubbad, svagt hårtofsad spets; några få inre äro sylspetsade. De äro klädda af täta, m. l. m. gulbruna, korta glandler, någon gång med få inblandade, korta hår och af glest ludd, hvilket vanligen framträder som en fin strimma i deras smutsigt grönaktiga kanter. *Calathidier* små, 30—40 mm. i D., föga glesa. *Ligulæ* i början rätt tydligt cilierade, 2—2,5 mm. breda.

Hittills endast funnen på tvenne ställen i *Östergötland*, nämligen i Jonsbergs s:n, Gummetorp (J. A. LEVIN) och Dagsbergs s:n (A. WIRÉN). Genom sin höga växt, mång- och smalbladiga stjelk och rika, utspärrade inflorescens med korta holkar är den af ett karakteristiskt utseende och påminner i habitus om smalbladigare former af *H. *rufescens* FR. eller om *H. Lindebergii* NYM., från båda dock lätt skild genom holkarnes beklädnad. Till dessa sednare liknar den mycket *H. extensum* LÜB., med hvilken den utan tvifvel är närmast slägt, men den är skild genom bladform, habitus samt holkarnes storlek och form. Då den ännu är för litet undersökt är det visserligen med tvekan jag här upptager den som serskild art, ehuru den på grund af sitt utseende synes mig lika väl utpräglad som t. ex. *H. extensum* LÜB. eller *H. Lindebergii* NYM.

H. SAXIFRAGUM FR.

H. saxifragum FR. p. max. p., Symb. p. 100 et Epicr. p. 87. — H. saxifragum LBG. in Hn. Fl., ed. 11, p. 42 p. p. — H. saxifragum FR., H. N. XII: 17 et LBG., Hier. Scand. exs., n. 30.

Caulis mediocris — elatus 1—5-folius ± pilosus et stellatus. *Folia* ad basin in rosulam congesta et pauca in caule evoluta v. caulina plura et basalia pauca (v. subnulla) ± glauca — canescentia ± pilosa et stellata. *Anthela* simplex — composita subcontracta v. laxa sæpe ± indeterminata. *Involucra* ± lata basi ovata postea rotundato-truncata, squamis laxe imbricatis, plerumque sat angustis plurimis saltim acutis — acuminatis, intimis subulatis, glandulis pilis et floccis multitudine variantibus obtectis. *Calathidia* mediocria — magna. *Ligulæ* fere semper breve — brevissime ciliatæ.

Under denna art, hvilken synes utgöra gruppens ännu i utbildning stadda centrum, sammanföres här en hel mängd, ofta i otaliga underordnade variationer och lokala modifika-

tioner splittrade former, hvilka delvis ännu behöfva närmare utredas. Några få synas temligen utbildade, andra deremot kunna på en trakt vara lätta att igenkänna men öfvergå på andra orter genom mellanformer mången gång i former, hvilka återigen på en annan trakt synas ganska konstanta. Arten sammanbindes för öfrigt genom öfvergångsformer med de flesta af *Oreadeas* mera markerade arter, såsom med *H. extensum* Lüb., *H. *rufescens* Fr. och sannolikt äfven med *H. oreades* Fr.

1. **H. *saxifragum** Fr.

H. saxifragum Fr. H. N. XII: 17. — Lbg. Hier. Scand. exs., n:o 30.

Caulis mediocris — sat altus et rigidus 1—5-folius, inferne breviter (1—2 mm.) sparsim — sat dense v. dense pilosus, superne sparsim — densiuscule pilosus v. subglaber rare — mediocriter stellatus. *Folia rosularia* pauca, exteriora minora ± elliptica interiora ± anguste lanceolata acuta, intima sæpe lineari-lanceolata cuspidata integerrima v. rare et minute denticulata marginibus apicibusque sæpe plicata, in marginibus in petiolis alatis et in costa dorsali mediocriter — dense pilosa ceterum sparsius pilifera, glauca — viridi-glaucescentia. *Folia caulina* 1—5, inferius petiolatum v. omnia sessilia ± lanceolata — lineari-lanceolata denticulata — integerrima cuspidata plerumque in bracteas ± decrescentia. *Anthela* simplex — composita raro laxa sæpius sat contracta, ramis arrectis raro magis patentibus superantibus ± stellatis, acladio brevi 3—20 mm. (raro longiore) pedicellis plerumque sat brevibus rare — mediocriter v. sat dense floccosis rare — sparse v. mediocriter glandulosis et pilis paucis brevibus obsitis. *Involucra* mediocria sat obscura v. diluta. *Squamæ* ± longæ e basi sat latæ plerumque sat longe attenuatæ glandulis minutis pilis sparsis et floccis raris — sparsis obtectæ.

Denna form, hvilken E. Fries utdelat i H. N., får genom de smala bladen, den vanligen mångbladiga stjelken och ofta sammanträngda inflorescensen en egendomlig habitus, hvarigenom den synes så utpräglad, att den kan anses som artens hufvudform, kring hvilken sedermera en mängd andra former, hvilka leda öfver till olika arter men ofta äro ganska utmärkta, gruppera sig. Liksom de flesta *Oreadea* varierar den såväl till växtsätt som hårighetens riklighet rätt betydligt. Än är den lågväxt, mera bredbladig med fåbladig stjelk och då ofta med mera aflägsnade och utspärrade grenar, än är den högväxt, flerbladig och smalbladig med ett färre antal smalare rosettblad och hopdragen inflorescens med mera upprätta grenar. Två mera utmärkta former, men hvilka synas genom mellanformer öfvergå i hvarandra, kunna i allmänhet temligen lätt urskiljas af hufvudformen:

α genuinum, nämligen:

a *breviceps* n. f. Glabrius. *Folia* magis viridia. *Involucra* breviora et latiora basi magis rotundata, postea plerumque truncata. *Squamæ* plures angustiores magis obtusæ obscuræ anguste viridimarginatæ, glandulis obscuris sat densis parvis pilis

(nullis v.) paucis floccis raris præcipue ad basin exteriorum obtectæ. *Calathidia* minora; *ligulæ* breviores, glabriores.

Denna form förekommer flerestädes i *Upland*, såsom kring Upsala rikligt, i Stockholmstrakten på fl. st., men är dessutom, ehuru mindre typisk, anträffad i *Östergötland*, vid Qvillinge (Fr. E. Herfurth). Öfvergångsformer till följande förekomma äfven vid Upsala. En lika smal och mångbladig form med mera tandade blad och rikligare glandulösa breda holkar, öfvergångsform till *β scopulivagum*, är anträffad i Roslagen på Sandön (K. Starbäck) och andra ställen i skärgården.

b *longiceps* n. f. Hirsutius, elatius. *Folia* sæpe sat intense glaucescentia, diluta. *Involucra* elongata et angustiora basi magis decurrentia dilutiora sæpe bigeminata v. pedicellis brevibus prædita. *Anthela* magis contracta et floccosa. *Squamæ* magis irregulariter imbricatæ et inæquales basi latiores, interiores longe protractæ et acutæ late viridimarginatæ glandulis sparsioribus et pilis frequentioribus ceterum floccis raris — sparsis in marginibus sæpe sat conspicuis obtectæ. *Calathidia* majora magis radiantia; *ligulæ* conspicue at plerumque breve ciliatæ.

Utmärkande för denna form är den vanligen höga och spensliga växten, den nedtill temligen rikliga hårigheten, de smala, merändels smalt lancettlika, helbräddade eller kort och glest, nästan omärkligt tandade, ljusa och vanligen lifligt glaucescenta bladen samt den sammandragna inflorescensen med jemförelsevis smala och långa, ljusa holkar, med sin bas nedlöpande i de upptill förtjockade holkskaften och ofta 2 och 2 förenade på mycket korta skaft. Ligulæ äro derjemte åtminstone tydligt småhåriga i toppen; kantblommorna omkring 2,5 mm. breda samt glesa och temligen långa. Stjelken är till sin nedre del lifligt violettfärgad. Varierar stundom med grönare blad och mörkare holkar. Ofta liknar den till örtståndets rikliga hårighet späda och smalbladiga former af *H. oreades* Fr. men är väl skild genom holkens utseende.

Denna och föregående form utgöra artens hufvudtyp, hvarvid dock den sednare är mindre utpräglad och genom flera mellanformer mindre skarpt begränsad från följande, hvaremot förhandenvarande form är mera fristående.

Den är anträffad i *Upland*, mångenstädes kring Upsala. Troligen äro Uplands kust- och bergstrakter att anse som båda formernas hufvudsakliga utbredningsområde.

β scopulivagum n. var.

Caulis sat altus 2—5-folius sæpe ramosus, inferne sat dense — sparsius pilosus, superne rare pilosus — subglaber subefloccosus et rare glandulosus. *Folia basalia* plura, exteriora minora sat lata ± elliptica subintegra obtusa, interiora ± late et sæpe oblonge lanceolata, intima angustius lanceolata ad medium sparsim et breve v. basin versus sat longe et anguste dentata ± longe acuta in petiolo sæpe brevi sat late alato ± decurrentia, omnia ubique v. subtus pilis brevibus ± densis hirsuta, in pagina superiore sæpe subglabra. *Folia caulina* 1—5 longe distantia, infimum sæpe petiolatum, superiora v. omnia sessilia ± lanceolata sæpe subæqualiter tridentata apice sat longo integro protracta cito in bracteas obeuntia. *Anthela* plerumque laxa patens simplex ± subfurcata vel composita indeterminata et vulgo ramis longis ex axillis foliorum superiorum aucta, pedicellis mediocribus — sat

longis acladioque 20—40 mm. longo glandulis gracilibus mediocriter — sat densis floccis mediocriter densis et pilis tenellis raris obtectis. *Involucra* brevia basi ± rotundata fusco-viridia. *Squamæ* subangustæ lanceolatæ, exteriores ± virides, interiores ± late viridimarginatæ, ceterum fuscæ in apicem obtusulum sat attenuatæ, glandulis ± tenuibus sat densis — crebris brevibus pilis nullis v. raris in exterioribus sæpe sat frequentibus obsitis ceterum haud v. vix v. in marginibus leviter stellatis. *Calathidium* mediocre sat radians. *Ligulæ* sat inconspicue ciliatæ.

Inv. $\frac{10—11}{5,5—6,5}$, D. 35—40, L. m. c. 2,5 mm.

Denna form utmärker sig genom sina företrädesvis vid basen hopade, oftast breda och isynnerhet inåt i rosetten tandade blad, få till flera stjelkblad, af hvilka de nedre äro stora, ehuru mindre än de inre rosettbladen och tydligen eller ibland långt men glest få- eller vanligen tretandade, samt uppåt hastigt öfvergå i brakteerna, sin temligen vida, vanligen utspärrade och glesa, nedåt obestämda inflorescens, ofta ända till basen grenad stjelk och jemförelsevis små, grönbruna, temligen breda holkar med rundad bas och m. l. m. smala, något utdragna, men i den smala spetsen trubbade fjäll med vanligen rikliga, fina, brunsvarta glandler och sällan med färre inblandade eller åtminstone föga synliga hår samt knappt märkbart stjernludd. Varierar temligen mycket till bladform och tandning samt stjelkens bladrikedom och deraf framkallade habitus, men utmärker sig alltid genom den rikliga bladrosetten och benägenheten att få de nedre mera utvecklade stjelkbladen närmade basen. Bladen äro både bredare och kortare än hos föregående samt äga ofta största bredden nedom midten, isynnerhet då de erhålla rikligare tandning; de yttre rosettbladen äro deremot oftast bredare ofvan midten. Holkfjällen tendera åt jembred form och äro ibland mycket rikligt och då oftast gröfre glandulösa; de äro endast i yngre stadier af holkens utveckling öfverskjutande de outslagna blommorna. Här och hvar uppträda former af likartad habitus, hvilka än närma sig den ena än den andra af föregående varietets former i anseende till holkfjällens form och beklädnad. Uppträder ibland med mycket smala blad, ibland med glesare eller tätare hårighet såsom ofta är förhallandet med ett flertal former inom gruppen. Somliga former med mera stjernludd på fjällen likna i detta afseende följande var., under det andra former deremot likna samma varietets hårigare former, i hvilka den på sina ställen torde öfvergå.

Inom området anträffad i *Östergötland*, Wists s:n, Sturefors; Rystad s:n, Risön (förf.); smalbladigare former äro anträffade i Kisa s:n, Karleby och Torpa s:n, Torpön (K. F. Dusén); måhända utgöra de mellanformer till *α genuinum* a *breviceps*.

Utom området funnen i *Upland*, flerestädes såsom kring Upsala, Sigtuna m. fl. andra ställen: *Södermanland*, Roslagen, Sandön (K. Starbäck); sannolikt allmännare utbredd i de östra kustprovinserna från norra *Upland* till södra *Östergötland*.

b *connophorum* n. forma. — Dahlst., Hier. exs., fasc. IV, n. 51.

Skild från föregående genom rikligare och längre hårighet isynnerhet på stjelk och bladskaft, smalare, skarptandade blad, flera, ända till 4 stjelkblad, glesare inflorescens med större korgar, klädda af glesa glandler och m. l. m. rikliga, kortare eller längre hår. På korgskaften äro både hår och glandler förhanden i ungefär lika antal, hvarvid de sednare

äro betydligt glesare än hos föregående. Inflorescensen är gles, nedåt obegränsad, med m. l. m. utspärrade och m. l. m. raka grenar, hvilka öfverskjuta akladiet, och är ofta ganska rikblomstrig. Har mycken likhet med *H. onosmoides* Fr. och torde vara beslägtad med den samt kanske hellre böra föras i dess närhet. Emellertid erinrar den mycket om föregåendes uppländska former, hvarföre den tillsvidare uppföres på detta ställe.

Anträffad rikligt i *Vestmanland* vid Kungsör på Örsåsen (C. O. v. Porat).

γ furfurellum n. var.

Caulis sat altus — altus subflexuosus rigidus et firmus 2—3-folius, ima basi sat dense setoso-pilosus sat stellatus violaceus, ceterum sparsim pilosus v. subglaber, superne sat dense stellatus. *Folia rosularia* 3—4, exteriora anguste elliptica obtusiuscula, interiora ± anguste ovato-lanceolata in petiolum sat longum alatum sensim decurrentia integerrima v. minutissime dentata undulata in apicem sat acutum plicatum attenuata, in marginibus et in costa breviter in petiolis sat longe et ± dense pilosa, supra subglabra ± glaucescenti-viridia, subtus ± stellata dilutiora et sæpe violascentia. *Folia caulina* sat bene evoluta plerumque basi ± attenuata et ad insertionem leviter auriculata sessilia, infimum longum denticulatum — subintegrum in apicem longum acutum — cuspidatum protractum anguste lanceolatum v. ovato-lanceolatum, superiora e basi latiore lineari-lanceolata longe cuspidata mediocria, spatio sat longo a bracteis discreta. *Anthela* subsimplex — subcomposita, ramis arrectis ± superantibus e floccis densis canis, acladio 10—40 mm. longo cum pedicellis mediocribus floccis densis canis v. cinereis pilis canis brevibus sparsis — sat densis et glandulis minutis raris — sparsis obtectis. *Involucra* fusco-canescentia obscuriora — dilutiora mediocria basi rotundato-ovata postea subtruncata. *Squamæ* plures lanceolatæ — lineares, exteriores obtusiusculæ, interiores acutæ, intimæ subulatæ sæpe paullum protractæ, anguste et sordide-viridi-marginatæ glandulis brevibus sat densis et pilis ± frequentibus brevibus canis obtectæ, ceterum floccis in marginibus sæpius lineam sat conspicuam formantibus in dorso rare adspersis obsitæ. *Calathidia* mediocria sat radiantia. *Ligulæ* brevissime et vix conspicue ciliatæ.

Inv. $\frac{10—11}{5—6}$, D. 32—37 mm., L. m. 2—2,5 mm.

Denna form är ganska utmärkt och skiljer sig från de föregående, bland hvilka den till habitus mest närmar sig *α genuinum* b *longiceps*, genom sina typiskt helbräddade, fasta, m. l. m. lancettlika, åt båda ändar ungefär likformigt afsmalnande blad, hvilka ej sällan äga största bredden nedom midten och vanligen äro utdragna i en lång, utböjd och veckad spets, genom stjelkbladens storlek, af hvilka det nedre vanligen är lika stort, stundom större, än det inre rosettbladet och de öfriga visserligen småningom aftaga i storlek men äro ganska skarpt begränsade från brakteerna samt äro utdragna i en ännu längre och smalare spets, vidare genom sina af de korta håren och det m. l. m. framträdande stjernluddet gråaktiga holkar och de af m. l. m. rikt stjernludd grågröna till askgrå grenarne och skaften.

Korgställningen är vanligen hopträngd och begränsad, stundom något utspärrad, isynnerhet hos individ med förgrening från bladvecken, hvilken dock sällan sträcker sig nedom stjelkbladsregionen utan vanligen är inskränkt till den öfre delen. Stjelken är vanligen nedtill lifligt röd och oftast bågböjd.

Varierar med mörkare och ljusare holkar till följd af svagare och ofta kortare eller rikligare och då vanligen längre hårighet samt svagare eller skarpare framträdande stjernludd. De hårigare formerna, hvilka äfven ofta äro mindre tydligt stjernhåriga, närma sig mången gång äfven c *hirsutiusculum* m. l. m. till bladformen. För öfrigt varierar den med smalare och bredare blad. I allmänhet äro solformernas holkar tydligare stjernludna och kortare håriga, hvaremot skuggformernas äro längre håriga; i örtståndet blir förhållandet motsatt. Höstformer sakna nästan alldeles hår i inflorescensen och äro på stjelk och blad m. l. m. rikt och styft borsthåriga. Någon gång varierar den med ända till 5-bladig stjelk men bibehåller sin karaktäristiska bladform.

Anträffad i *Östergötland* i Linköpingstrakten på öppna, sterila klippor och bergkullar eller på skuggigare sådana, omgifna af tallskog, flerestädes rikligt, vidare i Wånga s:n, Grensholmen vid Roxen (förf.) samt i Svinstad s:n, Gräfsten (N. C. KINDBERG).

b *latiusculum* n. forma.

Caule humiliore robusto, *foliis rosularibus* latioribus brevioribus plerumque ovatis breviter acutis ± dentatis, exterioribus solum subintegris obovatis obtusis, caulinis sessilibus 3—5 minoribus sparsim dentatis e basi ± ovata lanceolatis acutis v. in umbrosis obovatis plerumque sensim in bracteas abeuntibus, *anthela* subsimplici magis indeterminata ramis magis patentibus nec non *involucris* crassioribus latioribus cum pedicellis glandulis minutissimis pilis sparsis brevissimis et floccis in dorso squamarum frequentioribus obtectis diversum.

Inv. $\frac{11—12}{6—8}$, D. 35—40, L. m. 2,5—3 mm.

Utmärkt genom sin högre och gröfre men ofta flerbladigare stjelk med uppåt småningom aflägsnade, bredare och mera tandade blad, bredare och tandade, oftast äggrunda till omvändt äggrunda eller bredt lancettlika, mera styfhåriga men ofta gleshåriga rosettblad, mera utspärrad inflorescens och tjocka holkar med jembredt lancettlika, mera spetsade och mångradiga fjäll, liksom de något glesare stjernhåriga skaften klädda af mycket små, m. l. m. täta glandler och korta, glesa hår, samt i fjällens kanter något talrikare men för öfrigt öfverallt spridda stjernhår. Höstformer äro nästan glatta med kort och rikt glandelhåriga, knappt eller icke håriga och föga stjernludna, grönare fjäll. Stjelken och bladens undersida äro temligen stjernhåriga och bladfärgen vexlar från grön- eller något gulaktigt glaucescent till rent glaucescent.

Endast anträffad i vestra *Östergötland* såsom i Ödeshög s:n, Stora Åby prestgård (G. A:N MALME) och på Omberg, Alvastra branter m. fl. ställen (förf.).

c *hirsutiusculum* n. f. v. var.

Caulis robustus elatior, 1—2(—3)-folius ubique densius et longius hirsuto-pilosus. *Folia rosularia* densius hirsuta ± lanceolata — ovato-lanceolata obtuse — acute et sat crebre denticulata v. ad basin decurrentem longius et inæqualiter dentata. *Folium caulinum* infimum subpetiolatum e basi ovata in apicem longissimum subintegrum protractum ad basin ± longe dentatum v. omnia lanceolata — lanceolato-linearia ± subulata cito in bracteas abeuntia. *Anthela* ± laxa divaricata ± composita indeterminata sæpe ramis brevibus ex axillis foliorum aucta, ramis et pedicellis ± dense pilosis — hirsutis sparsim — dense (in pedicellis) floccosis et sub involucra rare glandulosis, acladio 15—40 mm. longo densius hirsuto. *Involucra* sat magna obscura ± canescentia basi primo ± ovato-decurrente, deinde rotundata — subtruncata. *Squamæ* ± laxæ e basi sat lata lanceolatæ in apicem acutum sat longum protractæ pilis ± longis et densis hirsutæ glandulis sat densis brevibus obtectæ et floccis sparsis præcipue in marginibus confertis obsitæ, latius — angustius viridimarginatæ. *Calathidia* sat magna subradiantia. *Ligulæ* breviter et sat dense ciliatæ.

Inv. $\frac{11-12}{6-7}$, D. 40—45, L. m. 2—2,5 mm.

En i sin typiska gestalt, sådan den förekommer kring Linköping, serdeles vacker form, utmärkt af sin öfverallt rikliga hårighet, stora och talrika rosettblad, oftast grenad stjelk och vid samt gles inflorescens med stora, håriga holkar och vida korgar. Likväl är den såsom det synes genom öfvergångsformer sammanbunden med föregående hårigare och mångbladiga former. Mången gång äga äfven former med mörkare hårighet till holkarne en viss likhet med ε *oreinum*, hvilken den liknar till holkbasens form, de langa fjällen o. s. v., men från hvilken den är skild framförallt genom sin rikare hårighet och gröfre växt m. m.

Vackrast utbildad och lätt igenkänd är den anträffad i Magistratshagen och vid Ekkällan nära Linköping, der likväl enstaka mellanformer till föregående äro funna, äfvensom vid Tannefors i S:t Lars s:n i *Östergötland*. Liknande former, närmande sig föregående, äro insamlade vid Tåby s:n, Skärstad (C. HALLENDORF) samt i S:t Johannes s:n, Ånestad (C. NILSSON); sparsammare mellanformer till δ *gigantocybe* äro äfven anträffade vid Linköping. Måhända innefattar denna form tvenne analoga, håriga former, af hvilka den ena närmast ansluter sig till hufvudformen af β *scopulivagum*, den andra till ε *oreinum*, hvilket med det ringa material, som är förhanden, för tillfället ej kan afgöras.

δ *gigantocybe* n. var. — DAHLST., Hier. exs., fasc. IV, n. 52.

Caulis plerumque elatus rigidus crassus simplex v. a basi ramosus 3—6-folius, ima basi saltim densissime et longe pilosus — hirsutus sat stellatus, ceterum sparsim raro mediocriter pilosus ad medium et superne sæpe glaber — subglaber rare — sparsim stellatus. *Folia rosularia* 1—4 sub anthesi sæpe emarcida magna ± late — anguste lanceolata sæpe oblongo-lanceolata (v. lanceolato-linearia) in petiolo late alato sensim decurrentia ± acuta undulata sparsim et acute vulgo minute dentata, in marginibus in petiolis et in costa dorsali ± dense — mediocriter et sat longe pilosa,

subtus ceterum subglabra rarissime stellata et glaucescentia, supra vulgo glabra glauco-viridia. *Folia caulina* sat anguste lanceolata v. subovato-lanceolata — linearia sæpe sat longa undulata v. ad medium patenter et inæqualiter 2—3 dentata in apicem ± longum acutum protracta cito in bracteas abeuntia. *Anthela* plerumque oligocephala subsimplex laxa v. ± contracta, ramis rectis ± patentibus sparsim stellatis et pilosis, pedicellis acladioque 30—60 mm. longo crassis et sub involucris squamosis ± incrassatis sat dense stellatis pilis sparsis — sat densis longis sat validis glandulis nullis v. rarissimis obtectis. *Involucra* magna — maxima et livido- v. obscure viridia basi ovata postea rotundata. *Squamæ* sat laxæ latæ (2—2,5 mm.) ovato-lanceolatæ, intermediæ in apicem obtusum — obtusiusculum ± comatum ± longe attenuatæ, intimæ paucæ subulatæ, dorso livido-obscuræ in marginibus ± late viridi-marginatæ pilis sat densis — densis longis albis ± hirsutis glandulis minutis sæpe inconspicuis sparsis — mediocribus et floccis laxis raris v. in marginibus paullo magis conspicuis obtectis. *Calathidium* magnum — maximum sat radians. *Ligulæ* marginales subglabræ v. obsolete ciliatæ.

Inv. $\frac{13—14}{8-9(-10)}$, D. (45—)50—60, L. m. 3—3,5(—4) mm.

En mycket framstående form och till habitus ganska lätt skild från föregående men genom karaktärer svår att begränsa. Framförallt utmärkt genom ännu gröfre växt, normalt flera stjelkblad och få rosettblad, hvaraf den ofta får ett *rigidum*-artadt utseende, ehuru ej i så hög grad som *H. *rufescens*, samt genom stora, bredfjälliga, håriga men knappt märkbart glandulösa holkar och stora vida korgar, de största hos någon bland områdets former af denna grupp och ofta täflande med dem hos *H. alpinum* i vidd. Varierar mången gång med mot basen mera sammanträngda stjelkblad, rikare bladrosett och glesare, mera långgrenig inflorescens. Sådana former få ofta stjelken mera grenig och inflorescensen vidare. Dessa exemplar tillhöra troligen rotstockar af yngre ålder eller tidigare blommande exemplar, hvilket synes deraf att de bistjelkar, dylika individ ofta utveckla, äro normalt utbildade, höga och försedda med flera högre upp spridda stjelkblad. Från gamla rotstockar utbildas alltid mångbladiga, högväxta stjelkar, hvilket äfven äger rum hos senblommande exemplar. Denna företeelse är för öfrigt ej enastående, utan hos många former af slägtet, serskildt inom denna grupp, är det en inom trängre eller vidare gränser allmän regel, att tidigare och yngre individ tendera att hafva bladen samlade mot stjelkbasen, senblommande och äldre deremot att erhålla högväxt och mångbladig stjelk.

I många af sina lågväxta former blir den rätt lik föregående men är i allmänhet lätt skild genom sina bredare fjäll samt gröfre hår och brist på glandler, isynnerhet på holkskaften. Högväxta former ha rätt stor likhet med *H. *rufescens* Fr. *β subrufescens* och sannolikt är denna form att anse som en mellanlänk till den sednare.

Hittills endast anträffad i *Östergötland* vid Linköping, fläckvis temligen riklig på kala klippor söder om staden, samt vid Söderköping, Ramundersberg (förf.).

ε *oreinum n. var.* — DAHLST., Hier. exs., fasc. III, n. 25.

Caulis mediocris firmus 3—6-folius simplex v. a basi ramosus, inferne violaceus ± setoso-pilosus, superne sparsim pilosus rare stellatus. *Folia rosularia* firma ± elliptico-lanceolata denticulata glauco-viridia sparsim — mediocriter pilosa, supra fere glabra. *Folia caulina* ± lanceolata — linearia parva sessilia sensim in bracteas abeuntia. *Anthela* simplex oligocephala ± contracta v. sat laxa, ramis pedicellisque paullum superantibus cum acladio 20—30 mm. longo fuscescentibus floccis sat densis glandulis densis parvis et pilis tenuibus ± frequentibus nigris — obscuris mediocriter longis firmis obtectis. *Involucra* sat gracilia, basi ovoidea in pedicello superne obscuro ± incrassato squamoso abeunte, postea rotundata — subtruncata, plerumque nigrofusca. *Squamæ* exteriores breves lineares, reliquæ longæ e basi latiore lanceolato-lineares in apicem longum ± acutum — cuspidatum attenuatæ, flores virgineos ± superantes, glandulis densis obscuris pilis mediocribus sparsis — sat densis nigris obtectæ, ceterum in marginibus floccis sparsis — raris lineam ± conspicuam formantibus obsitæ. *Calathidium* obscure luteum sat radians. *Ligulæ* subglabræ v. obsolete ciliatæ.

Inv. $\frac{11—12}{5—6}$, D. c. 40, L. m. 2—2,5 mm.

Denna serdeles distinkta form utmärker sig isynnerhet genom lägre, spädare och vanligen mera grenig stjelk än hos föregående former, genom smala, småningom aftagande blad, jemförelsevis smala holkar med nedlöpande äggrund till konisk bas, mörka, spetsiga fjäll, hvilka äro långt öfverskjutande och liksom de ganska stjernludna men dock af sin egen färg mörka, under holkarne nästan svartbruna, uppsvälda och 2—3-fjälliga skaften, äro klädda af längre eller kortare, mörka hår och talrika små, mörka glandler, samt slutligen genom temligen glesa korgar. På holkarne är det sparsamma stjernluddet oftast rätt tydligt samladt till en fin, ljus strimma i kanterna af fjällen, tydligast på de yttre. Varierar med längre till kortare, glesare eller stundom täta hår, hvilka alltid äro mörka eller åtminstone hafva lång, mörk bas. Ofta är stjelken, som ofvan är nämdt, grenig, stundom ända till basen, och grenarne vanligen utspärrade; stundom utgå flera stjelkar från rotstocken. Härigenom och genom sin låga växt får den ett egendomligt utseende, hvarpå den ofta på längre håll ganska lätt kan urskiljas. Möjligen är den att anse som en egen underart (under hvilken rang jag upptagit den i mina exsiccater), men då den ännu är väl litet känd, föredrar jag att tills vidare upptaga den som varietet.

I *Östergötland*, der den på kala berg flerestädes i S:t Lars s:n, såsom vid Tannefors, är anträffad i stora massor, växande blandad med γ *furfurellum*, har jag alltid och vanligen lättast på habitus kunnat skilja den från den sednare. Inom Östergötland för öfrigt anträffad i Ö. Tollstad s:n (C. STARBÄCK); Norrköping, Oxelbergen (P. OLSSON), jemte mellanformer till följande var.; Tingstad s:n (J. HULTING); Tåby s:n, Skärstad (C. HALLENDORF); Styrestad s:n, Dagsbergs bruk (L. WREDE); Svinstad s:n, Gräfsten och Grebo s:n vid sjön Erlången (N. C. KINDBERG).

Utom området i *Upland*, Wermdö s:n, Gustafsberg (L. SCHLEGEL).

b *subextensum* n. forma.

Statura robustiore, *caule* paucifolio, *foliis rosularibus* latioribus vulgo eximie dentatis et *involucris* crassioribus cum pedicellis minus pilosis at vulgo densius glandulosis a præcedente diversum, quocum formis transitoriis tamen conjungi videtur.

Denna form, som på sina ställen synes ganska utmärkt, öfvergår synbarligen genom mellanformer i föregående. Den utmärker sig genom gröfre växt, ofta långtandade, ibland mera helbräddade, bredare blad, färre rosettblad, glesare och mera utspärrad inflorescens samt större holkar med rikligare och vanligen gröfre glandler. Till holkarnes beklädnad liknar den mycket *H. extensum*, men är skild genom sina visserligen breda men långspetsade fjäll och för öfrigt genom örtståndets utbildning och beklädnad. Dock torde den af alla *H. saxifragi* former stå denna närmast.

Inom området anträffad i *Östergötland* i Dagsbergs s:n, Kårholmen m. fl. st. (J. A. LAGERMAN, A. WIRÉN); S:t Johannes s:n, Ånestad (C. NILSSON), jemte mellanformer till föregående; Sundstorp och Vi vid Glan (P. DE LAVAL) äfven här jemte öfvergångsformer till föregående.

Nära denna, med hvilken den har gemensamt holkens och fjällens form, men till indumentet, isynnerhet de rikligare stjernhåren, närmande sig γ *furfurellum*, står *v. rodense* STENSTR., Värml. Archiv., p. 10.

H. *petrophilum LÖNNR.

H. petrophilum LÖNNR., Resa i Smål. och på Gotl., p. 95.

Caules 1 — plures 30—45 ctm. alti suberecti firmi paullum flexuosi, 1—3(—4)-folii basi purpurascentes, inferne setulis densis — sat densis, superne pilis sparsis — raris et glandulis brevibus obsiti, fere efloccosi. *Folia rosularia* cæsio-glauca, in marginibus pilis ± elongatis — mediocribus rigidis setoso-ciliata et utrinque præsertim in nervo dorsali setoso-hispida v. supra fere glabra et subtus fere efloccosa, exteriora ± late elliptica obtusa subintegerrima, interiora ± ovalia — ovali-oblonga acutiuscula et mucronata denticulata, omnia basi in petiolum brevem ± coloratum alatum et albo-crinitum angustata; *caulina* 1—3(—4) subtus sat floccosa, inferiora ± ovato-lanceolata — lanceolato-oblonga ad medium magis minusve obsolete v. interdum grosse tridentata, superiora in bracteas sensim decrescentia lanceolata integra, omnia parcius setosa v. subglabra subsessilia basi sensim angustata. *Anthela* ± indeterminata subsimplex oligocephala furcato-ramosa, ramis pedicellisque elongatis superantibus strictis patentibus et acladio 25—30 mm. longo glandulis brevibus sparsis, superne ± densis, et setulis raris vestitis, inferne subefloccosis, superne floccis magis minusve parcis obsitis subcanescentibus v. fere efloccosis. *Involucra* ± dilute — obscure viridia primitus ovato-globosa, basi ± rotundata postea ± subtruncata. *Squamæ* subimbricatæ ± lanceolatæ, exteriores breves obtusæ concolores marginibus levissime stellatæ, interiores in apicem acutiusculum parum angustatæ

dorso apicemque versus obscuræ marginibus læte et pure viridulæ, omnes glandulis densis — crebris obscuris luteolis pilis longioribus ± raris obtectæ subefloccosæ, apicibus leviter puberulo-comosæ. *Calathidium* ± obscure luteum haud multum radians. *Ligulæ* leviter ciliatæ (?).

Inv. $\frac{10-11}{6-7}$, D. c. 40, L. m. 2,5 mm.

Denna af K. J. Lönnroth urskiljda form äger ett ganska karaktäristiskt utseende. Den utmärker sig företrädesvis genom flera, nedtill temligen lång- och styfhåriga, upptill gleshåriga till nästan glatta stjelkar med gles, ofta m. l. m. gaffelgrenad inflorescens med utstående, raka och temligen långa skaft, genom korta, rundade och rundbasiga holkar med gröna eller grönsvarta, smala, lancettlika, föga utdragna och kortspetsade fjäll, hvilka äro nästan nakna och glänsande samt klädda af ganska täta, ljusare eller mörkare, korta glandler, vanligen med endast få inblandade hår. Basalbladen äro vanligen styfva och kortskaftade, blågröna, icke eller kort tandade, ofta i kanten cilierade af styfva hår och för öfrigt öfverallt glest borsthåriga och undertill glest eller föga stjernhåriga. Detta gäller i högre grad om höstformerna; sommarformerna äro vanligen på bladens öfversida glatta. Stjelkbladen, isynnerhet de nedre, äro vanligen rätt stora och mestadels vid sin bas eller till midten tandade, alla vanligen oskaftade, de öfre småningom decrescerande och undertill, i motsats mot rosettbladen, ofta starkt stjernhåriga. Sommarformerna hafva vanligen på holkarne flera hår och smärre glandler än höstformerna, hvilka oftast blott äga glandelhår. Serdeles utmärker sig denna form genom saknaden eller åtminstone den sparsamma förekomsten af stjernludd och genom de för öfrigt svartgröna fjällens breda och lifligt gröna kanter. Stjelkens bas är vanligen ganska långt upp och bladskaften åtminstone till en del violettröda.

Först anträffad af K. J. Lönnroth på granitklippor i Järeda s:n, *Småland*, der den var talrik. Uppgifves af honom äfven från Fredriksberg nära Oskarshamn i samma landskap och från Boråkra i *Blekinge* (tagen af H. G. Lübeck). Vidare är den anträffad i *Östergötland* i Norrköpingstrakten flerestädes allmän (P. Olsson). Möjligen hithörande exemplar äro tagna vid Sigtuna i *Upland* (M. Floderus).

b *calvellum* n. forma.

Caulis humilis glaberrimus ima basi solum sparsim setosus efloccosus 1—3-folius divaricato-ramosus. *Folia rosularia* ovalia — oblonga v. lanceolata obtusa v. intimum acutum, glabra margine et in nervo dorsali setoso-ciliata, subtus efloccosa; *caulina* ± lanceolata — linearia sensim in bracteas abeuntia glabra cuspidata, subtus in nervo dorsali sparsim floccosa. *Anthela* furcata — furcato-ramosa laxa ramis pedicellisque valde superantibus rectis patentibus glabris v. sparsim glandulosis parce floccosis. *Involucra* obscura — nigra basi rotundata postea truncata. *Squamæ* nitentes, exteriores lineares obtusæ, interiores lanceolatæ acutæ vix stellatæ v. totæ nudæ glandulis obscuris sparsis et pilis nigris raris v. nullis obtectæ. *Calathidium* luteum, subradians. *Ligulæ* glabræ.

Inv. $\frac{10-11}{5-6}$, D. 35—40, L. m. 2,5—3 mm.

En serdeles vacker form och habituelt mycket lätt att igenkänna. Framförallt utmärkt genom sin utspärradt greniga, nakna, glatta och hala stjelk och glatta nästan helbräddade blad. Endast vid stjelkens bas, på bladskaften och på medelnerven förekomma glesa, i bladkanterna något tätare, borsthår. Holkarne äro mörka och glänsande, med spetsiga inre fjäll, alla klädda af mörka, glesare glandler än hos föregående och stundom några få inblandade svarta hår. De sakna nästan alldeles stjernludd eller är detta endast svagt förhanden på de yttre fjällens bas. På holkskaftens öfre del, hvilken är mörk, nästan svartbrun, äro stjernhåren något talrikare men aldrig i större mängd förhanden. Glandlerna äro här betydligt glesare än hos föregående.

En del af dessa egendomligheter äro möjligen i högre grad utpräglade af ståndorten (kala, blåsiga och låga strandklippor), men då formen på samma lokal under vexlande år bibehåller enahanda utseende och karaktärer synes den vara af den konstans, att den förtjenar ett närmare omnämnande. Med föregående har den många karaktärer gemensamt såsom de nakna holkarne, bristen på stjernludd hos örtståndet o. s. v. och torde lämpligast uppfattas som en varietet af den.

Hittills endast funnen på kala klippor ymnigt vid Hästholmen i Vestra Tollstad s:n i *Östergötland* på stranden af Vettern, der den insamlats redan 1878 (af J. E. ZETTERSTEDT) och sedermera flera år anträffats af mig och andra.

HIERACIUM LINDEBERGII NYM.

H. saxifragum FR. δ canescens (SCHLEICH.?) LBG., in Hn. Fl., ed. 11, 1879, p. 43 et in Blytt, Norges Flora, anden del, p. 18. — C. J. LINDEBERG, Hier. Scand. exs., n:o 28. — H. Lindebergii NYM., Consp. floræ europ., 1878—1882, p. 445. — H. Nymanni DAHLST., Hier. exs., fasc. I, n:o 38; fasc. III, n:o 24.

Caulis elatus 2—4 folius sæpe ex axillis omnibus ramosus flexuosus gracilis — crassiusculus basi ± obscure violaceus parce stellatus et pilis v. setulis ± longis sparsis — densiusculis obtectus, ceterum sparsim v. densiuscule stellatus et parce pilosus apice glandulis minutis raris obsitus. *Folia basalia* ± rigida coriacea sub anthesi 2—5, exteriora anguste ovalia ± obtusa cito emarcida, reliqua vulgo ± anguste lanceolata sparsim et acute denticulata — dentata pallide viridia, subtus subglaucescentia supra parce — sparsim pilosa v. subglabra, subtus sparsim — densiuscule pilosa sparsim stellata, in nervo dorsali pilis longis densiusculis — densis et floccis ± densis obtecta, in marginibus densiuscule setulosa in petiolis ± dense et sat longe setoso-pilosa, omnia basi ± longe descendentia apice ± acuta; *caulina* inferiora ± petiolata elongata lineari-lanceolata basi descendente apice ± longe acuto, superiora sessilia magis linearia cito decrescentia, omnia inter se ± remota, subtus magis stellata, remote denticulata v. basi sparsim et sæpe longe sinuato-dentata. *Inflorescentia* ± paniculata v. furcato-paniculata — subcorymbosa e ramis oligocephalis ex axillis foliorum (interdum omnium) ortis ± indeterminata, ramis pedicellisque acladium 10—60 mm. longum breviter v. longe superantibus apice squamosis gracilibus ± erecto-patentibus, summis basi leviter curvatis dense cano-

floccosis glandulis minutis sparsis v. superne densiusculis et pilis dilutis raris — sparsis obtectis. *Involucra* mediocria virescentia leviter cano-variegata basi ± ovata denique truncata. *Squamæ* exteriores angustæ lineares obtusiusculæ, intermediæ et intimæ sat angustæ e basi latiore lanceolato-lineares in apicem ± acutum — obtusiusculum angustum ± comosum sensim attenuatæ, exteriores et intermediæ marginibus stria floccosa angusta ± conspicue notatæ, omnes ceterum dorso sparsim stellatæ glandulis parvis et minutis densiusculis v. sparsis obsitæ, pilis brevibus sparsis — densiusculis vestitæ sat microglandulosæ ultra flores virgineos longe porrectæ. *Calathidium* læte luteum c. 35 mm. diametro. *Ligulæ* glabræ. *Stylus* luteus.

Denna form står bland *Oreadea* mycket isolerad och är onekligen en mycket utpräglad form. Den har en ej obetydlig likhet med *H. canescens* Schleich. (som utan tvifvel tillhör *Glaucina* eller utgör en medelform till denna grupp), hvilket föranledt Lindeberg att föra den som varietet af denna art. I dessa båda former torde *Oreadea* och *Glaucina* gränsa till hvarandra. Den utmärker sig genom sin vanligen fina och något bågböjda, flerbladiga, mycket glatta men rikligt stjernhåriga stjelk, som ofta är grenig från de öfre bladvecken, ej sällan äfven från basen, temligen fasta, ofta något läderartade, undertill stjernhåriga blad, af hvilka de smala, lancettlika basalbladen till stor del vid blomningen äro afvissnade och af hvilka stjelkbladen äro långt utdragna, smalt lancettlika till lineära, långspetsade och glest småtandade eller vid basen bugtigt tandade af 2—3, längre, utstående tänder och flikar, genom fåblomstrig, än gaffelgrenadt kvastlik än mera kvastlik, nedåt obegränsad inflorescens med ofta långt akladium och fina, rikt stjernhåriga, upprätta till utstående, svagt böjda, akladiet långt öfverskjutande holkskaft, genom medelstora, vid basen slutligen nästan tvärhuggna holkar med smala, öfvervägande lancettlika till lineära fjäll, hvilka långt öfverskjuta de unga blommorna och i spetsen äro fint håriga samt för öfrigt klädda af glesa till medelmåttigt tätt sittande, korta och ljusa hår, fina och små, glesa till temligen rikliga glandler samt ganska talrika mikroglandler, och äro gråa af m. l. m. rikt stjernludd i de yttre och mellersta fjällens kanter men sparsammare på deras ryggar, samt slutligen af temligen ljusa korgar med glatta ligulæ och gula stift. Till bladens tandning varierar den något; än äro de kort, fint och glest tandade till eller något öfver skifvans midt, än äro isynnerhet de mellersta stjelkbladen vid basen glest och ofta långt tandade af krökta och utstående tänder; den öfriga delen af skifvan är då vanligen alldeles helbräddad och utdragen i en lång, smal och skarp spets. Varierar för öfrigt med fåbladig, finare och vågböjd stjelk till flerbladig, grof och rak stjelk. Dessa flerbladiga exemplar få oftast ett mera *rigidum*-artadt utseende. Stjelkbladen bli hos dem ofta vid basen långtandade och holkarne äro ofta större och rikligare håriga. Äfven bladen bli hos dessa exemplar rikligare håriga med styfvare hår. Det är dessa rikhåriga och ofta *rigidum*-lika former, hvilka jag förut ansåg vara skilda från Lindeberg's form, och som jag utdelat i mina Hier. exs. under namn af *H. Nymanni*. Jag har numera öfvertygat mig om att dessa olika former blott äro modifikationer af samma art. De hårigare modifikationerna uppträda helst på torrare berg och klippor, hvilka äro mera aflägsnade från sjöstränder. De glattare förekomma deremot i närheten af större vatten.

Anträffad inom området i *Småland*, vid Grenna, rikligt (C. J. LINDEBERG, F. HAGSTRÖM m. fl.): *Östergötland*, Linköping i Trädgårdsföreningen, på öppna klippor i Borgmästarehagen; S:t Lars s:n, Ramstorp i klippspringor på kala eller glest tallbevuxna berg; Rystads s:n, Risön i Roxen (förf.).

Utom området anträffad i *Södermanland*, Brännkyrka s:n, Jacobsberg (S. ALMQUIST): *Helsingland*, på Vestra Stadsberget m. fl. st. vid Söderhamn (A. MAGNUSSON).

Såsom varietet kan upptagas:

β nudulum LBG.

H. canescens SCHLEICH. v. nudulum LINDEBERG, Hier. Scand. exs. n. 29.

A precedente diversum herba involucrisque minus floccosis involucris etiam epilosis v. vix pilosis glandulis uberioribus minutis obsitis.

Anträffad i *Vestergötland* vid Alingsås samt vid Göteborg (C. J. LINDEBERG och A. P. WINSLOW): *Bohuslän*, Östad vid Bullaren (C. J. JOHANSSON).

H. norvegicum FR. ***rufescens** (FR.) ALMQU.

H. rufescens FR., Symb. p. 101 (sub. H. saxifrago). — H. norvegicum FR. *rufescens Herb. Norm. XIII, n. 24 (n. 25 est H. norvegicum). — H. norvegicum FR. *β* rufescens LBG., Hn. Fl. ed. 11 (quoad loc. cit., exclus. syn. H. N. XIII, n. 25). — H. norvegicum FR. *rufescens ALMQU. in Thed. Fl. p. 358. — DAHLST., Hier. exs. fasc. IV, n. 53.

Aphyllopodum v. hypophyllopodum. *Caulis* plerumque elatus crassus rigidus fistulosus (5—)8—12-folius, ima basi sparsim v. ± dense et longe setoso-pilosus plerumque intense rufescens, ceterum glaber — subglaber et rare superne basique sparsim stellatus. *Folia rosularia* sub anthesi emarcida v. 1—2 elliptica — anguste lanceolata parva sensim in petiolum brevissimum alatum descendentia, margine minute et sparsim 3—5-dentata, glabriuscula v. marginibus et præcipue in nervo dorsali undique ± setosa, subtus sat stellata. *Folia caulina* inferne sat approximata v. superne ± distantia sensim decrescentia læte viridia subglaucescentia exacte lanceolata basi angusta sessilia ad medium ± minute v. haud rare longe et anguste ± patenter 3—5-dentata, inferiora ± acuta et præsertim superiora in apicem longum ± integrum curvato-plicatum ± subulatum protracta ± glabra v. marginibus et ad basin sparsim — densius setosa, subtus sat dense stellata. *Anthela* simplex corymbosa v. ramosa sæpe indeterminata (caule haud raro fere a basi ramoso), ramis inferioribus ± erectis, superioribus magis patentibus ± approximatis rectis subglabris sparsim stellatis, æquantibus v. parum — mediocriter superantibus, pedicellis brevibus acladioque 20—40 mm. longo sat stellatis v. ± dense floccosis rarissime pilosis et vix v. rare et minute glandulosis. *Involucra* sat magna lata fuscoviridia canescentia, basi rotundato-obtusa postea truncata. *Squamæ* pluriseriales, exteriores breves ± angustæ lineares sublaxæ obtusiusculæ, intermediæ et intimæ latæ — latissimæ elongatæ ovato-lanceolatæ v. lanceolatæ cito (a medio) in apicem obtusum — obtusiusculum leviter comatum sæpe coloratum attenuatæ pilis ± firmis sub-

dilutis mediocribus — brevibus sparsis — densiusculis v. raris glandulisque minutis parum conspicuis sparsis — densiusculis vestitæ, ubique sparsim floccosæ. *Calathidium* subdensum. *Ligulæ* subglabræ. *Stylus* luteus. *Pappus* eximie rufescens.

Inv. $\frac{11—13}{7—9}$, D. ad 40, L. m. ad 2,5 mm.

Utmärkt genom sin vanligen höga (40—80 ctm.), mång- och tätbladiga stjelk af *rigidum*-artadt utseende och sina stora, breda, gråsvarta till grågröna holkar med de inre och mellersta fjällen från bred bas temligen tvärt hopdragna till en föga utdragen m. l. m. trubbig, endast hos några få af de innersta skarp spets samt vanligen obegränsad, enkel eller något sammansatt kvastlik korgställning. Vanligen är den aphyllopod och stjelkens bas mer eller mindre högt upp lifligt purpurfärgad samt vanligen endast vid basen, stundom till midten, tätare eller glesare styfhårig men oftast till större delen glatt och endast på sin höjd vid basen och bladfästena gleshårig. Stjelkbladen sitta tätt, äro vanligen talrika, alla af väl utbildad lancettlik form och oskaftade, de nedre långa med smalare bas och m. l. m. långt spetsade, vanligen dubbelt längre än internodierna, småningom öfvergående i brakteerna genom de öfre, hvilka äro något längre eller lika långa som internodierna, och hafva något bred bas samt äro långt utdragna i en smal, veckad spets, stundom sylspetsade. Såsom äldre äro de i allmänhet alla glatta eller vid basen, isynnerhet i kanterna, borsthåriga, mera sällan på medelnerven och i hela kanten tätare borsthåriga, de nedre undertill glesare, de öfre vanligen ganska tätt stjernludna. Till färgen äro de m. l. m. blågröna, vid torkning oftast gulnande. Vanligen äro de kort och glest till eller något öfver midten syltandade; sällan äro tänderna, hvilka än äro något framåtrigtade än rätt utstående och 3—5 till antalet, längre och smalare.

Från den äkta *H. norvegicum* Fr., till hvilken den kan anses utgöra en östlig paralellform, skiljes den genom sina smala, lancettlika och karaktäristiskt långspetsade, tättsittande blad, större och gröfre korgar med vid sin bas bredare och längre utdragna fjäll med ofta föga utvecklade hår men deremot vanligen ganska rikligt stjernludd samt liksom de vanligen rikligt stjernludna skaften med ytterst små, knappt märkbara glandler.

Hos denna form inträffar ganska ofta liksom hos en del *rigidum*-artadt utbildade former af *H. porrigens*, hos *H. tridentatum* och hos former af *H. rigidum* m. fl., att ett par af de mellersta eller öfre stjelkbladen närma sig hvarandra betydligt mera än de öfriga och stundom bli alldeles motsatta. Från bladvecken, stundom ända från basen, utvecklas hos kraftiga exemplar korta grenar, hvilka sällan nå upp till den egentliga korgställningen och vanligen blomma sednare än denna. Såväl häri som i habitus samt bladens form och delvis äfven deras tandning, äger den en märkvärdig likhet med *H. rigidum* **Friesii* Hn. (Dahlst. Hier. exs. fasc. III, n. 63), hvilken likhet faller ännu mera i ögonen än den habituella likheten mellan den äkta *H. norvegicum* och *H. tridentatum*, hvilken likväl äfven är rätt stor. Utan tvifvel sammanhänga just i denna punkt *Oreadea* och *Rigida* med hvarandra. Fries märkte denna slägtskap, hvilket synes af hans arbeten, ehuru han förde *H. *rufescens* bland *Oreadea* och *H. norvegicum* bland *Rigida* (stirps *H. tridentati* i Symb.) i närheten af *H. tridentatum*. Ifrågavarande form, hvilken är den ursprungliga af Fries i Symb. beskrifna, är i Stockholmstrakten ganska allmän och konstant. Utom detta område synes den icke efter hvad hittills är kändt förekomma i sin typiska form. Inom

hufvudformens område förekomma äfven några smärre modifikationer eller mera afvikande variationer, hvarigenom den sammanbindes med några andra mera skilda, ehuru i det väsentliga öfverensstämmande former, af hvilka jag här anför några.

b *sparsifloccum* n. forma.

Habituelt ofta alldeles lik föregående och lika mångbladig men oftare med något kortare blad, öfverallt vanligen rikligare styfhårig, men med bladens undersida oftast betydligt glesare stjernhårig, vanligen endast på de öfre bladens medelnerv på undersidan med tydligt stjernludd. Inflorescensen mera hopträngd och bättre begränsad nedåt med finare och ytterst glest stjernhåriga grenar och skaft, hvilka äro klädda af glesare eller tätare, styfva borsthår samt få till talrika, korta glandler. Holkar små, mörka eller grönaktiga, temligen breda $\left(\frac{10-11}{7-8}\right)$ med smalare, temligen hastigt och tvärt i en trubbad, smal spets hopdragna fjäll, klädda af ganska rikliga, styfva hår, korta, fina, glesa till medeltäta glandler och obetydligt stjernludd. Basalbladen äro ofta kvarsittande, 2—3 till antalet.

Framförallt utmärkt af sin rikligare hårighet, sitt sparsammare stjernludd och de smärre, nakna holkarne. Bibehåller sina karaktärer både i skugga och på solöppna ställen. Skuggformerna äga dock vanligen något längre fjäll och ännu glesare stjernludd på holkar och skaft och närma sig i detta afseende *β subrufescens* c *nudius*. På solöppna ställen träffas stundom former med bladens undersida mera stjernhåriga och hela växten på samma gång glattare. De närma sig sålunda hufvudformen, men hafva dock mindre, hårigare och mera nakna holkar.

Funnen rikligt vid Tullinge i *Södermanland* (E. ALMQUIST).

β subrufescens n. var.

Aphyllopodum v. phyllopodum. *Caulis* mediocris — sat altus robustus rigidus ima basi v. supra medium rufescens, basi sat dense et longe setoso-pilosus v. ad medium sparsim — dense et longissime setosus, superne rare pilosus — subglaber, inferne rare — sparsim, superne ± dense stellatus. *Folia rosularia* sub anthesi emarcida v. 2—3 ± elliptica — ovato-elliptica v. lanceolata — oblonga integerrima v. rare denticulata undulata apice ± acuto plicato. *Folia caulina* 8—12 ± approximata — distantia, infimum subpetiolatum, superiora sessilia basi angusta sæpe subauriculato-amplectente, inferiora ± lanceolata haud raro lata acuta, superiora ± anguste ovato-lanceolata sat longe acuta — subulata, omnia in bracteas plerumque cito decrescentia ad medium ± minute et patentim 5—3-dentata, haud raro tantum longius 1—2 dentata, subtus præcipue ad basin et in nervo dorsali sparsim — dense setosa vix v. rare — sparsim stellata, supra subglabra — sparsim pilosa, marginibus ± setosa. *Anthela* ± contracta simplex — subcomposita, ramis æquantibus v. parum superantibus subrectis et sat erectis floccosis parce pilosis, pedicellis sat brevibus apice ± incrassatis acladioque 10—30 mm. longo sat dense floccosis sparsim pilosis et glandulis brevibus — mediocribus raris — sparsis v. superne frequentioribus obtectis. *Involucra* magna lata fusco-viridia — sat nigricantia basi ovato-rotundata postea

rotundato-obtusa. *Squamæ* obscuræ ± late fusco-virides, interiores pallide virides magis conspicue granulato-punctatæ, exteriores ± laxæ breves latiusculæ obtusæ, intermediæ et intimæ latissimæ ± elongato-triangulares sensim et sat longe in apicem ± obtusum — obtusiusculum attenuatæ, intimæ paucæ acutæ — fere subulatæ, pilis setulisque brevibus — sat longis apice dilutis basi sat longa crassa nigra sparsis — subdensiusculis, glandulis brevibus plerumque sparsis obtectis, rare stellatis. *Calathidium* sat obscure luteum, subplenum. *Ligulæ* glabræ.

Inv. $\frac{12—14}{8—10}$, D. 40—45, L. m. ad 3 mm.

Från föregående, hvilken ifrågavarande form står ganska nära, är den dock väl skild i första rummet genom sin habitus, men äfven genom flera tydligt framträdande afvikelser i karaktärer. Bladen äro ofta lika tättsittande som hos föregående och längre än internodierna men äro kortare, mera bredt lancettlika, vanligen ej så långspetsade med än korta, vanligen 3—5, spetsiga tänder, än längre och 1—3 på hvarje sida. Varierar dock med glesare (4—5), längre och smalare, ofta nästan helbräddade eller ojemnt och vågigt fåtandade stjelkblad. Stjelken är till öfver midten glest eller temligen tätt och mot den m. l. m. långt upp brunröda till lifligt purpurfärgade basen ofta betydligt tätare borsthårig. Håren äro äfven på bladen, isynnerhet på deras kanter och undersida, betydligt rikligare än hos föregående. Holkarne äro vanligen mörkare än hos föregående och längre samt hafva ej så tvär bas utan öfvergå åtminstone i yngre stadier genom de yttre med spetsarne frånstående och nedstigande fjällen i mer eller mindre grad i de upptill mycket mera förtjockade och gröfre holkskaften. Genom fjällens större längd, deras betydligare bredd nedtill, hvarifrån de småningom och ej hastigt äro hopdragna till en trubbig spets, samt derigenom att de yttre äro korta och breda samt utstående, förlänas holkarne ett karaktäristiskt utseende, hvarigenom denna form väl skiljes från föregående, hvartill äfven bidrager indumentets beskaffenhet, nämligen de längre eller tjockare och styfvare håren, de talrikare och bättre framträdande glandlerna samt det sparsamma eller åtminstone tydligt glesare stjernluddet. Varierar dock på en del ställen (såsom i Ödeshög s:n i Östergötland) samt eljest i enstaka individ med kortare holkar och smalare, mera tilltryckta fjäll med rikligare stjernludd och närmar sig häri sålunda föregående, men dessa former äro vanligen rikligare håriga, ha bredare blad och tydligare samt större glandelhår på skaft och holkar. Dylika bredbladiga former, hvilka stundom ha längre tandade blad, påminna såväl härigenom som genom den rikliga hårigheten om var. *macranthum* Lbg. af *H. norvegicum* och äro åtminstone analoga med denna.

Anträffad vid Linköping i *Östergötland* på ett par ställen temligen rikligt samt vid St. Åby i Åby s:n (G. A:n Malme) och Norköping, Hult (P. Olsson).

Former, hvilka kunna föras hit, förekomma äfven i *Södermanland*, Stockholmstrakten (S. Almquist): *Blekinge* (H. G. Lübeck) och *Ångermanland*, Nordingrå (V. F. Holm).

En något afvikande form med mot basen närmade, långspetsade och mera långtandade blad, hvari den liknar följande, samt mindre håriga men mera glandelhåriga och stjernhåriga holkar är funnen på Omberg (Alvastra branter) i *Östergötland* (G. A:n Malme och J. A. Lagerman); måhända tillhör den i stället följande form.

Höstformer hafva oftast bredare blad; de på hösten stundom utbildade små rosetterna hafva oftast rundade till ovala, helbräddade och trubbiga blad, hvilka liksom stjelkens nedre del äro tätt, styft och långt borsthåriga. Deremot äro hos dessa exemplar stjelkens öfre del nästan glatt, de ganska stjernludna holkskaften knappast eller icke håriga men liksom de m. l. m. stjernhåriga holkarne ganska tydligt och groft men glest glandelhåriga.

Till denna ansluter sig:

b *basiphyllum n. forma.*

Stjelkens bas och rosettbladen rikligt, några af de nedre stjelkbladen och internodierna mellan dem glesare styfhåriga, större delen af de öfriga bladen och stjelken nästan glatta. Rosettbladen många, de flesta vanligen vid blomningen kvarsittande, de yttre spadlika till spadlikt tunglika, bredskaftade, nästan helbräddade och trubbiga, de inre m. l. m. smalt lancettlika, vågbräddade eller glestandade, spetsiga, undertill föga stjernludna. Stjelkbladen små, smala, lancettlika, de nedre tättsittande, spetsiga, mera lågtandade af 1—3 spetsiga tänder, de öfre långspetsade nedom midten med omkring 2 korta till ganska långa, smala, syllika tänder; från stjelkens midt äro bladen nästan liniesmala och öfvergå hastigt i brakteerna samt äro undertill ganska stjernhåriga. Holkarne äro smärre, samlade i glesare inflorescens med smalare, mera raka och upprätta grenar och skaft, och hafva basen något nedlöpande i det upptill förtjockade skaftet. Holkskaften äro gråludna af tätt stjernludd, nästan utan eller med få hår och ännu färre glandler. Fjällen äro af samma form som hos föregående, men spetsigare, klädda af ganska rikliga, kortare eller längre hår med ljusa spetsar och temligen grof, svart bas, öfverallt spridda stjernhår, men med få eller inga glandler. Bladen äro blågröna. Stjelken m. l. m. långt upp, stundom öfver midten, mörkt till lifligt röd. Blomkorgar stora, omkring 45 mm. breda, något glesa. Ligulæ glatta och i början svagt korthåriga.

Genom sina smala, skarpspetsade, företrädesvis nedåt stjelkens bas hopade och mera utbildade, ofvan midten smärre, glesare och nästan liniesmala blad, de flesta med oftast några längre utstående skarpa tänder, de smala kvarsittande rosettbladen, de smärre holkarne med nedåt afsmalnande bas och spetsigare fjäll samt motsatsen mellan örtståndets nedre rik- och styfhåriga och öfre glattare del, är denna form af ett serdeles karaktäristiskt utseende. Motsvarar till holkarne föregåendes f. *sparsiflocculum.*

Endast anträffad i *Östergötland* på Omberg, Hjässan, (P. DE LAVAL).

c *nudius* n. forma.

Utmärkt af nästan glatt och naken eller nedtill korthårig stjelk, vid blomningen felande rosettblad, talrika stjelkblad, af hvilka de nedersta äro skaftade, elliptiska till lancettlika, ojemt och utstående korttandade, de mellersta tättsittande, rhomboidiska till lancettlika, de öfre glesare, smalare lancettlika, alla korta och oregelbundet korttandade med några inblandade, längre och utstående tänder samt uppåt hastigt decrescerande, genom gles inflorescens med tättsittande, temligen långa, något utspärrade grenar och skaft, de sednare vanligen föga stjernludna men m. l. m. glest till tätt styfhåriga samt knappt eller

icke glandelhåriga, mörka, stora och temligen långa holkar med smalare, temligen utdragna och spetsigare fjäll, hvilka äro nakna eller nästan nakna, men klädda af temligen rikliga styfva borsthår, utan eller med få inblandade glandler jemte mikroglandler.

Anträffad då och då vid Linköping bland *β subrufescens* i ett färre antal exemplar. Är måhända endast en tillfällig modifikation af denna, men i alla händelser intressant för sin stora likhet med en serdeles utpräglad form från Bohuslän, hvilken står nära *H. norvegicum* var. *angustifolium* Lbg Till holkarnes byggnad och beklädnad synes den nästan identisk med nyssnämda bohuslänska form, hvilken dock bland annat är skild genom sina betydligt smalare och längre, regelbundet och ofta långt två- till tretandade, långspetsade blad, sin längre och styfvare men glesare håriga stjelkbas, större brist på stjernludd m. m. Denna form, hvilken jag vill kalla *γ bahusiense*, är anträffad flerestädes i Tanums s:n i *Bohuslän* (H. Thedenius).

H. norvegicum Fr. *var. diodontum* Stenstr. tillhör snarare *H. *rufescens* såsom varietet, men är betydligt fåbladigare än både denna och *H. norvegicum* och ganska afvikande från båda, isynnerhet i habitus.

För öfrigt synas afvikande former af *H. *rufescens* äfven förekomma på några ställen i södra *Norge*.

III. RIGIDA Lbg.

Holkar medelmåttigt stora till stora, oftast breda, klädda af små, mörka till gulaktiga glandler och vanligen korta hår i vexlande förhållanden eller alldeles utan glandler och hår, i allmänhet med stjernluddet i kanterna föga framträdande eller jemnt spridt öfver hela fjällens yta. Holkfjäll flerradiga, åtminstone de yttre mer eller mindre utböjda, de inre smalare än mellanfjällen och mera spetsiga, de öfriga oftast trubbade, de inre isynnerhet i kanten gråprickiga af små tätt sittande hårliknande bildningar. Achenier medelstora eller små, svartbruna. Ligulæ i spetsen alltid glatta. Stiftet mörkt till rent gult. Stjelk mångbladig med till största delen oskaftade blad, hvilka äro temligen jemt spridda på stjelken eller nedtill mera närmade till hvarandra, uppåt till midten vanligen tilltagande i storlek, alltid uppåt decrescerande och tilltagande i bredd, isynnerhet vid bladbasen, aldrig egentligen stjelkomfattande men väl svagt till öronlikt utvidgade vid sjelfva den breda basen, oftast med svagt tillbakaböjda, styfva kanter, på båda sidor oftast spridt stjernhåriga af ytterst små stjernhår (vanligen af de af N. och P. med namnet »schwertflocken» omnämda), samt rent gröna eller stötande i lökgrönt till gulgrönt, sällan något blåaktiga. Innovationen sker genom på hösten anlagda, m. l. m. köttiga och fjälliga knoppar af vexlande form men oftast långsträckta, hvilka på våren omedelbart utväxa till en stjelk med större eller mindre mellanleder mellan de spadlika till tunglika lågbladen, hvilka småningom öfvergå i örtbladen och sålunda ej bilda en basal bladrosett.

Inom inflorescensen förekomma glandler, hår och stjernludd hos de olika formerna i olika förhållanden, men dessa äga sällan eller aldrig den karaktäristiska anordning, som så

ofta förekommer hos *Vulgata*, ej heller äro de så utpräglade hvarken till storlek, form eller färg som hos denna afdelning. Dertill kommer att deras inbördes förhållande hos hvarje serskild form är temligen vexlande, ofta inom rätt vida gränser och synes röna starkt inflytande af ståndorten. Karaktärer, hemtade från inflorescensens indument, äro derför i allmänhet af mindre betydelse inom denna grupp än hos föregående. Dock förekomma äfven här former, hvilka i detta afseende äro synnerligen utpräglade och serdeles konstanta. Stjernluddet är i allmänhet föga utprägladt och vanligen jemnt spridt (oftast glest) öfver hela fjällets yta. Mera sällan är det anordnadt en tydlig strimma på fjällens ryggar eller i deras kanter. På inflorescensgrenarne och på stjelken, isynnerhet dess öfre del, är det deremot oftast rikligt. Ofta förekomma spridda små stjernhår antingen med stjernlik eller oftast enkel ändcell äfven på stjelkbladens öfre sida. Stjernhåren äro på holkarne vanligen små och tilltryckta, sällan större och mera löst gyttrade. Glandlerna äro i allmänhet mycket små och ofta vid ett ytligt betraktande lätta att förvexla med de ofta korta och mörka håren, i hvilka de synbarligen hos en del, om ej de flesta former, alltefter lokalens beskaffenhet kunna delvis öfvergå eller hvilka de i större eller mindre grad kunna utesluta. De äro än mörka, än gulaktiga, allt efter ståndorten och likna ibland något mikroglandler, hvilka hos denna grupp aldrig synas förekomma. Sällan saknas de alldeles. Håren äro som sagdt korta och ofta till större delen af sin längd mörka samt kort hvitspetsade, mera sällan långa, nästan alltid fina. Stundom saknas de alldeles. Sparsammare på de yttre, rikligare på de inre fjällen förekomma små under mikroskop synliga vårtlika eller taggliknande upphöjningar från kuticulan, hvilka förläna fjällen ett gråprickigt utseende och ofta ger dem utseende af att vara klädda af tätt tilltryckt stjernludd. Holkfjällen äro hos alla flerradiga och jemnt öfvergående i hvarandra utom hos *H. tridentatum*, hos hvilken de äro färre och anordnade som hos *Vulgata*. Stjelkbladen äro talrika och öfvergå småningom i korgställningens brakteer. Än aftaga de hastigt än långsamt uppåt i längd. Ofta aftaga de äfven i bredd uppåt men mången gång äro de öfre bredare och och tendera att få svagt omfattande bas. De äro oftast jemnt fördelade utefter stjelken eller äro mellanlederna uppåt något längre, hvarvid bladen bli kortare än dessa, hvaremot de nedre bladen vanligen äro ända till dubbelt längre än internodierna. En basal bladrosett förekommer aldrig utom på torra och solbelysta eller denuderade lokaler, i hvilket fall en rosett uppstår genom stark förkortning af internodierna mellan högbladen och de nedersta egentliga örtbladen, men denna företeelse står ej i samband med innovationssättet, utan är framkallad af de yttre förhållandena, ehuru den likväl i visst fall är analog med densamma hos *Vulgata*. Ur de om hösten anlagda knopparne uppväxa de nya ofvanjordiska stamdelarne. Nederst på dessa kan man se en m. l. m. jemn öfvergång (i olika grad hos olika former) från de 2—3 eller flera köttiga knoppfjällen af i jemn följd allt högre utvecklade blad till de väl utbildade stjelkbladen; af dessa blad äro de nedersta lågbladlika och små och de följande tilltaga småningom i storlek uppåt. Dessa blad äro äfven, isynnerhet de nedersta och mellersta, af en annan form, nämligen spadlika till m. l. m. tunglika, än de fullt utvecklade stjelkbladen och äro mer eller mindre men alltid temligen bredt skaftade, samt äro föga eller icke tandade. Vid blomningen äro de vanligen alla och stundom äfven några af de närmaste stjelkbladen afvissnade. De äga emellan sig på dessa formers normala växtplatser m. l. m. utdragna mellanleder.

Endast, som förut redan nämts, på solöppnare och derjemte denuderade växtplatser äro deras och en del af de egentliga stjelkbladens mellanleder m. l. m. starkt förkortade. Här kvarsitta de äfven ofta vid blomningen utan att afvissna. (Detta händer deremot sällan med de första om hösten utvecklade bladen i de basala rosetterna hos *Vulgata*, utan äro dessa om våren nästan alltid bortvissnade, hvarvid endast de inre 3—5, som motsvara de nedre stjelkbladen hos *Rigida*, bli kvar.) Sällan och mestadels under milda höstar utveckla sig en del af de för öfvervintring anlagda knopparne. I detta fall bildas små rosetter af spadlika till tunglika blad med starkt förkortade internodier. Härigenom komma de nedre bladen på följande års stjelk att sitta omedelbart vid stjelkbasen. De nyssnämda rosetternas blad vissna vanligen genast på våren. Som alla stjelkbladen äga förmåga att i sina veck anlägga knoppar, af hvilka ofta en större eller mindre del af de öfre utvecklas i tur och ordning nedåt, blir inflorescensen oftast obegränsad, ett förhållande som inom föregående grupp nästan endast och tydligast framträder hos former af *subrigidum*-typen, hvilken morfologiskt står *rigidum*-typen nära. Jordstammen är i allmänhet svagare utbildad än hos föregående grupp, hvilket nog torde stå i samband med de tjocka och köttiga och för bevarande af upplagsnäring lämpliga öfvervintringsknopparne. Formerna af denna grupp äro eftersommars- och höstväxter. De förekomma dels på berg och klippafsatser, dels i kanten af busksnår och fördraga äfven väl en omgifvande högväxtare vegetation, detta på grund af sin morfologiska utbildning, genom hvilken de synas tillpassat sig för dylika lokaler.

Med afseende på sina slägtskapsförhållanden stå *Rigida* sannolikt emellan *Foliosa* och *Vulgata*. *H. tridentatum* är t. o. m., såsom redan antydts, en mellanlänk mellan *Rigida* och *Vulgata*, om hvilken man kan vara tveksam, till hvilkendera gruppen den verkligen bör föras.

Conspectus specierum.

A. *Involucri* parvi squamæ pauciseriales sæpius magis irregulariter imbricatæ multum et sat longe pilosæ marginibus ± anguste — latiuscule floccoso-limbatæ. *Folia caulina* sæpius valde et longe ± irregulariter et ± patenter pinnato-dentata. *Innovatio* per rosulas v. gemmas clausas. *Folia basalia* sæpe in rosulam conferta.
H. tridentatum Fr.

B. *Involucri* mediocris v. magni squamæ multiseriales sæpius regulariter imbricatæ vulgo haud multum et breviter pilosæ — epilosæ fere efloccosæ v. ubique floccosæ — stellatæ v. dorso solum stellatæ. *Folia caulina* brevius v. longius ± regulariter 3—4-dentata dentibus arrectis, angustiora. *Innovatio* per gemmas clausas. *Rosula* basalis vera numquam evoluta.
H. rigidum Hn.

H. TRIDENTATUM Fr.

H. vulgatum var. *tridentatum* Fr., Nov. 1819, p. p. — *H. rigidum* Fr., Mant. II, p. 48, p. p. — *H. tridentatum* Fr., Symb. p. 171, p. p. — *H. tridentatum* Fr., Summa Veg. Scand. p. 545, p. p. — E. Fries H. N. III: 4 sub nom. H. rigido Hn. — H. N. XII: 14 (?) — *H. rigidum* Hn. var. *tenue* Hn., Lbg. Hier. Scand. exs. n. 7 p. p. (spec. dextra a cl. E. Fries ex. Ups. missa). — H. tridentatum Dahlst., Hier. exs. fasc. III, n. 57. — Dahlst., Herb. Hier. Scand., Cent V, n. 73, 74.

Caulis strictus subcavus 50—70 ctm. altus 6—12-folius basi purpurascens ad nodos longe et sæpe sat dense pilosus, inferne densiuscule et longe medio sparsius pilosus leviter stellatus, apice subglaber rare — sparsim stellatus sub anthela sæpe subtomentellus. *Folia basalia* nunc in rosulam confertiorem v. laxam 2—4-foliam approximata nunc sub anthesi emarcida, exteriora oblonga obtusiuscula apice sæpe plicata breviter sparsim et sat late dentata v. subintegra, interiora oblongo-lanceolata — anguste v. late lanceolata sæpe ± longe acuta sparsim longius et anguste dentata, læte viridia subtus pallidiora et sæpe subglaucescentia, supra glabriuscula v. rare et breviter pilosa, subtus sparsim v. rare et molliter in nervo dorsali sat floccoso longius et crebrius pilosa, ceterum leviter stellata, marginibus breviter sparsim v. subdensiuscule ciliata, petiolis pilis tenuibus longis mollibus densiusculis v. densis obtectis; *folia caulina* superne sensim in bracteas decrescentia, infimum v. inferiora subpetiolata magna ± late — anguste lanceolata dentibus sat longis angustis 3—4 et parvis alternantibus instructa longe acuta basi ± cuneata, intermedia minora longe et ± anguste 3—4-dentata et superiora parva — minima longissime et anguste 3—4-dentata v. pectinatim subulato-dentata dentibus minimis v. parvis subulatis inter longiores immixtis in apicem longum — longissimum ± integrum acutum — cuspidatum protracta ± lanceolata — ovato-lanceolata basi breviter cuneata v. haud raro rotundato-obtusa sessilia. *Anthela* nunc laxa subsimplex paniculata nunc corymboso-paniculata ± determinata et contracta v. ramoso-paniculata indeterminata, ramis ex axillis foliorum caulinorum superiorum v. etiam ex axillis mediorum ortis aucta, ramis anthelæ gracilibus, inferioribus ± remotis erecto-patentibus sat rectis, superioribus magis et interdum multum approximatis sat patentibus, omnibus ± arcuatis tomentellis — tomentosis glabris v. breviter et sparse pilosis, pedicellis gracillimis brevibus — mediocribus acladioque (5—)15—20 mm. longo dense tomentosis pilis brevibus — brevissimis gracilibus obscuris v. dilutis densiusculis — densis glandulis parvis v. minutis nigris — dilutis inter floccos sæpe fere occultis inferne raris v. subnullis superne sparsis — densiusculis obtectis. *Involucra* parva ± gracilia pulchre atroviridi-variegata sat diluta basi ± ovata postea rotundata. *Squamæ* angustæ sublineares v. elongatæ triangulari-lanceolatæ, exteriores angustiores subpatulæ ± acutæ obscuriores, interiores e basi latiore sensim in apicem pallide viridem (v. leviter coloratum) obtusiusculum — acutum leviter comatum attenuatæ haud raro falcatæ ± late viridi-marginatæ, intimæ latæ amoene — pallide

virides pilis brevibus — brevissimis v. mediocribus basi crassiore nigra fuscis v. dilutis densiusculis — densis glandulis parvis — minutis vulgo parum conspicuis et inter pilos sæpe occultis vestitæ, dorso sparsim stellatæ, marginibus linea sparsim floccosa angusta — angustissima v. apicem versus latiore in vivo vulgo propter colorem viridem perlucentem marginis parum (in sicco magis) conspicua notatæ. *Calathidium* parvum 25—28 mm. diametro sat obscure — læte luteum sat radians. *Ligulæ* glabræ, marginales circ. 2 mm. latæ. *Stylus* subluteus (— luteus) v. ferrugineus ± fusco-hispidulus, siccus haud raro sat fuscescens.

Af våra skandinaviska *rigidum*-lika former känner jag ingen, som så väl öfverensstämmer med FRIES' *beskrifning* på *H. tridentatum* i Nov. 1819 och i Symb., Fl. sv., som denna. Ehuru den har habitus af *Accipitrina*, äger den så många karaktärer gemensamma med *Vulgata*, att den kanske snarare borde föras till denna sednare grupp. I hvilket fall som helst är den morfologiskt en mellanlänk mellan dessa båda grupper. Så synes äfven E. FRIES ha uppfattat densamma. Han för den nemligen i sina olika arbeten än till den ena än till den andra gruppen.

I Nov. Flor. svec. 1819, p. 187, ställer han den otvifvelaktigt här beskrifna formen såsom var. *tridentatum* under *H. vulgatum* och sålunda till *Vulgata*. I Nov. Flor. svec. Mant. 2, p. 49, der den kallas *H. rigidum*, synes han i hufvudsak mena samma form. Här säger han äfven att den närmar sig *H. vulgatum*, »cui flore simillima» och *H. boreale* (som här är sammanfattningen af de former, hvilka han sedan benämde *H. gothicum*), »cui herba proprior», på samma sätt som *H. diaphanum* närmar sig *H. murorum* (= *Silvatica* i detta arbete) och *H. vulgatum*. Han anger sålunda här dess medelställning. I Symb. p. 171, der arten ånyo kallas *tridentatum* men förenas med andra ej hithörande former och är ännu mera kollektiv än förut, föres den visserligen till *Accipitrina*, men här säges äfven: »Limites definiti formarum scilicet nemoralium ab H. vulgato [1] adhuc nobis sunt obscuri», och längre fram: »Formæ nemorales in H. vulgatum adire videntur», hvilken ovisshet angående formens ställning jemte sjelfva beskrifningen tyder på, att han hufvudsakligen haft just denna form för ögonen, ty om ingen af våra äkta sydsvenska *rigidum*-artade former kunna sådana uttryck användas. I Summa Veg. Scand. har arten ungefär samma omfattning som i Symbolæ. I Epicrisis, der den för öfrigt jemte *H. gothicum* m. fl. bildar en serskild undergrupp af *Accipitrina*, nämligen *Pseudopulmonaria*, under det *H. rigidum* (delvis, ty en del former af denna subsummeras här under *H. tridentatum*) föres till *Umbellata*, blir den lika om ej mera kollektiv, men äfven här tyder beskrifningen och sådana uttryck som: »Involucro subsimplici *H. vulgati* . . . . . .» etc., just på den form, för hvilken jag här behållit namnet. Det är vidare bekant (af Nov. ed. I), att formen först insamlades i Femsjö, och då den finnes i Dref i samma socken (hvarifrån jag sett exemplar, insamlade af G. E. HYLTÉN-CAVALLIUS), är detta ytterligare ett stöd för min åsigt. Som jag framhållit, passar FRIES' beskrifning i Nov. ed. I och i Symb.

[1] *H. vulgatum* är här liksom i FRIES' alla arbeten starkt kollektiv och innefattar utom den i detta arbete med namnet *vulgatum* betecknade formen äfven en mängd andra till *H. anfracti* och *H. irrigui* formgrupper hörande former. I samlingar finnas dessutom *H. stipatum* STENSTR., *H. acroleucum* STENSTR. m. fl. af FRIES bestämda till *H. vulgatum*.

till ingen annan *rigidum*-lik form så väl som till denna, hvarföre det förefaller mig alldeles tydligt, att de ursprungliga Femsjö-exemplaren alltid legat till grund för Fries' beskrifningar på denna art, oaktadt han äfven hit, såsom med många andra arter varit fallet, (i sina sednare arbeten isynnerhet) fört äfven andra heterogena former. Exemplaren i H. N. III: 4 tillhöra tydligen förhandenvarande form, deremot äro exemplaren i H. N. XII: 14 något afvikande genom svagare stjernludd på holkarne, men detta kan möjligen bero på exemplarens ålder och pressningen. Med tiden mörknar nämligen i herbarier stjernluddet hos alla Hieracier och blir då ofta svårt att märka på holkarne (äfven med tillhjelp af lup).

Jag har redan nämnt, att denna form i flera af sina karaktärer, såsom i de små och temligen fåfjälliga holkarne och de väl utbildade basalbladen, hvilka ej såsom hos de äkta *Accipitrina* nedåt småningom öfvergå i en serie allt enklare lågblad, utan hvilka tendera att sluta sig till en mer eller mindre mångbladig rosett vid stjelkens bas, i mycket erinrar om *Vulgata*. Basalbladen utbildas nämligen med temligen tvärt afbrott ur långa, tunna, fåfjälliga men temligen stora, öfvervintrande knoppar, hvilka ofta redan tidigt på hösten utveckla sig till små rosetter, väl skilda från de hos de äkta *Accipitrina* stundom proleptiskt under milda höstar ur de tjocka, mångfjälliga öfvervintringsknopparne utväxande rosetterna, hvilkas blad äro föga differentierade och alltid ha karaktär af mera utvecklade lågblad. Bladrosetten är hos ifrågavarande form, hvilken liksom många former af *Vulgata* tillhör *subrigidum*-typen, i allmänhet ej tät och mångbladig utan något gles genom de något sträckta internodierna och fåbladig. Bland gräs och högre örter uppstiga basalbladen med långa internodier m. l. m. högt på stjelken och afvissna här oftast tidigt.

Den sluter sig rätt nära till sådana former af *Vulgata* som *H. *striaticeps* Dahlst., *H. *acroleucum* Stenstr. m. fl., så att den på nästan lika starka grunder kunde betraktas som nyssnämda formgrupps mest *rigidum*-artadt utbildade form. *H. *dædalum* Stenstr., hvilken i karaktärer synes intermediär mellan *H. *acroleucum* Stenstr., om hvilken den erinrar till holkarne och ifrågavarande form, hvilken den liknar i bladform och habitus, förenar i viss grad dessa sistnämda former med hvarandra. I södra Norge finnas dessutom mycket liknande och analoga former, hvilka synas ha *H. *striaticeps* Dahlst. till utgångspunkt.

Det är derföre med stor tvekan jag för denna form till *Rigida*. I hvilket fall som helst kan den uppfattas som en tydlig medelform mellan denna grupp och *Vulgata*.

Ifrågavarande form är framförallt utmärkt genom sina ofvan ljust gröna och undertill (stundom på båda sidor) något glaucescenta blad, af hvilka de nedre på denuderade platser samlas till en glesare, sällan tätare bladrosett, hvilken utan förmedlande öfvergång af lågblad uppstår ur tunna, fåfjälliga, öfvervintrande knoppar, genom talrika, lancettlika, långspetsade stjelkblad med i hvardera kanten enbart eller kraftigare utbildade 3—4 långa, framåt eller utåtrigtade fliktänder, blandade med korta tänder, genom fina, smala grenar och korgskaft, hvilka äro glest till tätt stjernludna, de sednare ytterst kort och temligen tätt finhåriga och närmast under holkarne tätt klädda af mycket små glandler, samt genom små grönbrokiga holkar, klädda af korta m. l. m. täta hår och glesare små, eller ytterst små glandler samt sparsamt stjernludd, hvilket i kanterna af fjällen bildar en smal, men mot den blekgröna grundfärgen vanligen föga framträdande, hvitaktig strimma. Efter torkning är denna likväl stundom svår att iakttaga. På de Friesiska exemplaren i H. N. XII: 14, hvilka i allt öfrigt öfverensstämma med de här beskrifna, hvarför jag för-

modar att de äro identiska, är stjernluddet knappast eller alls ej märkbart (måhända på grund af åldern).

Stiftet är hos lefvande exemplar gult, vanligen något mörkare än ligulæ och stundom stötande i rostgult, oftast försedt med små mörka hårpapiller, hvilket gör, att det efter torkning ofta får en ganska mörk färg.

Till holkarnes utseende, indument, bladform etc. är den obetydligt föränderlig, men deremot vexlar den till habitus och till tandningens längd rätt betydligt samt i mindre grad till bladens färg och konsistens. På öppna, denuderade ställen blir den lågväxt med de nedre bladen närmade till basen och de nedersta, som här bli stora och breda, samlade till en bladrosett. Stjelkbladen aftaga hastigt i längd och bredd uppåt och äro vanligen redan från midten af stjelken små och brakteliknande. Hos kraftiga exemplar äro de äfven här visserligen rätt stora men nästan alltid smala och långt spetsade. På soliga ställen bli de styfva och fasta samt något läderartade efter torkning. Här bli bladen på öfversidan blekt gulgröna. Undertill äro de deremot hos alla modifikationer m. l. m. glaucescenta. På öppna ställen blir stjelken också mera rikt grenad och blomsterställningen sålunda m. l. m. obegränsad nedåt, isynnerhet hos odlade exemplar, hvilka oftast bli grenade ända till basen. I skugga blir växten högre och slankigare, de nedre bladen aflägsnade från hvarandra och ofta afvissnade vid blomningen, de öfre rätt breda, alla utåtrigtade, inflorescensen fåblomstrigare, mera begränsad och bladfärgen mera mörkgrön. Ibland, såsom i *Kristiania*-trakten på lerskiffer, bli bladen mörkt och något lökgrönt glaucescenta äfven på öfversidan.

Inom området är ifrågavarande form anträffad i *Småland*, Rogberga s:n, Målen (K. JOHANSSON); Dref s:n och Uppåkra i Wallsjö s:n (G. E. HYLTÉN-CAVALLIUS) samt vid Oskarshamn (K. J. LÖNNROTH).

Utom området i *Vestmanland*, Kungsör (C. O. v. PORAT): *Upland*, Upsala (E. FRIES):[1] *Dalsland*, Örs s:n (A. FRYXELL). — I *Norge* vid Kristiania flerestädes såsom vid Grönlien, på Malmön och vid Bygdö (förf.).

I Bergianska trädgården är den odlad af frön från Kristiania och Dalsland sedan 1886 och har hela tiden, under hvilken den allt som oftast sjelfsått sig, bibehållit sina karaktäristiska egendomligheter.

H. RIGIDUM (HN).

Caulis elatus strictus vulgo rigidus firmus, inferne sparsim — dense pilosus, superne sparsim pilosus — subglaber v. totus glaber lævis interdum scaber leviter stellatus v. apice ± tomentellus — tomentosus 6—15(—20)-folius. *Folia* læte viridia v. obscure subprasino-viridia, supra glabra — sparsim pilosa sæpe levissime stellulata, subtus sparsim — densiuscule pilosa haud raro glaucescentia leviter stellata, marginibus sæpius revolutis, infima minima ± spathulata et inferiora pauca ± lingulata — oboblonga ± petiolata distantia normaliter in rosulam haud approximata sub anthesi sæpius emarcida, reliqua caulina sessilia sensim decrescentia ± angusta et in apicem ± longum integrum protracta remote 3—4-dentata dentibus parvis

[1] Denna forms identitet med den här beskrifna bör ytterligare pröfvas. Möjligen är det blott en yttre likhet, hvilken föranledt FRIES att föra den till sin ursprungliga *H. *tridentatum*, med hvilken den dock, såsom jag ytterligare här vill betona, mycket nära öfverensstämmer.

— longis ± arrectis. *Anthela* ± corymboso-paniculata ramis inferioribus haud v. raro æquantibus deorsum ± indeterminata. *Involucra* mediocria — sat magna eglandulosa et epilosa v. glandulis minutis et pilis raris — frequentibus sæpius immixtis brevibus obsita efloccosa v. leviter — densius ubique v. passim floccosa, squamis multiserialibus plurimis v. exterioribus ± patulis apice recurvatis (subsquarrosis). *Stylus* niger v. ferrugineus — luteus.

Ehuru alla hitförda former habituelt synas ganska närstående, afvika ytterligheterna rätt mycket från hvarandra i en mängd karaktärer, hvarför måhända de bort fördelas åtminstone på ett par arter. Mest afvikande från de öfriga är *H. *lineatum* och *H. *melanographum*, af hvilka den förra i många afseenden närmar sig *H. umbellatum* Lbg. med närstående, den sednare i flera afseenden påminner om vissa former af *H. sparsifolium* Lbg. och till holkarne äfven om *H. crocatum* Fr. men för öfrigt i förhållande till öfriga här beskrifna former står mycket isolerad. Dessa båda borde måhända ha upptagits som skilda arter. Af öfriga former närma sig en del, t. ex. *H. *trichocaulon*, betydligt en del sydligare former af *H. sparsifolium*, i hvilken synes mig böra innefattas en serie former, hvilka på många ställen tangera *H. rigidum* och i vissa ytterlighetsformer nära gränsa intill *Vulgata*, i vissa åter till *H. umbellatum* och en del andra *Foliosa*.

Conspectus subspecierum.

A. *Folia* numquam maculata.

1. *Involucra* pilosa et glandulosa v. solum glandulosa ± floccosa v. efloccosa.

a. *Squamæ* involucri dilute atrovirides v. virescentes e floccis ubique sparsis v. vulgo frequentibus ± canescentes.

Folia læte viridia plurima longissime lanceolata et longissime attenuata acuta breviter v. longius ± æqualiter 2—4-dentata. *Squamæ* involucri sat angusti gracilis ± obtusæ — obtusiusculæ angustæ lanceolatæ ubique sparsim — frequenter marginibus paullo densius floccosæ glandulis parvis — minutis obscuris v. luteolis sæpe vix conspicuis sparsis — densiusculis et pilis vulgo brevibus raris — sparsis obsitæ.

1. *H. *mixopolium* Dahlst.

b. *Squamæ* involucri atræ v. virescentes efloccosæ v. sparsim stellatæ.

α. *Involucra* ± glandulosa et fere epilosa v. pilis ad summum glandulis numero æquantibus obsita.

Squamæ involucri crassi atroviridis v. atri ± anguste lanceolatæ obtusiusculæ — subacutæ fere efloccosæ glandulis nigris sparsis — densiusculis sat validis et pilis obscuris longioribus raris — sparsis vestitæ. *Styli* obscure ferruginei mox nigricantes. *Folia* angusta.

2. *H. *rigidum* Hn.

Squamæ involucri sat magni obscure — dilute virescentis sat latæ ± elongate triangulari-lanceolatæ ± obtusæ efloccosæ v. dorso rare stellatæ marginibus pure et dilute viridibus efloccosis glandulis gracilibus luteo- v. nigro-virescentibus sparsis et pilis mediocribus raris simplicem seriem fere formantibus obsitæ. *Styli* vulgo mere lutei. *Folia* angusta.

3. *H. *acrifolium* Dahlst.

Squamæ involucri brevis crassi dilute atrovirescentis — sat viridis latæ triangulari-lanceolatæ breves efloccosæ v. basi rarissime stellatæ glandulis minutis luteolis sparsis pilis brevissimis solitariis interdum immixtis obsitæ. *Styli* ± ferrugineo-livescentes. *Folia* sat lata brevius acuta.

4. *H. *Friesii* (Hn.).

Squamæ involucri sat magni crassiusculi ± atroviridis ± anguste lanceolatæ obtusæ — acutiusculæ efloccosæ v. basi leviter stellatæ glandulis parvis v. minutis raris — sparsis et pilis brevibus inferne sparsis superne raris — nullis obsitæ. *Styli* vulgo luteo-ferruginei. *Folia* sæpe magna sat lata longe acuta.

5. *H. *ruberulum* Dahlst.

Squamæ involucri crassiusculi sat læte atroviridis — sat virescentis ± triangulari-lanceolatæ obtusiusculæ — obtusæ efloccosæ v. basi levissime stellatæ pilis mediocribus et glandulis brevibus sparsis — densiusculis obsitæ. *Styli* vulgo ± ferruginei. *Folia* latiuscula obtusiuscula — sat acuta cum caule sat dense et longe pilosa.

6. *H. *trichocaulon* Dahlst.

β. Involucra ± dense — densiuscule pilosa rare glandulosa.

Squamæ involucri parvi mediocri atri v. atroviridis ± triangulari-lanceolatæ obtusiusculæ — subacutæ pilis longiusculis densiusculis v. densis et glandulis brevibus v. nullis obsitæ ± rare — sparsim v. ad basin et in marginibus sæpe densius stellatæ. *Pedicelli* ± pilosi. *Folia* latiora saturate viridia. *Stylus* fuscus.

7. *H. *scabrescens* K. Johanss.

Squamæ involucri mediocris sat magni crassi ± lati atri v. obscure atroviridis ± triangulari-lanceolatæ latæ obtusæ — obtusiusculæ efloccosæ v. dorso basique levissime floccosæ pilis densiusculis — densis obscuris glandulis parvis — minutis raris — sparsis obsitæ. *Pedicelli* epilosi. *Folia* angustiora ± subprasino-viridia. *Stylus* fuscoater.

8. *H. *obatrescens* Dahlst.

2. *Involucra* epilosa eglandulosa, *squamis* dorso floccis in linea angusta ± conspicua dispositis.

Caulis totus glaber et lævis. *Stylus* fuligineus.

9. *H.* **lineatum* ALMQV.

B. *Folia* supra ± maculata.

Squamæ involucri brevi nigri v. obscure atroviridis latæ latius — angustius triangulari-lanceolatæ plurimæ ± late obtusæ efloccosæ v. basi levissime stellatæ pilis crassis rigidis obscuris nigris sparsis — densiusculis et inferne glandulis crassis solitariis parum conspicuis raris obsitæ v. eglandulosæ. *Folia* lata. *Stylus* ± obscure ferrugineus.

10. *H.* **melanographum* DAHLST.

1. **H.** **mixopolium** n. subsp.

H. rigidum HN. **glareosum* LÖNNR., Resa i Smål. och på Gotl. p. 87 p. p., 1882. — H. rigidum HN. *griseellum DAHLST., Hier. exs. fasc. III, n. 58, 59 (1889).[1]

Caulis 50—90 ctm. altus gracilis — crassus ± firmus et rigidus 6—15-folius, basi v. maxima parte ± rubro-violascens, inferne pilis sparsis v. raro densiusculis obsitus leviter stellatus et scaber, superne rarius pilosus sat scaber et fere efloccosus, apice lævior et sparsim stellatus. *Folia* læte viridia, supra glabra et leviter stellulata, subtus ± glaucescentia pilis brevibus sparsis in nervo dorsali densiuscule stellato frequentioribus et longioribus obsita, ceterum sparsim stellulata marginibus revolutis breviter et sparsim pilosa scabra densiuscule stellata, infima 2—3 internodiis brevibus sæpe approximata v. sub anthesi emarcida late oblonga — oblongo-lanceolata obtusiuscula — subacuta sparsim et æqualiter ± acute denticulata in petiolis latis alatis brevibus rubro-violascentibus attenuata, subtus ± hepatico-violascentia, inferiora et intermedia longissime lanceolata quam internodia 2—4-plo longiora ad v. supra medium remote argute — subalate et sæpius minute 3—4-dentata in apicem longum integrum acutum sensim attenuata, superiora e basi latiore lanceolata basi longius et sæpe densius 2—4-dentata ± longe acuta — subulata sensim in bracteas decrescentia, omnia sæpius firma et coriacea sæpe carinata sessilia. *Anthela* nunc oligocephala simplex nunc polycephala ± composita sæpe indeterminata paniculata, interdum ramis brevibus haud multum remotis strictis sat erectis basi autem curvatis ex axillis foliorum superiorum ortis ramoso-paniculata, ramis superioribus v. omnibus multum approximatis sæpe in umbellam dispositis superantibus erecto-patentibus v. sat patentibus gracilibus basi leviter curvatis tomentellis — tomentosis fere epilosis et eglandulosis pedicellis gracillimis superantibus brevibus — mediocribus acladioque 20—30 mm. longo ± tomentosis apicibus ± incrassatis v. totis pilis mediocribus sparsis — densiusculis fuscis et glandulis solitariis — nullis v. sub involucris raris obtectis. *Involucra* atroviridia — virescentia ± canescentia sat angusta

[1] Då såväl namnet *glareosum* redan förut är användt (af KOCH, syn. ed. 2, II (1844) p. 512) som det med *griseellum* nära likljudande namnet *grisellum* (af N. et P. l. c. p. 165 sub H. Pilosella), har ett annat namn måst väljas för närbeskrifna form.

gracilia basi ovata postea rotundata. *Squamæ* angustæ imbricatæ, extimæ sublineares brevissimæ obscuræ ± patulæ, intermediæ ± angustæ et interiores late viridimarginatæ e basi latiore anguste lanceolatæ in apicem ± angustum obtusum — obtusiusculum sensim attenuatæ, ubique floccis ± sparsis v. frequentioribus ± conspicuis in marginibus sæpe paullo densius confertis leviter v. eximie canescentes et glandulis parvis — minutis obscuris v. luteolis sæpe vix conspicuis sparsis — densiusculis et haud raro pilis brevibus basi nigris apice canis raris — sparsis (— densiusculis) immixtis vestitæ. *Calathidium* sat parvum luteum ± radians. *Ligulæ* apice glabræ. *Stylus* subluteus — ferrugineus, fuscohispidulus, siccus sæpe sat fuscus.

Denna vackra form, som tillika är den mest distinkta af områdets alla *rigidum*-former, liknar något till habitus och de små, smala holkarne *H. *tridentatum* Fr., men skiljes från den genom mera blågröna, smalare blad, genom de på de tätt och fint hvitludna holkskaften nedstigande ytterfjällen, som göra holkbasen kantig och ojemn, gråaktigt gröna till svartgröna holkar, hvilkas fjäll ej äro hinnaktiga eller bleka, icke ens de innersta, hos hvilka den gröna färgen utlöper nästan ända till den jemt afsmalnande och utdragna men ej hvassa spetsen, genom de yttre och mellersta fjällens rikedom på stjernhår, som äro jemt och mer eller mindre tätt strödda öfver hela deras yta eller derjemte äro något rikligare mot kanterna, men ej som hos *H. *tridentatum* nästan uteslutande hålla sig till fjällens (hos denna) något utböjda kanter, samt de vida smalare och längre holkfjällens beklädnad af till större delen gulhufvade och små, sällan till en del (på ytterfjällen) större och mörkare glandler, hvilka mycket ofta äro nästan dolda af luddet och vanligen blandade med spridda, någon gång talrikare, korta hår, ej såsom hos *H. *tridentatum* med ofta temligen riklig beklädnad af korta till medellånga hår och inblandade, små glandler, vidare genom något större korgar och vanligen ljusare blomfärg. *H. *tridentatum* har derjemte betydligt trubbigare fjäll med blekgröna kanter och fåfjälligare holkar. Hos närvarande form äro kanterna mera orent gröna, opaka och korgarne mångfjälliga med regelbundet tegellagda fjäll. För öfrigt är den utmärkt genom sin högre, tätbladigare stjelk, med långa, i en lång helbräddad spets utdragna blad, hvilka äro betydligt längre än internodierna, kortare men smalare och skarpare tänder på de öfre bladen, hos frodiga exemplar rikgrenig inflorescens, hvars grenar äro m. l. m. utstående och ofta samlade i flock samt fina, hårlösa eller nästan hårlösa, stjernludna grenar, och endast under holkarne på några men ej alla korgskaften utvecklade, glesa, korta hår och en och annan glandel. Hos kraftiga exemplar utvecklas ofta från de öfre små bladens veck fina, vid basen bågböjda, eljest raka och nästan upprätta, fåblomstriga grenar, af hvilka de nedre sällan nå öfver de närmast öfres midt och de öfre vanligen ej räcka öfver akladiet. Späda exemplar få vanligen endast 2—3 korta korgskaft. Stjelken är oftast till eller öfver midten lifligt rödviolett, vid sjelfva basen mörkare. De nedre bladens skaft äro alltid lifligt rödvioletta och bladskifvan är vanligen undertill m. l. m. lefverfärgadt rödviolett, hvilken färg ej sällan uppträder, fastän svagare och fläckvis, äfven på de mellersta och stundom på de öfre bladen.

Bredbladigare exemplar påminna genom denna färgning och i habitus rätt mycket om *H. *ruberulum*, hvilken sannolikt är rätt nära beslägtad, men de skiljas bland annat

genom sina stjernhåriga holkar, smalare holkfjäll och finare grenar och korgskaft. Håren på holkarne variera till rikligheten och äfven till storleken såsom hos de flesta *rigidum*-former. I djup skugga saknas de nästan alldeles. På soliga ställen bli de små och föga framträdande; på friska lokaler bli de längre, mörkare och talrikare.

Då den växer på grus, får den ofta bladen samlade på stjelkens nedre del, och på dylik lokal bli de nästan elliptiskt aflånga, styfva och spröda samt på undre sidan mera glaucescenta än vanligt. På dessa liksom i allmänhet på denuderade lokaler bli ofta internodierna mellan de nedersta bladen korta, så att en falsk rosett med till marken tryckta och m. l. m. utbredda blad uppstår. På fastare mark och bland högt gräs bli bladen ofta kortare än vanligt och tätare samlade på stjelkens öfre del samt mera utstående och i kanten ofta veckade. Eljest äro bladen upprätta och långt utdragna. På serdeles gynsamma lokaler, men ofta äfven på berg, blir den ej sällan grenig ända till basen. På rhizomets öfre del uppstå ofta under mildare höstar, stundom tidigare, små bladrosetter af breda, ovala, trubbade blad, hvilka hafva korta, täta och något styfva kanthår. Detta inträffar vanligen hos former, som växa på öppna, grusiga lokaler, der förhållandena mera än annars synas gynna en proleptisk utveckling af de för arten eljest normala, tjocka och köttiga, öfvervintrande innovationsknopparne.

Inom området är denna form anträffad i *Östergötland*, Qvarsebo; Jonsbergs s:n, Gränsö (E. ADLERZ); Vestra Husby s:n, Korssäter; Gårdeby s:n, Örsby (H. STRÖMFELT); Skärkinds s:n, Halleby (M. FLODERUS); Åtvids s:n, Adelsnäs, Karstorp och Slefringe; Rinna s:n, Stortorp; Wists s:n, Sturefors; Linköping; Wreta s:n, Berg (förf.): *Småland*, Jönköping, Husqvarna (J. E. ZETTERSTEDT); Oskarshamn; Högsby s:n, Forsaryd; Madesjö s:n, Brånahult (K. J. LÖNNROTH).

Utom området i *Upland*, Löfsta s:n, Löflund vid Heby (C. A. E. LÉNSTRÖM).

2. H *rigidum* Hn.

H. rigidum Hn., Scand. fl. ed. I, p. 300 (1820). — H. rigidum Hn., Fr. Symb. p. 174, p. p.? — H. rigidum Hn., Lbg. Scand. fl. ed. 11, p. 49, p. p. — H. rigidum Hn. *α* (H. lævigatum Koch) H. N. V: 6. — H. rigidum Hn., Lbg., Hier Scand. exs., n. 76. — Dahlst., Herb. Hier. Scand., Cent. V, n. 77.

Caulis 70—90 ctm. altus rigidus firmus 7—15-folius, basi ± purpurascens pilis densis hirsutus et scaber densiuscule floccosus, medio minus pilosus sed vulgo sat scaber sat stellatus, superne subglaber leviter stellatus v. summo apice subtomentellus. *Folia* inferiora caulis numquam in rosulam approximata sed ± remota elongate lingulata denticulata basi in petiolum sat longum alatum sensim decurrentia, intermedia longa lanceolata et superiora anguste lanceolata — subovato-lanceolata, omnia sessilia basi cuneata v. ad medium remote 2—4 dentata, dentibus ± patentibus minutis — sat longis, omnia in apicem longum — longissimum acutum — cuspidatum attenuata et in bracteas inflorescentiæ sensim abeuntia, supra glabriuscula rare — sparsim stellulata, subtus sparsim in nervo dorsali densiuscule pilosa v. glabriuscula densiuscule — sparsim stellulata margine revoluto rare piloso et scabro. *Inflorescentia* corymbosa — ramoso-paniculata polycephala, ramis inferioribus

± erectis superioribus magis patentibus et valde approximatis sæpe umbellatis tomentellis, pedicellis brevibus acladioque 15—20 mm. longo canotomentosis glabris eglandulosis v. præsertim in acladio et interdum sub involucris pilis raris et glandulis solitariis obsitis. *Involucra* brevia crassa obscure atroviridia basi ovata postea rotundata. *Squamæ* exteriores atro-virescentes lineares obtusæ — obtusiusculæ patulæ, intermediæ obtusiusculæ et intimæ subacutæ angustæ lanceolatæ ± virescenti-marginatæ apicibus non comatæ sæpe coloratæ, efloccosæ glandulis nigris mediocribus sparsis — densiusculis sat validis et pilis obscuris longioribus raris — sparsis vestitæ. *Calathidium* sat obscure luteum, haud radians. *Ligulæ* glabræ nitentes. *Stylus* obscure ferrugineus fusco-hispidulus, mox sat nigricans.

Utmärkt genom sin höga och styfva, vanligen grofva och sträfva stjelk, hvilken nedtill är purpurfärgad och sträft hårig af rikliga, medellånga hår, på midten sparsamt hårig och upptill nästan glatt, för öfrigt vid basen och mot inflorescensen rikligare eljest sparsamt stjernhårig, genom vanligen rikblomstrig, oftast nedåt obegränsad inflorescens, hvars nedre grenar vanligen stödjas af små brakteliknande, vanligen föga örtbladslika blad och äro långt aflägsnade från hvarandra samt upprätta, då de öfre grenarne deremot äro tätt närmade till hvarandra, ofta flocklikt anordnade och långt öfverskjutande det vanligen mycket korta akladiet, alla svagt stjernludna och utan hår eller glandler utom på akladiet, som vanligen är klädt af tätare stjernludd och spridda hår, genom korta, hvitludna korgskaft, hvilka sakna eller hafva enstaka glandler och hår utom under holkarne, der stundom spridda eller talrikare och mörka glandler äro samlade, genom korta och ganska breda, små, grönaktigt svarta holkar med utstående yttre fjäll och klädda, isynnerhet mot basen af de yttre fjällen, af kortare och längre, spridda till talrika, svarta och vanligen ganska grofva glandler samt spridda eller enstaka, temligen grofva, mörka hår och för öfrigt alldeles saknande stjernludd utom vid sjelfva holkens bas, der det stundom uppstiger ett kortare stycke på de yttre fjällen. Holkarnes glandler och hår, hvilka jemte fjällen äro mycket glänsande, äro störst och rikligast vid basen af de yttre och mellersta fjällen samt aftaga i riklighet och storlek mot spetsarne och saknas nästan alldeles på de inres öfre delar. Fjällspetsarne sakna hårtofs och äro vanligen grönaktiga eller svagt violettfärgade. Bladen sitta ej synnerligen tätt; de nedre afvissna oftast tidigt, de mellersta äro oftast längre än internodierna men de öfre betydligt kortare. De äro vanligen ej långt tandade. Tänderna sitta till ett antal af 3—4 på hvardera sidan oftast på bladets nedre tredjedel, sällan stiga de högre upp. De öfversta af dem äro vanligen de största, isynnerhet då de sitta nära bladets midt. De äro alltid skarpa och rätt utstående. Bladen äro för öfrigt helbräddade och utdragna i en skarp spets. De nedre äro i allmänhet smalt lancettlika, de öfre ofta smalt äggrundt lancettlika med svagt rundad bas, men vanligen är basen m. l. m. vigglik. Upptill öfvergå de hastigt i inflorescensens brakteer. Ibland får ett och annat af de mellersta m. l. m. halftomfattande bas. Hårigheten är mycket sparsam utom på medelnervens undersida. På öfversidan äro bladen oftast nästan glatta. Derjemte äro de fint och temligen tätt stjernhåriga, isynnerhet på undersidan. Ej sällan är stjelken tätare bladig endast till midten, hvarefter ett långt internodium vidtager med plötsligt afbrott mellan det öfversta, tydliga örtbladet och den närmast följande, en gren stödjande, brakteen. På öfre delen af stjelken

närmast ett dylikt längre internodium äro ofta tvenne blad nästan eller helt och hållet motsatta. Stiften äro från början mörkt rostgula eller brunaktiga med mörka hårpapiller men bli vid afblomstringen nästan svartbruna. Blommornas färg är ganska mörk och glänsande. Korgarne äro små, 25—30 mm. i diameter, och temligen täta.

Att denna form är HARTMANS *rigidum* framgår såväl af lokalen och de LINDEBERGSKA exemplaren samt jemförelsen med HARTMANS originalexemplar som hans beskrifning i Skand. Fl. ed. I, der den säges ha glandelhårig holk, som eljest liknar *H. umbellati*.

Är allmän flerestädes i *Stockholms*-trakten såsom på Djurgården, straxt utanför Östermalm m. fl. st., der jag sjelf insamlat den. Dessutom anträffad på Observatoriebacken (C. HARTMAN och K. FR. THEDENIUS); Djurö (S. ALMQUIST): *Södermanland*, Södertelje (M. FLODERUS). För öfrigt funnen i *Upland*, Upsala (E. FRIES, H. N. V: 6); Steninge (M. FLODERUS). Exemplar från *Vermland*, Sjöändan nära Kristinehamn (C. M. BROSTRÖM), synas äfven höra hit.

Inom området anträffad i *Östergötland*, Jonsbergs s:n, Utterklabbarne (F. ELMQUIST); Simonstorp, Uddetorp (A. WIRÉN).

En på stjelk och blad rikligare hårig form och med något smalare, mera jemnbreda fjäll, *β attenuatum* (= H. *trichocaulon DAHLST. var. attenuatum DAHLST., Hier. exs. fasc. III, n. 65) och med fjällen klädda af blott glandler, hvilka ofta äro långa och väl framträdande, sällan med ett och annat längre inblandadt hår samt alldeles saknande glandler och hår på grenar och skaft, men i öfrigt alldeles lik hufvudformen, är anträffad i *Östergötland*, Jonsbergs s:n, Gränsö (E. ADLERZ) och i *Upland*, Vermdö (A. MAGNUSSON); Steninge s:n, Sjöändan (M. FLODERUS).

3. **H. *acrifolium** n. subsp.

H. nemophilum LÖNNR., in sched. — H. Friesii HN. var. hirsuta LÖNNR. p. p.; Resa i Smål. och på Gotl. (i Öfversigten af K. Vet. Akad. förhandl. 1882, N:o 4). — H. Friesii HN. var. saxicola LÖNNR., l. c. p. 94 (est modo forma reducta rupestris). — H. nemophilum LÖNNR., DAHLST. Hier. exs. fasc. I, n. 98. — H. acrifolium DAHLST., Hier. exs., fasc. III, n. 61, 62. — DAHLST., Herb. Hier. Scand., Cent. IV, n. 74.

Caulis 35—90(—100) ctm. altus aphyllopodus v. false phyllopodus gracilis et sæpe subflexuosus — crassus rigidus strictus (4—)5—16-folius, basi v. sæpe totus intense ± obscure v. sæpius lucide rubro-purpureus v. violascens, inferiore parte pilis mollioribus — sat rigidis sat longis mediocribus — sat parvis densis — densiusculis hirsutus v. hirtus sparsim — densiuscule stellatus, medio minus pilosus et stellatus, apice fere glaber fere efloccosus v. rare — sparsim stellatus. *Folia* ± membranacea mollia — sat firma ± obscure et pulchre gramineo-viridia, supra rarissime pilosa — glabra, subtus pallide et sæpe subglauco-viridia rare et breviter pilosa, in nervo mediano sat dense floccoso sat longe leviter — sparsim v. densiuscule pilosa, marginibus rare — sparsim v. densiuscule ciliata; *caulina* inferiora sæpius ± remota v. ad basin rosulatim congesta sæpe ± magna ± oblonga — oblongo-lanceolata v. lanceolata sparsim — rare et breviter ± obtuse — acute dentata breviter ± late alato-petiolata, superiora sensim in bracteas decrescentia ± oblonge et anguste lanceolata — lineari-lanceolata, summa magis magisque linearia, omnia ± approximata — sat remota vulgo a medio in apicem longum — longissimum ± integrum acutum

cuspidatum ± attenuata basi breviter et sparsim v. longe — longissime ± acute 3—4-dentata, superne ubique magis magisque stellata sed minus pilosa. *Anthela* simplex oligocephala — magna v. maxima polycephala ± indeterminata corymboso-paniculata, ramis infimis brevibus — brevissimis ± erectis — erecto-patentibus, intermediis magis patentibus haud v. vix æquantibus magis approximatis, summis maxime approximatis — subumbellatis ± superantibus sæpe multum patentibus leviter stellatis — subtomentellis epilosis et eglandulosis, pedicellis ± brevibus acladioque 15—20 mm. longo ± tomentosis rare pilosis et rarissime glandulosis v. etiam subglabris. *Involucra* ± obscure — dilute virescentia sat magna basi ± lata rotundata v. angustiore subovata postea sæpe valde truncata. *Squamæ* ± multiseriales sat latæ, juniores apicibus leviter retrocurvatæ ± imbricatæ, exteriores breviter interiores longius triangulari-lanceolatæ, omnes apicibus levissime comatæ ± obtusæ breviter v. sat longe protractæ, marginibus præsertim interiores pure et dilute virides nudæ, ceterum dorso floccis raris in exterioribus vulgo sparsis et glandulis ± gracilibus luteo- v. nigro-virescentibus sparsis et pilis basi nigris mediocribus raris v. subnullis fere simplicem seriem formantibus obtectæ. *Calathidium* pure et saturate luteum maxime radians — sat radians. *Ligulæ* apice glabræ. *Stylus* luteus, raro obscurius et leviter fusco-hispidulus.

Inv. $\frac{10—12}{6—8}$, D. 35—45, L. m. 2,5—3 mm.

En bland sydöstra Sveriges allmännaste och mest utmärkta *rigidum*-former, hvilken likväl, märkvärdigt nog, ej förut iakttagits af äldre författare med undantag af K. J. Lönnroth, hvilken först upptäckte och urskilde arten, ehuru han ej hann publicera densamma. Ej heller har den förut blifvit utdelad i något exsiccatverk.

Utmärkt af sin höga, mångbladiga, i skugga spädare och mera vågböjda, på öppna ställen grofva (ofta af en gåspennas tjocklek eller ännu gröfre), till hälften eller ofta helt och hållet violetta, nedtill vanligen rik- och styfhåriga stjelk, genom mestadels tunna och mjuka eller temligen fasta, utom på ryggnerven och i kanterna, der korta eller medellånga m. l. m. täta hår förefinnas, föga håriga eller nästan alldeles glatta blad, hvilka antingen alla äro vid basen glest korttandade eller de nedre nästan helbräddade till trubbtandade och de öfre vid sjelfva basen m. l. m. långt 3—4-tandade, alla mer eller mindre långt utdragna i en m. l. m. jembred, kortspetsad eller oftast småningom afsmalnande, lång och vanligen helbräddad spets, och alla stjelkbladen åtskilda eller de nedre ofta sammanträngda i en falsk rosett, men vanligen äfven de åtskilda och vid blomningen ofta afvissnade, de nedres skifva afsmalnande till ett kort vingadt skaft, de öfre deremot alldeles oskaftade, genom vanligen stora och temligen breda holkar af grön eller något svartgrön färg, på ryggen af fjällen klädda af glesa, gul- eller svartgröna, fina glandler samt vanligen få eller enstaka (stundom felande), korta, svartfotade hår jemte på midten och vid fjällens bas enstaka till spridda stjernhår, hvaremot de lifligt gröna kanterna äro glatta och alldeles utan stjernhår, samt genom vanligen glesa, stora, mörka korgar af ren färg och rent gula stift. Liksom alla *rigidum*-former öfvervintrar den med mer eller mindre köttiga och stora knoppar med tjocka, ljusa knoppfjäll. De första örtbladen äro små af m. l. m. tunglik form samt helbräddade och afvissna snart. De äro skilda af kortare eller längre internodier. De derpå följande tilltaga

hastigt i storlek och bredd, men aftaga sedan mot stjelkens spets återigen till bredden, hvaremot de tilltaga i längd. De yttre äro mer eller mindre bredt aflånga till aflångt lancettlika och sitta i förening med ett till två inre, mera utdraget lancettlika blad (isynnerhet på öppna eller mera denuderade lokaler) m. l. m. tätt, hvarigenom de bilda en falsk rosett och äro ofta då utbredda utefter marken I skugga och bland gräs äro de deremot mera och ofta långt aflägsnade från hvarandra samt afvissna stundom alldeles. De öfriga stjelkbladen äro mera aflångt jemnbredt lancettlika och ofta långspetsade samt äro vanligen, isynnerhet på skuggiga lokaler, till större delen längre än internodierna, ofta mer än dubbelt så långa. De aftaga uppåt småningom eller hastigt i storlek och bredd men öfvergå omärkligt i kvastens brakteer. På skuggiga ställen (såsom i lundar, der den helst förekommer) äro bladen äfven upptill ganska stora och äga oftast smalt jemnbred, långt utdragen spets, men äro i sjelfva spetsen hastigt hopdragna. Här äro de tunna, veka och föga håriga. På dylika ställen äro äfven korgarne ofta helt och hållet gröna. På soliga eller mera öppna ställen äro de öfre bladen små och smala och alla utdragna i en smal, ofta mycket lång, helbräddad och skarpare spets. Här blir stjelken oftast lifligt violett, nedtill mera hårig, bladen något styfvare och sträfva af rikligare hår, isynnerhet i kanterna, och holkarne ofta större och svartgröna. Hos fåblomstriga former äro holkarne oftast större än hos mångblomstrigare exemplar. För öfrigt synas oberoende häraf tvenne modifikationer förekomma, en oftast rikblomstrigare med bredare, flerfjälliga holkar af grönare färg och med mycket tvär bas samt kortare fjäll, hvilka äro klädda af fina, mera gulgröna, tätare glandler, utan eller med inblandade få, korta hår, och en annan med längre holkar, hvilka ofta äro mörkare, hafva smalare m. l. m. rundad bas och vid basen bredare, mera utdragna, färre fjäll, hvilka äro klädda af glesare, gröfre och mörkare glandler samt spridda, längre och gröfre, mörka hår. Men dessa modifikationer synas utan gräns öfvergå i hvarandra. En mycket trubbfjällig och bredbladig, i bergsspringor växande form är *var. saxicola* Lönn. l. c. En mera sträfhårig, på torrare och soligare ställen växande bergsform, är den på samma ställe af Lönnroth under namn af *H. Friesii* Hn. *β hirsutum* Lbg. upptagna formen. Bladen variera rätt mycket till tandningen, än nästan helbräddade eller försedda med några få, glesa tänder vid sjelfva basen, än vanligen upptill på stjelken (hos kraftigare former vid basen) långt och smalt, ibland något oregelbundet 2-, 3—4-tandade. På de nedre bladen är stjernluddet nästan endast inskränkt till medelnervens undersida och oftast glest eller spridt. På de öfre bladen, isynnerhet på soliga lokaler, är det rikligare och uppträder äfven på deras öfversida glest eller spridt. Holkfjällen äro något slappa och utstående, i synnerhet hos former med längre och glesfjälligare holkar, och i spetsarne svagt utböjda.

Inom området anträffad i *Östergötland*, Vestra Husby s:n, Korssäter och Ludden (H. Strömfelt); Krokeks s:n, Marmorbruket; Simonstorps s:n, Uddetorp; Vånga s:n, Grensholmen; Wreta s:n, Berg och Stjernorp; Kärna s:n, Malmen; Wists s:n, Sturefors och Wessentorp; Wäderstads s:n, Bossgård och Lindekullen: Svanshals s:n, Stora Kullen (förf.); Omberg och söder derom vid Vettern (C. J. Lindeberg); Trehörna s:n, Slangeryd (förf.); Torpa s:n, Torpa prestgård; Asby s:n, Solfarp (K. F. Dusén) och Aspa samt Marck (A. Molin); Sunds s:n, Sunds Södergård och Norrgård, Sandbäckstorp, Broby, Löfåsa m. fl. st. (förf.); Tomta vid Slättfall, Rökulla, Bodaslätt m. fl. st.; Rumskulla s:n, Gnöst; Svinhults s:n, Skuru (K. F. Dusén); Åtvids s:n, Adelsnäs, Karstorp, Slefringe och Åtvidaberg (förf.): *Småland*, Sommens jernvägsstation; Gärdserums s:n, Bossgård (förf.); Norra Sandsjö s:n,

Höganäs (C. O. v. PORAT); Rogberga s:n, Tenhult och Fagerslätt; Heljaryds s:n; Öggestorps s:n, Ljungarp och Månsarp (K. JOHANSSON); Jönköping (C. O. v. PORAT); Barkeryd s:n (A. W. JOHANSSON och G. W. MONTELIN); Bergunda s:n, Räppe (C. O. U. MONTELIN); Almvik (förf.); Westervik (A. W. LUND); Loftahammars s:n, Källvik och Lerglo (M. FLODERUS); Järeda s:n, nära Klöfdala (= H. Friesii var. saxicola i LÖNNROTHS reseberättelse); Kråksmåla s:n, mellan Tröskelås och Askemåla (K. J. LÖNNROTH); Gladhammars s:n, Thorfall; Fagerhults s:n, nära Högsby och Åshults by (H. Friesii β hirsutum i LÖNNROTHS reseberättelse) och för öfrigt enligt LÖNNROTH allmän i hela östra Småland; Kråkshults s:n, Fagerhult (A. RUDBECK); Femsjö s:n, Nyby (G. E. HYLTÉN-CAVALLIUS); Östra härad, Nye (S. LINDQUIST).

Utom området funnen i *Blekinge*, Karlskrona flerestädes (H. G. LÜBECK och F. SVANLUND); Ronnebytrakten (C. G. WESTERLUND): *Vestergötland*, Toarps s:n, Borås bygd och Kulla (A. O. OLSSON); Gustaf Adolfs s:n (K. P. HÄGERSTRÖM); Sandhems s:n, Ödegärdet (O. NORDSTEDT): *Halland*, Weinge (J. A. GABRIELSSON): *Bohuslän*, Bodeled (C. TOMSON): *Södermanland*, Stafsjö bruk (HJ. MOSÉN); Söderteljetrakten (M. FLODERUS); Allhelgona s:n, Bullersta (GUNNAR SCHOTTE).

4. **H. *Friesii** (HN.).

H. Friesii HN. Scand. fl. ed. 3, p. 187 et 4 p. 257, p. p.?[1] — H. Friesii HN. α genuinum LBG., HN. Scand. fl., ed. 11, p. 50, p. p. — H. boreale *H. Friesii HN., FRIES H. N. IX: 2. — H. Friesii HN., DAHLST., Hier. exs., fasc. III, n. 63.

Caulis 70—100 ctm. altus firmus et rigidus 10—15-folius, basi ± violascens et leviter pilosus, inferiore parte scaber rare stellatus, superne lævis fere efloccosus, apice subtomentellus. *Folia* læte viridia glaberrima v. in nervo dorsali rare pilosa, supra levissime subtus densius stellulata et glaucescenti-viridia, infima ± oblonga — oboblonga sparsim denticulata v. sub anthesi pro majore parte emarcida, inferiora ± elongate lanceolata sparsim et patule ± irregulariter acute v. subulate dentata ± acuta, intermedia ± lanceolata v. e basi latiore lanceolata ± irregulariter et argute serrato-dentata in apicem ± integrum cuspidatum cito v. sensim attenuata, omnia vulgo dense approximata et abrupte in folia summa minuta anguste ovato-lanceolata crebre subulato-dentata ± cuspidata sensim decrescentia, omnia firma et coriacea. *Inflorescentia* corymboso- v. ramoso-paniculata, ramis ex alis fol. superiorum ortis strictis haud superantibus aucta, ramis ipsius anthelæ vulgo maxime confertis et sæpe umbellate congestis patentibus longe superantibus tomentellis, pedicellis brevibus — mediocribus epilosis eglandulosis ± tomentosis et acladio tomentoso eglanduloso pilis mollibus sparsis obsito 10—15 mm. longo. *Involucra* brevia crassa vulgo dilute atro-virescentia v. sat viridia basi ovata postea ± obtusa — truncata squamifera. *Squamæ* multiseriales eximie imbricatæ, exteriores brevissimæ triangulari-lanceolatæ subpatulæ obtusæ, intermediæ et intimæ e basi latiore cito in apicem angustiorem ± obtusiusculum attenuatæ, omnes toto epilosæ et efloccosæ v.

[1] *H. Friesii* är visserligen ett namn, som i olika upplagor af HARTMANS flora betecknat olika arter, hvarföre det är svårt att afgöra, hvilken form egentligen härmed menats, men då beskrifningen afsett en form med glatt holk och till denna beskrifning rätt passande exemplar af FRIES utdelats i H. N. IX: 2 under detta namn samt då äfven C. J. LINDEBERG till sin *H. *Friesii* citerar dessa, tvekar jag ej att använda namnet för denna form. Det torde visserligen vara möjligt att *H. *lineatum* ALMQU. äfven af HARTMAN afsetts med *H. Friesii* (med all säkerhet har C. J. LINDEBERG under denna sednare äfven fört nyssnämda form).

ad basin exteriorum dorso rare stellulatæ, ceterum glandulis parvis raris et minutis luteolis nitentibus sparsis cum minutissimis immixtis obtectæ et pilis brevissimis solitariis interdum conspersæ. *Calathidium* sublæte luteum parvum parum radians. *Ligulæ* glabræ. *Stylus* ferrugineo-livescens.

Denna form, hvilken i naturen är mycket lätt att igenkänna och har ett högst karaktäristiskt utseende, står säkerligen närmast *H* **acrifolium*, med hvars mång- och bredbladigare former den har mycken habituel likhet och från hvilka den efter pressning ofta är rätt svår att skilja. Vid pressningen gå nämligen flera framträdande karaktärer förlorade, framför allt blomfärgen. Från *H.* **acrifolium* är den konstant skild genom betydligt högre och gröfre, längre uppåt storbladig stjelk med åtminstone vid midten af stjelken tätare sittande blad, genom (äfven de nedre) bladens tätare och kortare men skarpare tänder, hvilka ibland äro något oregelbundet sittande, ibland jemnare fördelade, så att kanten blir skarpt och oregelbundet sågad och hvilka sträcka sig öfver bladets midt, då deremot hos *H.* **acrifolium* tandningen är gles och vanligen lång samt mestadels inskränkt till basen och den helbräddade, nästan jemnbreda och sedan hopdragna spetsen oftast är dubbelt längre än den tandade basaldelen, genom de proportionsvis bredare bladen, isynnerhet de mellersta, hvilka äro bredt lancettlika eller smalt äggrundt lancettlika och hastigt hopdragna i en kortare, helbräddad men skarpare spets, genom den ljusare bladfärgen och vidare genom de bredare och kortare, mångfjälligare och ljusa holkarne med regelbundet tegellagda fjäll, af hvilka de yttre äro ytterst korta och något utstående och de öfriga småningom tilltaga i längd samt från bredare bas äro hastigt hopdragna i en m. l. m. trubbad, grön och hårlös spets, genom holkarnes beklädnad af öfvervägande ytterst korta, gulaktiga och glänsande glandler, hvilka äro föga framträdande men ibland, hufvudsakligast vid de yttre fjällens bas, äro blandade med några större och mörkare samt ett och annat kort hår och slutligen genom betydligt ljusare blomfärg och något grönaktigt rostgula, aldrig rent gula stift. Hos den lefvande växten är som antydts blomfärgen ett godt kännetecken. Blommorna hos denna form äro nämligen m. l. m. ljust och rent gula. Hos *H.* **acrifolium* deremot hafva de en m. l. m. stark dragning i äggult. Vidare har denna form temligen små, föga radierande korgar, hvilka deremot hos *H.* **acrifolium* äro vida och i allmänhet mycket starkt radierande. Stjelken är vanligen föga hårig utom på torrare och soliga ställen, der den på de nedersta internodierna blir rikligare hårig. På öfriga lokaler är den glattare men till midten sträf af korta hårrester och blir uppåt allt mindre och mindre sträf samt är vanligen på öfre tredjedelen alldeles hårlös och nästan hal för känseln men blir deremot under inflorescensen rikligare stjernluden. De mellersta stjelkbladen och äfven i mindre grad de små, öfre bladen, hvilka stödja de under sjelfva inflorescensen utgående, fåblomstriga grenarne, äro oftast i kanten karaktäristiskt veckade, hvarjemte skifvan är mer eller mindre vriden och utåtrigtad. Förgreningen börjar vanligen öfver stjelkens midt från axlarne af de der befintliga, smärre bladen men sträcker sig stundom hos frodiga exemplar långt ned mot basen. Grenarne nå sällan öfver midten af närmast högre sittande grenar och de öfversta äro nästan aldrig öfverskjutande den egentliga inflorescensen. Denna bildas af tätt sittande, ofta i flock ställda grenar, hvilka äro mycket utspärrade i motsats till de öfriga och långt öfverskjuta akladiet. De äro mer eller mindre

tätt stjernludna och utan glandler och hår i motsats till akladiet, som har spridda, längre hår. Stjelkbasen är oftast långt upp ljust violettfärgad och de nedre, breda, m. l. m. aflånga bladen, hvilka på denuderade lokaler ibland bli kvarsittande och till ett antal af 2—3 med korta internodier närmade till hvarandra, äro ofta mot spetsarne på båda sidor klart purpurröda men få ej den mörkt lefverfärgadt purpurröda anstrykningen, hvilken hos *H. *acrifolium* är utbredd på båda sidorna af bladen och förlänar denna på liknande lokaler ett så karaktäristiskt utseende. Sannolikt är denna form, att döma af holkarnes byggnad och det allmänna utseendet, nära beslägtad med de båda följande.

Anträffad i *Östergötland*, Åtvids s:n, Åtvidaberg flerestädes rikligt, företrädesvis på de sandiga jernvägsdoseringarne (förf.) samt i Motala s:n, Säter (A. ARVÉN): *Småland*, Taberg; Ökna s:n (O. SVANSTRÖM); Jönköping, Torp (G. LUNDBERG); Sanna (J. E. ZETTERSTEDT): *Halland*, Torpa (E. FRIES, H N. XX: 2): *Södermanland*, Allhelgona s:n, Bullersta (G. SCHOTTE).

5. **H. *ruberulum** DAHLST.

H. *glareosum LÖNNR. var. ruberulum DAHLST., apud STENSTR., Värml. Archier. (1889).

Caulis 40—90 ctm. altus rigidus firmus, inferne obscure superne sæpe supra dimidium caulis lucide purpureus, basi pilis crispulis mollibus ± adpressis raris — sparsis vestitus, medio pilis sparsis magis patentibus obsitus, apice fere glaber, inferne floccis sparsis superne densioribus sæpe in lineas dispositis obtectus, apice tomentellus — sat tomentosus, 8—20-folius. *Folia* infima sub anthesi vulgo emarcida ± remota, inferiora et intermedia magna ± late obovato-lanceolata basi sensim et longe cuneata supra medium 1—2-dentata breviter acuta v. ± lanceolata — rhomboideo-lanceolata et infra medium denticulata v. acute et anguste ± remote 1—3-dentata dentibus omnibus ± patentibus, summis paullo infra medium impositis sæpe longioribus, ± longe acuta et apice ± plicata v. in apicem longissimum integrum ± cuspidatum attenuata, superiora et summa lanceolata — lineari-lanceolata sæpe infra medium latiora basi ± inæqualiter et longe 2—3-dentata dentibus ± patentibus angustis curvatis in apicem longum — longissimum integrum cuspidatum sensim contracta, omnia basi angusta breviter — sat longe cuneata sessilia superne sensim in bracteas decrescentia, inferiora sæpe in utraque pagina superiora sæpe subtus interdum etiam supra partim rubro-violascentia, omnia supra læte viridia fere glabra densiuscule stellulata subtus nervis ruberulis v. basi stramineis firmis eximie prominentibus prædita pallidiora densiuscule — sat dense flocculosa sparsim et breviter in nervo mediano longius pilosa, marginibus revolutis ± floccosis sparsim et sat breve ciliata. *Anthela* fastigiato-paniculata ± contracta, inferne ramis brevissimis 1 — oligocephalis remotiusculis sæpe aucta, ramis summis ± dense confertis brevibus ± patentibus sat rectis v. basi leviter curvatis ± tomentosis glabris v. fere epilosis superantibus, pedicellis brevibus gracilibus apice incrassatis ± squamosis acladioque 3—15 mm. longo tomentosis pilis mollibus ± sparsis et glandulis minutis (raris —) solitariis v. nullis obsitis. *Involucra* sat magna crassiuscula ± atroviridia basi

lata ovata postea rotundato-truncata. *Squamæ* pluriseriales sat breves imbricatæ, exteriores lineares angustæ obtusæ obscuriores, intermediæ ± virescenti- et intimæ pallido-marginatæ e basi latiore anguste lanceolatæ in apicem ± angustum obtusiusculum — acutiusculum sensim et longe attenuatæ efloccosæ v. exteriores basi leviter stellatæ, pilis ± brevibus inferne sparsis superne raris glandulis parvis v. minutis inferne raris — sparsis superne frequentioribus obsitæ, interiores dorso sæpe solum glandulosæ epilosæ. *Calathidium* subobscure luteum sat radians. *Ligulæ* apice glabræ. *Stylus* ± luteo-ferrugineus fusco-hispidulus, sæpe v. postremo sat livescens.

Denna vackra form synes mig, att döma af de exemplar, jag sett, såväl habituelt som till karaktärer vara ganska väl begränsad. Dock känner jag ännu ej på grund af materialets otillräcklighet på långt när dess variationskrets och närmare slägtskapsförhållanden, hvarför sannolikt ett och annat i beskrifningen vid fortsatta fynd torde behöfva en ändring. Formerna från de olika här nedan uppgifna fyndorterna äro ej, ehuru i väsentligt öfverensstämmande, fullt lika, och måhända torde flera af dem vid fortsatta undersökningar visa sig böra afskiljas. Beskrifningen är uppgjord efter östgötska och vermländska exemplar, hvilka i allt öfverensstämma, frånsedt de smärre differenser, hvilka äro att tillskrifva ståndortens inverkan. Synes å ena sidan stå nära *H. *mixopolium*, från hvilken den dock är lätt skild genom saknaden af stjernludd på holkarne, hvilka derjemte äro större och hafva något bredare fjäll, samt genom bredare större blad af ofvantill mörkare grön och undertill föga eller ej så märkbar glaucescent färg; å andra sidan liknar den något *H. *acrifolium* och *H. *Friesii*. Från den förra, hvilken den mera närmar sig till formen på bladen (isynnerhet dess bredbladigare former) och den ofta uppträdande ehuru lifligare rödvioletta färgen på dessa och stjelken, är den skild genom bladens betydligare storlek, deras tätare ställning på stjelkens öfre del, den gröfre och nedtill betydligt sparsammare samt, kortare, mjukare och krusigt håriga stjelken, den tätare inflorescensen, de större och vanligen bredare holkarne med smalare, mera håriga och sparsammare glandelhåriga, trubbigare fjäll, hvilkas hårighet är mera utbredd mot kanterna, som äro blekgröna och prickiga, ej klart och lifligt gröna, som hos nyssnämda form, samt slutligen genom de ljusare, i mindre grad radierande korgarne och de af mörka hårpapiller orent rostgula stiften. Från *H. *Friesii* är den lätt skild genom sina mera utdragna och långspetsade blad, isynnerhet genom de öfre, hvilka äro smalt lancettlika och glessittande, och genom bladens glesare, hufvudsakligen vid basen utvecklade tänder, genom dunklare, undertill endast i ringa grad glaucescent bladfärg samt genom större och hårigare holkar med längre och mindre trubbade fjäll och något ljusare blomfärg. Den liknar äfven något *H. *trichocaulon*, men är bland annat lätt skild genom sin sparsammare hårighet och de smala bladbaserna, den sammanträngda inflorescensen, de smalare holkfjällen och de mycket ljusare korgarne. Till det yttre blir den oftast lätt igenkänlig genom den lifligt och långt upp rodnande stjelken, sina långsträckta och stora, oftast äfven m. l. m. lifligt violettfärgade blad samt den upptill hopträngda inflorescensen, hvilken nedåt ofta är obegränsad genom oftast korta, från de öfre bladvecken utgående, en- till fåblomstriga, m. l. m. upprätta grenar, och slutligen genom stora korgar och ljusa blommor.

Anträffad i *Östergötland*, Vreta s:n, Stjernorp; Trehörna s:n, Slangeryd (förf.): *Upland*, Vermdö s:n, Södernäs (A. MAGNUSSON): sydvestra *Vermland* (enl. K. O. E. STENSTRÖM).

Mycket närstående men ej fullt identiska former äro anträffade i *Upland*, Vermdö s:n, Brevik (A. MAGNUSSON); Almarestäket (M. FLODERUS). Dessa äro rikligare håriga och hafva längre upp på holkfjällen uppstigande stjernludd. På samma ställe är anträffad en mycket närbeslägtad form med högväxtare och flerbladigare stjelk, med bladen vid sin bas rikligare och mera oregelbundet tandade till smalt och långt parflikade samt med mindre, mera rent gröna holkar.

6. **H. *trichocaulon** n. subsp.

DAHLST., Hier exs., fasc. III, n. 64.

Caulis 35—90 ctm. altus crassus — crassiusculus rigidus et strictus 8—12-folius, inferne ± obscure — dilute purpurascens pilis ± longis densiusculis — densis hirsutus leviter stellatus, medio densiuscule — sparsim pilosus sparsim stellatus, apice subglaber ± floccosus — tomentellus, ad nodos etiam superne ± barbatus. *Folia* supra saturate viridia opaca v. ± adiposa sparsim pilosa — subglabra sparsim flocculosa, subtus subglaucescentia sparsim — densiuscule in nervo dorsali longe et ± dense piloso sat dense flocculosa, marginibus revolutis ± stellata scabra v. pilis sparsis raro densiusculis ciliata, inferiora 2—3 sæpe sat approximata ± oboblonga — oblonga v. obovato-oblonga sparsim denticulata — dentata v. subintegra obtusa — obtusiuscula sæpe in utraque pagina rubro-violascentia breviter et alate petiolata — late sessilia subamplectentia basi cuneata v. sæpe leviter panduræformia, intermedia ± anguste — late lanceolata basi cuneata angustiore v. haud raro subpanduræformi subamplectente sessilia, ad v. supra medium regulariter et sparsim ± acute denticulata v. subirregulariter dentata ± breviter — longe acuta, superiora ± lanceolata — ovato-lanceolata basi breviter cuneata — rotundata v. ovata sessilia v. leviter amplectentia basi denticulata v. longius et inæqualiter 3—4-dentata a medio in apicem longum — longissimum integrum acutum — subulatum sensim v. cito contracta quam inferiora magis approximata et sensim in bracteas adeuntia. *Inflorescentia* pauciflora simplex v. subcomposita paniculata v. ramoso-paniculata laxa ± indeterminata, ramis infimis sæpe a medio caulis evolutis brevibus, superioribus longis ± distantibus sat erectis strictis sæpius superantibus, summis magis approximatis et sæpe valde superantibus ± erecto-patentibus — sat patentibus ± gracilibus, subtomentellis — sparsim floccosis fere epilosis et eglandulosis, pedicellis brevibus apice ± squamosis acladioque 10—30 mm. longo ± tomentosis rare — sparsim pilosis eglandulosis v. rare glandulosis. *Involucra* mediocria crassiuscula sat lata atroviridia — sat virescentia basi ovata postea ± rotundato-truncata. *Squamæ* pluriseriales imbricatæ, omnes dorso ± atrovirescentes, exteriores ± patulæ anguste lineares v. ± triangulares breves — brevissimæ ± obtusæ obscuriores basi ± pallidæ, intermediæ ± triangulari-lanceolatæ ± anguste virescenti-marginatæ et intimæ e basi lata ± lanceolatæ ± late et pallide v. virescenti-marginatæ, omnes in apicem obtusiusculum — obtusum pallidum v. summo acumine leviter coloratum et nudum sensim v. vulgo cito contractæ, intimæ paucæ acutæ — cuspidatæ efloccosæ, v. basi

levissime stellatæ pilis sparsis — densiusculis glandulis brevibus — minutis sparsis — densiusculis obtectæ. *Calathidium* sat obscure luteum subplenum. *Ligulæ* apice glabræ. *Stylus* ± ferrugineus fuscohispidulus, siccus ± fuscescens..

En serdeles utmärkt och egendomlig form, i viss mån erinrande om en del former af *H. sparsifolium* Lbg., hvilken onekligen är nära befryndad med en del former af *H. rigidum* Hn. Isynnerhet påminner den om den i mina Hier. exs. fasc. III, n. 70 utdelade och af K. O. E. Stenström i Värml. Archier. 1889 beskrifna formen af *H. sparsifolium* Lbg., hvilken den mycket liknar till habitus och till de ofta halft omfattande eller åtminstone breda bladbaserna, men den är väl skild genom mindre rik hårighet på blad och stjelk, bredare blad med skarpare och smalare tänder och m. l. m. långt utdragen, skarp spets (ej med m. l. m. jemnbred och derpå hastigt hopdragen trubbad och kort spets som hos nyssnämnda form), genom smalare, mindre bredtrubbiga och sparsammare korthåriga men äfven glandelhåriga fjäll och mörkare blommor samt mera orent färgade stift. Den karaktäriseras framförallt genom sina nästan ovala till aflånga, breda, få och korttandade eller nästan helbräddade nedre blad, hvilka ofta än äro skaftade med korta, breda och vid basen vingade m. l. m. omfattande skaft, än nästan alldeles oskaftade och mycket omfattande, vidare genom de derpå följande bladens ofta något rhombiska eller gigliknande form, genom de öfre bladens breda och ofta äggrunda eller kort vigglika, och isynnerhet hos lågväxta former något omfattande eller åtminstone med breda fästen försedda baser samt slutligen genom inflorescensen, hvilken hos spädare exemplar är fåblomstrig, hos gröfre individ mångblomstrig och rikgrenig samt vanligen gles med upprätta eller snedt upprätta, öfverskjutande, långa grenar. Bladen äro af en karaktäristisk dunkelgrön färg, ofvantill matta eller svagt fettglänsande, undertill gråaktigt eller lökgrönt glaucescenta, och vid torkning lätt svartnande. De nedre och mellersta bladen hafva vid basen på hvardera sidan 3—4 små, glest sittande, smala och skarpa uddtänder, hvilka sällan uppstiga till bladets midt. Mången gång äro på något af bladen de öfre ensamt eller kraftigare utvecklade, hvarigenom bladet får en m. l. m. rhombisk form. I detta fall är bladet ej sällan nedom midten hopdraget och derefter till den halftomfattande basen nästan jemnbredt eller långsamt afsmalnande och ofta vid fästet m. l. m. utvidgadt. De öfre bladen äro vid sin bas hos späda exemplar kort tandade och mera lancettlika, hos kraftigare exemplar långt 3—4-tandade af utåt eller något framåtrigtade, skarpa, smalt triangulära, ofta olikstora, mera närmade tänder eller flikar. Hos dessa sednare äro bladen ofvan sin midt hastigare hopdragna i en mycket lång och skarp, helbräddad spets. Hos spädare exemplar är spetsen kortare och småningom afsmalnande. På soliga och torrare lokaler är hårigheten på örtståndet riklig och tät, på holkarne äro deremot de enkla håren sparsammare men glandlerna mera förherskande. I skugga blir örtståndets hårighet glesare, holkarnes hår deremot rikligare och längre och, derigenom att glandelhåren ofta äro små, åtminstone till utseendet talrikare än dessa. Stjelken är isynnerhet på soliga ställen nedtill lefverfärgad eller lifligt rödviolett, hvilken färg ofta uppträder äfven på de nedre bladen, starkast på undersidan men äfven, fastän fläckvis och mindre utpräglad, på de öfre bladens undersida. Ej sällan blir öfversidan af de yttre bladen helt eller delvis och spetsarne af ett och annat af de öfriga lifligt blodröd. Mycket ofta händer att några af de yttre och ibland äfven ett och annat

af de inre holkfjällen äga ojemn, buktig och något sargad kant, och ej sällan äro flera af fjällen nedtill m. l. m. ovala och äro derefter hastigt hopdragna i en smal men trubbad spets. Några af de inre fjällen äro vanligen skarpt spetsade.

Funnen inom området i *Östergötland*, Vreta s:n, Stjernorp; Åtvids s:n, Åtvidaberg, Adelsnäs, Karstorp och Slefringe ofta i stora massor på såväl öppna platser i kanten af ekbackar och busksnår, på dikeskanter m. m. som på sjelfva ekbackarne på steniga och bergiga lokaler (förf.): *Gotland*, Bunge s:n, Hultungs, en smalbladig modifikation (K. JOHANSSON): *Vestergötland*, Töreboda (A. CALLMÉ).

7. **H. *scabrescens** K. JOHANSSON in litt. n. subsp.

DAHLST. Hier. exs., fasc. II, n. 100.

Caulis 40—80 ctm. altus 7—10-folius sat gracilis — crassiusculus subflexuosus firmus et rigidus ± scabrescens, basi ± intense violaceus pilis ± densiusculis v. sparsis ± adpressis obsitus densiuscule stellatus, medio sparsius pilosus et ± floccosus, apice sat dense floccosus — tomentellus rare pilosus. *Folia* saturate viridia, supra pilis brevibus sparsis obsita — subglabra sparsim — densiuscule stellulata, subtus ± glaucoviridia pilis brevibus densiusculis et in nervo dorsali dense stellato densioribus obtecta densiuscule stellulata, marginibus scabris v. rare et breviter ciliata, infima ± oboblonga — oblongo-lingulata ± late petiolata subintegra obtusa subtus ± violascentia sub anthesi sæpe emarcida, inferiora ± lanceolato-lingulata basi rare denticulata, intermedia ± anguste lanceolata v. lineari-lanceolata ± longe acuta ad medium rare et breviter 3—5-dentata, superiora longe remota anguste lanceolata — anguste ovato-lanceolata infra v. ad medium longius et argutius ± sparse 3—5-dentata in apicem ± longum integrum acutum — cuspidatum contracta sensim in bracteas decrescentia, omnia basi anguste v. late cuneata sessilia v. haud raro ± amplectentia. *Anthela* ± paniculata v. ramoso-paniculata simplex — sat composita ± contracta — sat laxa, ramis infimis brevibus remotis superioribus ± superantibus magis approximatis ± erectis summis approximatis erecto-patentibus omnibus sat rectis vel basi leviter curvatis gracilibus tomentosis pilis mollibus sparsis — densiusculis obsitis, pedicellis brevibus gracilibus apice squamosis subincrassatis acladioque (3—)5—10(—15) mm. longo dense tomentosis et pilis mollibus vulgo densiusculis obtectis. *Involucra* parva — mediocria atra v. atro-viridia ± canescentia basi ovata postea rotundata. *Squamæ* ± irregulariter imbricatæ ± latæ, exteriores ± lineares parum patulæ obscuræ ± obtusiusculæ, intermediæ triangulari-lanceolatæ ± anguste et obscure viridi-marginatæ, intimæ lanceolatæ latius viridi-marginatæ in apicem obtusiusculum — subacutum protractæ pilis mediocribus — longiusculis densiusculis v. densis basi ± crassa nigra apice canescente glandulisque raris brevibus interdum immixtis obtectæ v. eglandulosæ basi sæpe sat dense marginibus densiuscule pulverulento-stellatæ, ceterum floccis raris v. sparsis obsitæ. *Calathidium* saturate luteum mediocre sat radians. *Ligulæ* apice glabræ. *Stylus* fuscus v. fusco-viridis.

En mycket karaktäristisk och väl utpräglad form, utmärkt genom sin höga, ej grofva, men styfva, ofta något bågböjda stjelk, hvilken öfverallt är mer eller mindre sträf af hårrester, nedtill rikligare och tilltryckt hårig samt ofta ett m. l. m. långt stycke stundom till midten lifligt rödviolett och upptill ganska tätt stjernluden, genom sina saftigt och lifligt gröna, mest på den något gråaktigt glaucescenta undersidan håriga och på båda sidor m. l. m. stjernhåriga blad, af hvilka de nedersta äro m. l. m. skaftade och af m. l. m. aflång till tunglikt-aflång form samt helbräddade, de mellersta m. l. m. smalt lancettlika, vid basen glest men skarpt korttandade, de öfre bredare eller mera äggrundt-lancettlika och vid basen längre tandade, m. l. m. spetsiga och mera aflägsnade från hvarandra samt småningom öfvergående i brakteerna, genom tätt stjernludna, gleshåriga grenar och täthårigare korgskaft samt framförallt genom mörka, än nästan svarta, än svartgröna, sma eller medelstora, rikhåriga holkar med äggrund och sedermera rundad bas, och hvilka alldeles eller nästan helt och hållet sakna glandler men hvilkas fjäll, isynnerhet de yttre, äro vid sin bas temligen tätt beströdda af stjernhår och för öfrigt i kanterna något mjöliga af sparsammare till rikligare, fint stjernludd, hvilket ibland är glest ibland något rikligare strödt äfven på deras ryggar, samt genom bruna stift och mörka blommor. Holken, som i sig sjelf är af en nästan svart till svartgrön eller mörkt grön färg, får genom de ljusa hårspetsarne och det fina stjernluddet ett egendomligt gråsvart eller grågrönt, dammigt utseende. Som det synes varierar stjernluddet något till rikligheten och ännu mera till tydligheten. Då fjällens grundfärg blir mera orent grönsvart, framträder det otydligast och synes vid första påseendet alldeles saknas, men då fjällens färg blir renare svart eller grönare är det i allmänhet synnerligen tydligt. Bäst synes det alltid på yngre holkar. Bladen variera något till bredden och betydligt till storleken samt tändernas längd. Hos späda exemplar äro de m. l. m. smalt lancettlika, åtminstone de mellersta. På soliga och torra ställen bli de kortare och något rhomboidiska. På skuggiga ställen bli de stora och tunna, ofta mycket långt utdragna i en smal, helbräddad spets, och äfven de nedre äro försedda med glesa, långa tänder eller flikar vid basen. Vanligen är kanten fint och kort glestandad till eller öfver midten och bladspetsen i allmänhet ej lång, ehuru på de öfre isynnerhet ganska skarp. På skuggigare eller friskare ställen är inflorescensen gles med längre och i toppen mera utbredda grenar. På öppna och torrare lokaler blir den sammanträngd och kortgrenig med ofta ytterst kort akladium. Vanligen är den väl begränsad nedåt, men mycket frodiga exemplar bli ej sällan greniga ända till stjelkens midt. De nedre grenarne äro vanligen korta och nå sällan öfver de närmast följandes bas eller midt. De öfversta grenarne äro alltid m. l. m. öfverskjutande akladiet och ofta tätt närmade hvarandra. Är mycket nära beslägtad med följande, till hvilken medelformer synes förekomma, men är lätt skild genom sin fåbladigare stjelk, sina i allmänhet bredare blad af mera lancettlik och mindre jembred form, sina håriga inflorescensgrenar och blott håriga eller äfven ytterst sparsamt glandelhåriga, stjernhåriga och smalare samt mindre holkar med smalare, spetsigare fjäll.

De former, hvilka synas utgöra mellanformer till följande, hafva mindre håriga inflorescensgrenar och holkar, hvilka sednare deremot äga talrikare men små glandler, isynnerhet på de nedre fjällens bas, men eljest öfverensstämma de med ofvanbeskrifna form till de smala holkarnes beklädnad af stjernhår och till de bredare bladen, hvilka till tandning och färg deremot mera erinra om följande. De äro anträffade i *Södermanland* vid

Södertelje (M. FLODERUS) och i *Upland*, Vermdö s:n, Brevik (A. MAGNUSSON). Hufvudformen är funnen mest typisk i *Småland*, Rogberga s:n, Tenhult (ymnig), Ljungarp och Månsarp (K. JOHANSSON); Visingsö (J. E. ZETTERSTEDT); Burseryds s:n, Mölneberg (K. A. TH. SETH); Femsjö s:n, Lilla Valshult (O. G. BLOMBERG); *Skåne*, Engeltofta park (B. LIDFORS).

8. **H. *obatrescens** n. subsp.

H. *pullatum DAHLST., Hier. exs., fasc. I, n. 99.

Caulis 50—90 ctm. altus crassiusculus — crassus rigidus et strictus 8—12(—15)-folius, inferne ± dilute — obscure violascens pilis longis mollibus ± patentibus curvatis densiusculis obsitus rare — sparsim stellatus, medio ± scaber v. rare pilosus sparsim stellatus, apice subglaber densiuscule stellatus. *Folia* obscure subprasino-viridia, supra fere glabra v. rare — sparsim pilifera sparsim — densiuscule stellulata, subtus glauco-prasina sparsim in nervo dorsali sæpius pallide stramineo paullo densius pilosa sparsim v. raro densiuscule stellulata, marginibus revolutis scabris pilis rarissimis ciliata, inferiora parva ± anguste oblonga — lanceolata subintegra ± obtusa — crebre et acute fere ad apicem ± acutum denticulata late et alate petiolata, intermedia elongata et ± lineari-lanceolata basi longa cuneata sessilia subamplectentia sparsim et irregulariter ± acute paullo supra medium v. ad apicem fere dentata breviter acuta v. in apicem integrum ± longum attenuata, superiora lineari-lanceolata — linearia basi abrupte cuneata v. subrotundata haud raro late sessilia (et) v. leviter amplectentia infra medium sparsim et longe ± anguste 3—4-dentata in apicem longissimum vulgo ± subulatum sensim producta superne sensim in bracteas decrescentia. *Anthela* simplex ± paniculata v. ± composita et sæpe ramoso-paniculata ± laxa, ramis inferioribus remotis brevibus ± erectis, superioribus magis approximatis erecto-patentibus cum summis sat patentibus et sæpe multum approximatis ± superantibus tomentellis fuscovirentibus, pedicellis brevibus fuscescentibus acladioque brevi 3—10(—15) mm. longo tomentosis eglandulosis et epilosis v. sub involucris pilis solitariis obsitis. *Involucra* mediocria — sat magna crassa et ± lata atra v. obscure atroviridia basi lata rotundata postea truncata. *Squamæ* latæ imbricatæ, exteriores breves angustiores triangulares obtusæ, intermediæ triangulari-lanceolatæ et intimæ paucæ acutiusculæ ± virescenti-marginatæ late lanceolatæ, omnes in apicem ± obtusum — obtusiusculum ± mucronatum cito attenuatæ, pilis mediocribus densiusculis — densis basi ± crassa nigra apice albidis et glandulis raris — sparsis parvis — minutis nigris parum conspicuis obtectæ, ceterum efloccosæ v. dorso basique leviter — levissime stellulatæ. *Calathidium* saturate luteum subplenum. *Ligulæ* apice glabræ. *Stylus* obscure fuscus — fuscoater, siccus ± ater.

Är liksom föregående, med hvilken den är närmast beslägtad, en bland områdets mera distinkta *rigidum*-former. Den utmärker sig genom sin styfva och vanligen höga, oftast rikbladiga stjelk, hvars blad äro långa, isynnerhet de mellersta och öfre med långt utdragen

spets, och öfvervägande jemnbredt lancettlika, de nedre glest, kort, till öfver midten tandade, de öfre med glesa och längre, hufvudsakligen vid bladets nedre tredjedel sittande tänder, genom ofvantill mörkt grön, i lökgrönt dragande, undertill blekare lökgrön till glaucescent bladfärg, genom m. l. m. tätt stjernludna, gråhvita grenar och korgskaft, genom svarta eller svartgröna, breda holkar med breda, nakna, eller på ryggen och vid basen svagt stjernhåriga fjäll med vanligen medelmåttigt tät beklädnad af hvitspetsade, groft svartfotade hår och inblandade, glesare små, vanligen svarta och i allmänhet föga framträdande glandler, hvilka äro talrikast förhanden på de yttre fjällens bas, samt genom mörkgula, temligen täta korgar och svartbruna eller nästan svarta stift. De nedre 1—2 stjelkbladen äro temligen korta, vanligen närmade hvarandra, till formen varierande från kort aflånga till bredt lancettlika, mer eller mindre helbräddade till utefter nästan hela längden glest och skarpt korttandade. De äro m. l. m. kort vingskaftade med skaftets bas m. l. m. stjelkomfattande. Hos högväxtare individ (bland högre gräs eller i kanten af busksnår etc.) äro de oftast liksom en del af de följande stjelkbladen vid blomningen afvissnade. Undertill äro de vanligen m. l. m. violetta, hvilken färg äfven förekommer på stjelkens nedre del och ofta sträcker sig till dess midt och ej sällan äfven uppträder på undersidan af de mellersta och öfre bladen. De mellersta bladen sitta vanligen hos fåbladiga exemplar glest, hos rikbladigare tätare, äro nästan jemnbreda och mycket långa, vanligen längre än internodierna, samt hafva långt nedlöpande, vigglik och oftast halft omfattande bas. De öfre variera från jemnbredt lancettlika eller smalt äggrundt lancettlika till liniesmala med mycket kort, vigglik eller äggrund, ibland halftomfattande bas och hafva långt utdragen, helbräddad spets. Från föregående är den lätt skild genom de i förhållande till längden smalare och mera jemnbreda, mera upprätta bladen med längre utdragen spets, den dunklare, lökgröna bladfärgen, de bredare och större, mörkare holkarne med bredare fjäll, hvilka äro klädda af något glesare men gröfre hår och något rikligare glandelhår, men deremot nästan alldeles sakna stjernludd, hvilket genom sin riklighet och egendomliga fördelning ger holkarne hos föregående form ett så karaktäristiskt utseende. Till föregående förhåller den sig ungefär som *subrigidum*-typen till *vulgatum*-typen, d. v. s. den är en ännu mera utpräglad *rigidum*-typ än denna, utan att denna sednare likväl kan sägas falla utom denna typs gränser.

Inom området är den anträffad i *Östergötland* vid Linköping; S:t Lars s:n, Ekkällan; Kärna s:n, Malmen; Väderstads s:n, Lindekullen, Bossgård m. fl. st. rikligt; Rinna s:n, Stortorp; Omberg flerestädes; Åby s:n, Vestergården; Trehörna s:n, Slangeryd; V. Ryds s:n, Krämarbo (förf.); Aspön i Vettern (C. J. LINDEBERG); Qvarsebo; Törnvalla s:n, Klinttorp (N. C. KINDBERG): *Småland*, Grenna (C. A. ANDERSSON).

Utom området i *Upland*, Vermdö s:n, Brevik (A. MAGNUSSON): *Vestmanland* vid Kungsör (C. O. v. PORAT): *Vestergötland*, Jonsered (C. J. LINDEBERG); Kinnekulle, Råbäck (E. HOLMGREN): *Vermland*, Arvika (E. HOLMGREN): *Dalsland*, Örs s:n, Åsmule (A. FRYXELL): *Bohuslän*, Kristinedal (K. FR. THEDENIUS).

9. **H. *lineatum** ALMQU.

H. lævigatum FR., Mant. II, p. 49. — H. rigidum HN. — lævigatum FR. Symb. p. 174. — H. Friesii HN. Skand. fl. ed. 3, p. 187 et ed. 4, p. 257, p. p. — H. tridentatum FR. Summa veg. scand., p. 545, p. p. — H. tridentatum FR. Epicr., p. 116, p. p. — H. rigidum HN. — lævigatum FR. H. N. IX: 3! — H. Friesii HN. *α* genuinum LBG., HN. Skand.

fl. ed 11, p. 50 p. p. — H. Friesii Hn., Lbg. Hier. Scand. exs., n. 81. — H. lineatum Almqu., Stenstr. Värml. Archier. 1889. — H. lineatum Almqu., Dahlst. Hier. exs., fasc. III, n. 68, 69.

Caulis 60—100 ctm. altus strictus v. leviter flexuosus, inferne obscure purpurascens superne viridis totus glaber et sensu lævis v. sub internodiis leviter stellatus ima basi levissime puberulus et stellulatus apice præsertim sub v. in anthela leviter stellatus — subtomentellus. *Folia caulina* infima squamiformia remota cum inferioribus caulinis ± lingulatis pedicellatis subintegris sub anthesi emarcida, *caulina* reliqua plurima 8—15 sensim in bracteas decrescentia, inferiora quam internodia longiora ± lanceolata sæpe supra medium latiora sparsim dentata v. denticulata ± acuta basi cuneata longe — longissime decurrentia, intermedia ± lanceolata — lineari-lanceolata in apicem longissimum integrum cuspidatum attenuata ad v. infra medium breviter — longissime et anguste sæpe subulate tridentata et superiora internodiis æquantia parva — minima anguste lanceolata — linearia basi latiore sessilia v. interdum ovato-lanceolata basi semiamplectentia acuta — cuspidata inferne argute 3—4-dentata, omnia sessilia, supra læte viridia glabra et præsertim superiora sparsim — densiuscule stellulato-puberula, subtus subglaucula densiuscule — dense puberulo-stellata, marginibus leviter revolutis scabriusculis. *Anthela* vulgo paniculata parva et ± contracta v. ramis brevibus mono — oligocephalis ex alis foliorum summorum ortis fastigiato-corymbosa, haud raro ramis longioribus a medio caulis evolutis maxime indeterminata et ramosa, ramis summis strictis v. leviter curvatis gracilibus ± erecto-patentibus sæpe valde approximatis mono — bicephalis pedicellis squamulosis sub involucro ± incrassatis acladioque 3—10 mm. longo sparsim — densiuscule floccosis v. sub involucris tomentellis epilosis et eglandulosis. *Involucra* sat obscura brevia crassa ± fusco- v. atro-viridia basi rotundata postremo truncata. *Squamæ* pluriseriales, exteriores brevissimæ angustæ obscuræ obtusiusculæ ± patulæ, interiores anguste lanceolatæ ± viridi-marginatæ in apicem ± piceum obtusiusculum sæpe ± mucronatum leviter attenuatæ, intimæ fere totæ sordide et obscure virescentes efloccosæ et glabræ, reliquæ dorso floccis sparsis striam dilutam ± conspicuam formantibus notatæ, glabræ v. interdum (præsertim in squam. basalibus) pilo uno alterove obscuro brevissimo obsitæ. *Calathidium* sat obscure luteum sat radians. *Ligulæ* glabræ nitentes. *Stylus* fuligineus fuscohispidulus, siccus sat obscurus.

Är måhända Skandinaviens bäst differentierade *rigidum*-form och genom sina karaktärer lätt att skilja från de öfriga. Mest utmärkande för densamma är den höga och glatta, nästan hala stjelken, som är tätt beklädd af smala, vanligen lancettlika blad, af hvilka de mellersta från kort vigglik eller tvärt hopdragen och nästan rundad bas äro nästan jemnbreda, på sin nedre del oftast med 2—3 långa och smala tänder och derpå utdragna i en mycket lång, helbräddad spets, de öfre än jemnbreda än med bredare bas, som ofta är rundad och ibland halftomfattande, och hastigt hopdragna i en ganska lång och skarp spets samt till sin nedre del vanligen rikligare än de öfriga tandade af långa, utstående tänder, alla småningom öfvergående i inflorescensens brakteer, de vanligen mörka,

svartgröna eller nästan svarta holkarne med åtminstone de inre fjällen utdragna i en smal spets, hvilken öfverskjuter de unga blommorna, alla i regeln alldeles saknande glandler och hår men klädda af sparsamma stjernhår, hvilka på fjällens midt samla sig till en tydlig, hvit strimma, de vackert och temligen mörkt gula, glänsande blommorna samt de brungula, slutligen nästan svarta eller svartbruna stiften. Stjelkens nedre blad äro vanligen af något tunglik form men kortspetsade, oftast ända till spetsen skarpt och fint tandade. Hos späda exemplar äro oftast äfven de öfre bladen till öfver midten eller nästan ända till spetsen fintandade. Hos dylika exemplar äro äfven de öfre bladen smala, nästan jemnbreda och skarpt och långt spetsade. Hos mycket grofväxta exemplar bli ej sällan de öfversta bladen äggrundt lancettlika med rundad, gerna halftomfattande bas och temligen kort spetsade. De nedre bladen hafva nästan alltid långt vigglikt nedlöpande bas. De mellersta bladen få ej sällan, då deras bas är rundad, ett ytterst kort men tydligt skaft. Hos späda exemplar blir inflorescensen fåblomstrig, vanligen med 2—3 korgar, alla på korta, mycket upprätta skaft. Hos frodiga individ blir inflorescensen rikblomstrig med upptill mera utstående grenar och ökas ofta genom ända från midten af stjelken utgående, småbladiga grenar. Ej sällan sträcker sig förgreningen ända till basen af stjelken. Denna liksom de nedre grenarnes bas är nästan alltid mörkt och lysande purpurfärgad, hvilken färg uppåt småningom öfvergår i en ljusare, klar och liflig färg.

Inom området funnen i *Östergötland*, Vinnerstads prestgård 1848 (J. E. ZETTERSTEDT).

Utom området funnen i *Helsingland*, Söderhamn m. fl. st. (A. MAGNUSSON): *Medelpad*, Indalsliden, Backe vid vägen till Sillre såg och Sillre äng samt mellan Backe och Flygge (S. J. ENANDER): *Dalarne*, Silfsbergs s:n, Skräcka (K. P. HÄGERSTRÖM): *Upland*, Löfsta s:n, Hvilstenaåsen (C. A. E. LENSTRÖM): *Vermland*, Gillberga och Borgviks socknar ymnigt (K. O. E. STENSTRÖM); Arvika (E. HOLMGREN); Väse i Norra Löfås (H. FALK): *Vestmanland*, Kungsör (C. O. v. PORAT); Arboga s:n, Assarstorp (O. G. BLOMBERG): *Södermanland*, Södertelje (M. FLODERUS); Ö. Vingåker, Forsa (INDEBETOU; H. N. IX: 3): *Vestergötland*, Toarps s:n, Gällsjö (A. O. OLSSON); Göteborg (C. J. LINDEBERG, A. P. WINSLOW); Alingsås (A. BERLIN).

En habituelt genom bredare blad och tjocka holkar med bredare, något kortare och trubbigare fjäll afvikande men eljest ej skild form är funnen i *Dalarne*, Lima s:n, Skälmo (K. P. HÄGERSTRÖM). Är utan tvifvel en af lokalen, igenlagd åker med sand- och lerblandadt underlag, framkallad frodig modifikation. De nedersta bladen äro här närmade till hvarandra till en gles rosett samt af elliptisk till aflång form, de mellersta bredt lancettlika och de öfversta äggrundt lancettlika, alla kort spetsade. Holkarne äro hos de pressade exemplaren nästan lika höga som breda.

10. **H. *melanographum** n. subsp.

Caulis 50—80 ctm. altus firmus 6—10-folius, inferne subflexuosus ± intense purpurascens lævis et glaber, medio levissime scabrescens pilis paucis obsitus, superne ad nodos ± longe et molliter barbato-pilosus, ceterum pilis mediocribus raris — sparsis obsitus, basi efloccosus medio levissime et apice sparsim floccosus — subtomentellus. *Folia* tenuia firma supra amoene et saturate viridia vulgo intense et ± dense nigro- v. purpureo-maculata rare pilifera — glabra leviter stellulata, subtus pallidiora subglaucula rare pilifera v. fere glabra in nervo dorsali sparsim longe et molliter pilosa leviter stellulata, marginibus inferne pilis raris — sparsis ± longis superne raris — subnullis ciliatis leviter stellatis, inferiora vulgo sub anthesi emarcida

v. rarius persistentia ± alate petiolata ± oblonga obtusiuscula — subacuta subintegra v. leviter denticulata, intermedia ± anguste oblonga — oblongo-lanceolata v. elliptico — rhomboideo-lanceolata denticulata v. basi cuneata dentibus paucis inæquilongis triangularibus acutis prædita v. etiam usque ad medium dentata, superiora ± late lanceolata — anguste ovato-lanceolata basi brevi cuneata — contracto-rotundata ad medium sparsim et irregulariter dentibus acutis triangularibus obsita, summa lanceolata — anguste ovato-lanceolata v. subovata basi rotundata — subtruncata inferne late 2—3-dentata v. denticulata — crebrius et irregulariter et angustius denticulata — dentata, omnia ± acuta, summa etiam subulata, infimis exceptis sessilia in bracteas sensim decrescentia. *Anthela* simplex — composita ± paniculata et determinata v. ramoso-paniculata et indeterminata contracta rarius laxior, ramis inferioribus brevibus suberectis superioribus brevibus — longioribus ± superantibus et ± patentibus basi sæpe curvatis ± tomentellis epilosis v. pilis raris obsitis, pedicellis brevibus sæpius ± curvatis apice ± incrassatis squamosis acladioque 5—20 mm. longo ± tomentosis pilis crassis brevibus — mediocribus nigris apice brevissime albidis firmis raris v. sub involucris sparsis usque densiusculis vestitis. *Involucra* brevia lata nigra v. obscure atroviridia basi lata rotundata postea subtruncata. *Squamæ* imbricatæ latæ, exteriores lineares angustiores obtusæ breviter albido-comatæ haud patulæ, intermediæ anguste triangulari-lanceolatæ in apicem angustiorem obtusum mucronatum cito contractæ interiores latissimæ lanceolatæ in apicem latum obtusum mucronatum pallide piceo-coloratum sensim attenuatæ ± sordide virescenti-marginatæ, pilis crassis rigidis mediocribus v. brevibus nigris apice breviter albidis sparsis — densiusculis obtectæ eglandulosæ v. glandulis solitariis obscuris crassis parum conspicuis ad basin squam. exteriorum interdum evolutis obsitæ et efloccosæ v. basi levissime stellatæ. *Calathidium* obscure luteum v. fere vitellinum sat plenum. *Ligulæ* apice glabræ. *Stylus* ± obscure ferrugineus, siccus obscure badio-fuscus.

En synnerligen märkvärdig och framträdande form, om hvars frändskaper jag ej kunnat bilda mig en bestämd åsigt. Då jag första gången såg den, förmodade jag på grund af dess bladform och habitus, att den tillhörde *Oreadea* och var närmast beslägtad med *H. *rufescens*. Onekligen har den också mycken likhet med vissa former af denna art, men den är bland annat vida skild genom stiftens färg och holkarnes egendomliga beklädnad. Till sina allmänna drag tillhör den nog *Accipitrina*, men den står mycket isolerad bland de sydsvenska formerna af denna grupp. Deremot erinrar den delvis om vissa nordliga former af *H. sparsifolium* Lbg. och till holkarnes form, färg och beklädnad samt fjällens bildning i ej ringa grad om *H. crocatum* Fr. och närstående. *H. *melanographum* utmärker sig förnämligast genom sin nedtill lifligt röda, glatta och hala, upptill spridt eller sparsamt, men vid bladfästena rikligare långhåriga och mot spetsen äfven m. l. m. stjernhåriga stjelk, nedåt beklädd af mera aflånga och något skaftade, uppåt af ofta bredt lancettlika, glest korttandade och mot spetsen allt kortare tandade eller ej sällan smalt äggrundt lancettlika, vid sin bas då vanligen längre tandade, oskaftade blad, hvilka utan gräns öfvergå i brakteerna och ofvantill äro lifligt gröna samt vanligen tätt betäckta med oregelbundna, svartbruna eller purpurfärgade fläckar, undertill äro blekare och något glaucescenta, ofta m. l. m.

violettfärgade samt på medelnerven och i kanterna mot basen äro m. l. m. glest långhåriga, på båda sidor fint och glest stjernhåriga, genom vanligen liten inflorescens med hvitludna grenar och skaft, de sednare beklädda med spridda, upptill tätare, tjocka och styfva, mörka, kort hvitspetsade hår, genom breda, oftast svarta holkar med breda, trubbiga fjäll, klädda af medeltäta hår af samma beskaffenhet som på korgskaften men något gröfre och längre, utan eller vid basen med blott spår af stjernludd och alldeles saknande glandelhår, samt genom nästan brandgula, temligen täta korgar och brungula till nästan svartbruna stift. Vid sjelfva basen är någon gång ett af de öfre, mera örtbladslika lågbladen kvarsittande vid blomningen. Det är vanligen litet, ovalt, trubbigt och helbräddadt. Vanligen är det jemte de derpå följande m. l. m. skaftade, i beskrifningen omnämda bladen vid blomningen afvissnadt, hvarföre stjelken oftast blir långt upp bladlös. De mellersta bladens baser äro mer eller mindre långt vigglikt nedlöpande och vid sitt fäste ofta något utvidgade och svagt omfattande. De derpå följande hafva vanligen kort vigglik eller rundad bas och de öfre hafva ej sällan nästan tvär bas. Vanligen är bladet vid insertionen smalt men ibland svagt omfattande. Än är tandningen endast antydd genom små glandeluddar, än äro tänderna större på de nedre och mellersta bladen samt då alltid triangulära och spetsiga, på de öfre någongång fast mera sällan långa, utdraget triangulära, men de äro alltid glesa och i allmänhet något framåtrigtade. Någongång och lätt att förbise förekommer en eller annan glandel eller hos frodigare individ några få, korta och grofva glandler vid holkens bas.

Anträffad i *Östergötland* på Omberg, Mullskräerna (förf.): *Småland*, Grenna, Rättle m. fl. st. på branterna i Vettersbergen (Fr. Hagström).

IV. FOLIOSA (Fr. ex. p.) Lbg.

Angående gruppens karaktärer och begränsning hänvisas till C. J. Lindebergs framställning af slägtet Hieracium i Hartmans Handbok i Skandinaviens Flora, Ed. 11, Del I, 1879, sidorna 54—57.

H. UMBELLATUM L.

Den enda inom området förekommande arten af denna grupp. Den förhåller sig till sin variabilitet ungefär på samma sätt som *H. *sabulosorum* (Dahlst. Bidr. till sydöstra Sveriges Hieracium-flora, I Piloselloidea), det vill säga den äger en stor vexling icke blott af individuella modifikationer, oberoende af ståndortsförhållandena, utan äfven af ståndortsmodifikationer och i allmänhet svagt, i olika rigtningar markerade variationer, hvilka utan gräns löpa öfver i hvarandra. I denna vexlande rikedom af obetydligt skilda former synes det dock gifvas några, hvilka äro tillräckligt utpräglade, att de torde förtjena rang af varieteter, eller af hvilka en och annan måhända kan äga underarts värde. Dock

har jag allt för litet sysslat med dem för att här våga upptaga dem och egna dem en närmare redogörelse. Jag vill blott fästa uppmärksamheten härpå, emedan det är sannolikt, att denna art i det vidsträckta område och under de olikartade förhållanden, hvarunder den förekommer, åtminstone på några ställen gifvit upphof till former af systematiskt värde, hvartill jag sett antydningar såväl inom området som utom detsamma, isynnerhet i nordligare Skandinavien.

Sålunda har jag inom området sett former med utpräglad skillnad i stiftens färg (rent gul eller grönsvart), hvilka skillnader äfven i många fall stått i ett bestämdt sammanhang med andra skillnader i inflorescensens utseende, bladens bredd etc. Detta tyder på att dessa former äga ett visst formvärde. En annan variation har jag i *Östergötland* ofta påträffat, nämligen en form med rikt (åtminstone nedtill) korthårig stjelk och tätt korthåriga blad. Denna form torde måhända vid närmare undersökning visa sig vara en varietet eller kanhända underart. Ett skäl som talar härför är äfven, att den förekommer på ganska olika lokaler med bibehållande af sina karaktärer och mången gång inblandad bland former af skiljaktigt utseende.

En mera framstående form synes vara *H. umbellatum* L. *var. dunense* Reyn. sec. Fr. Symb., utmärkt genom sitt egendomliga växtsätt, sin långt och tätt håriga stjelkbas och långhåriga nedre stjelkblad. Från *Gotland* har jag sett den typisk, men jemte den förekomma på samma lokaler analoga, små och nedliggande former, hvilka i intet annat utom habitus skilja sig från vissa högväxta fastlandsformer. Sannolikt innefattas äfven dessa af florister under samma namn. I hvilket förhållande *var. dunense* för öfrigt står till den eller de ofvannämda håriga fastlandsformerna, om den är väl skild varietet eller af lokalen beroende modifikation af densamma, vill jag lemna osagdt, då jag ej haft tillfälle att se den i naturen. Den i Fries' Symb. upptagna *var. filifolium*, om hvilken ej heller är afgjordt, huruvida den är en sjelfständig form eller modifikation af någon annan form eller om den omfattar analoga former af olika värde, har jag ej sett från området. Från *Helsinglands* och *Skånes* kuster har jag deremot sett former, hvilka torde höra dit.

För öfrigt påträffas öfverallt inom området former med vexlande bladform och tandning, med liniesmala till bredt lancettlika blad med smal eller bred bas, trubbad eller skarp spets, helbräddad eller glest och smalt fliktandad kant o. s. v. Huruvida dessa karaktärer äro konstanta och angifva bestämda former eller blott äro individuella modifikationer återstår att undersöka. Att de i många fall ej bero af ståndorten framgår deraf, att de anträffas hos former, växande om hvarandra på samma ståndort.

Hos de flesta formerna äro holkarne alldeles utan glandler och hår, men hos en del har jag påträffat glesa hår på de yttre fjällen och ibland på alla. Möjligen angifva äfven dessa karaktärer i en del fall former af systematiskt värde.

Kollektivt tagen är *H. umbellatum* utbredd öfver hela området och oftast ett bland de allmännaste Hieracia, uppträdande på lokaler af vida skiljaktig natur.

Tillägg.

Sedan mina »Bidrag till sydöstra Sveriges (Smålands, Östergötlands och Gotlands) Hieraciumflora II, Archieracia, sectio I Vulgata, subsectio Subcæsia et Subvulgata» inlemnats till tryckning, liksom äfven under och efter sjelfva tryckningen, har jag i Centurierna I, II och III (1892) samt IV och V (1893) af mitt »Herbarium Hieraciorum Scandinaviæ» utdelat en del i nyssnämnda arbete beskrifna eller omtalade former. Då dessa sålunda ej på anf. st. kunnat citeras, anser jag mig här för fullständighetens skull böra meddela en förteckning öfver desamma under hänvisning till de resp. sidorna i ofvannämnda afhandling.

Sid. 42. *H. *stenolepis* Lbg. — Dahlst. Herbarium Hieraciorum Scandinaviæ, Cent. I (1892) n. 1—4, n. 5 (forma); Cent III (1892) n. 90; Cent. IV (1893) n. 7 a & 7 b (b *obscuratum*), n. 8.

» 45. *H. *stenolepis* Lbg. *β canulum* Dahlst., Herb. Hier. Scand., Cent. I, n. 6.

» 47. *H. *coadunatum* Dahlst., Herb. Hier. Scand., Cent. III, n. 89.

» 47. *H. *oxylepium* Dahlst., Herb. Hier. Scand., Cent. IV, n. 16.

» 47. *H. *canitiosum* Dahlst., Herb. Hier. Scand., Cent. I, n. 7.

» 50. *H. *cæsiiflorum* Almqu. & Norrl. — Dahlst., Herb. Hier. Scand., Cent. I, n. 14, 15; Cent. III, n. 77—79.

» 53. *H. *sinuosifrons* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 10—13; Cent. IV, n. 14, 15.

» 55. *H. *silvaticum* L. — Dahlst. Herb. Hier. Scand., Cent. I, n. 16, 17.

» 59. *H. *acidotum* Dahlst., Herb. Hier. Scand., Cent. I, n. 18—20; Cent. III, n. 83.

» 61. *H. *prolixum* Norrl. — Dahlst.. Herb. Hier. Scand., Cent. I, n. 22; Cent. III, n. 82.

» 63. *H. *psepharum* Dahlst., Herb. Hier. Scand., Cent. IV, n. 17.

» 65. *H. *maculosum* Dahlst., Herb. Hier. Scand., Cent. III, n. 85.

» 69. *H. *triangulare* Almqu. — Dahlst. Herb. Hier. Scand., Cent. I, n. 27, 28; Cent. IV, n. 20, 21.

» 71. *H. *subtriangulare* Stenstr. — Dahlst., Herb. Hier. Scand., Cent. I. n. 26.

» 72. *H. *lacerifolium* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 29, 30.

» 80. *H. *pellucidum* Læst. — H. melanolepis, Dahlst., Herb. Hier. Scand., Cent. I, n. 31, 32.

Sid. 86. *H. *Stenstroemii* Dahlst., Herb. Hier. Scand., Cent. I, n. 33—35.
» 88. *H. *æthiops* Dahlst., Herb. Hier. Scand., Cent. I, n. 36.
» 89. *H. *serratifrons* Almqu. — Dahlst., Herb. Hier. Scand., Cent. III, n. 50.
» 89. *H. *incrassans* Dahlst., Herb. Hier. Scand., Cent. III, n. 24.
» 91. *H. *glandulosissimum* Dahlst., Herb. Hier. Scand., Cent. I, n. 38; Cent. III, n. 49.
» 92. *H. *lepistoides* K. Johanss. — Dahlst., Herb. Hier. Scand., Cent. I, n. 44; Cent. III, n. 52.
» 95. *H. *subcrassum* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 39.
» 97. *H. *meticeps* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 41.
» 99. *H. *canipes* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 42, 43; Cent. V, n. 27, 28.
» 103. *H. *caliginosum* Dahlst., Herb. Hier. Scand., Cent. I, n. 47, 48.
» 104. *H. *morulum* Dahlst., Herb. Hier. Scand., Cent. I, n. 52; Cent. III, n. 46.
» 106. *H. *subciliatum* Dahlst., Herb. Hier. Scand., Cent. V, n. 22.
» 109. *H. *ciliatum* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 58—60.
» 113. *H. *variicolor* Dahlst., Herb. Hier. Scand., Cent. I, n. 56, 57; Cent. II, n. 68; Cent. V, n. 36.
» 118. *H. *integratum* Dahlst., Herb. Hier. Scand., Cent. I, n. 54, 55; Cent. V, n. 35.
» 122. *H. *munduliforme* Dahlst., Herb. Hier. Scand., Cent. I, n. 53.
» 125. *H. *panæolum* Dahlst., f. *myrtillinum* K. Johanss. — Dahlst., Herb. Hier. Scand., Cent. I, n. 68.
» 128. *H. *torticeps* Dahlst., Herb. Hier. Scand., Cent. V, n. 32.
» 131. *H. *subulatidens* Dahlst., Herb. Hier. Scand., Cent. I, n. 64; Cent. V, n. 30.
» 133. *H. *duplidens* Dahlst. b *trilineatum* K. Johanss. — Dahlst., Herb. Hier. Scand., Cent. I, n. 65; Cent. III, n. 58.
» 142. *H. *sparsidens* Dahlst., Herb. Hier. Scand., Cent. I, n. 66; Cent. III, n. 57.
» 144. *H. *subcinerellum* K. Johanss. — Dahlst., Herb. Hier. Scand., Cent. I, n. 72.
» 149. *H. *tenebricosum* Dahlst., Herb. Hier. Scand., Cent. I, n. 73.
» 155. *H. *persimile* Dahlst., Herb. Hier. Scand., Cent. III, n. 63.
» 156. *H. *rubiginans* Norrl. — Dahlst., Herb. Hier. Scand., Cent. I, n. 47.
» 158. *H. *prætenerum* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 74—76.
» 160. *H. *aquiliceps* Dahlst. — H. aquilum Dahlst., Herb. Hier. Scand., Cent. I, n. 78; H. aquiliceps Dahlst., Herb. Hier. Scand., Cent. III, n. 62.
» 162. *H. *orbicans* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 69.
» 166. *H. *latilobum* Almqu. — Dahlst., Herb. Hier. Scand., Cent. I, n. 91, 92; Cent. V, n. 19, 20.
» 169. *H. *gracilipes* K. Johanss. — Dahlst., Herb. Hier. Scand., Cent. I, n. 99.
» 171. *H. *molybdinum* Stenstr. — Dahlst., Herb. Hier. Scand., Cent. I, n. 100.
» 174. *H. *expallidiforme* Dahlst., Herb. Hier. Scand., Cent. I, n. 93—95; Cent. III, n. 72.

Sid. 176. *H. expallidum* Norrl. — Dahlst., Herb. Hier. Scand., Cent. I, n. 97; Cent. III, n. 73.
178. *H. *scalenum* (Norrl.) — Dahlst., Herb. Hier. Scand., Cent. III, n. 75.
178. *H. *acrogymnon* G. A:n Malme. — Dahlst., Herb. Hier. Scand., Cent. I, n. 98.
178. *H. *plumuligerum* Dahlst., Herb. Hier. Scand., Cent. II, n. 1.
182. *H. *marginellum* Dahlst., Herb. Hier. Scand., Cent. I, n. 86, 87.
185. *H. *expallescens* Dahlst.. Herb. Hier. Scand., Cent. III, n. 64.
187. *H. *philanthrax* Stenstr. — Dahlst., Herb. Hier. Scand., Cent. I, n. 79—84; Cent. V, n. 45.
190. *H. *lanuginosum* Lönnr. — Dahlst., Herb. Hier. Scand., Cent. I, n. 85; Cent. III, n. 69.
192. *H. *sagittatum* Lbg. — Dahlst., Herb. Hier. Scand., Cent. I, n. 88—90; Cent. II, n. 3.

Under tryckningen af såväl ofvannämnda som nuvarande afdelning ha en del nya former tillhörande området upptäckts, hvilka jag finner mig föranlåten att här med några ord omnämna, då det torde dröja, innan jag blir i tillfälle att närmare redogöra för desamma. På samma gång begagnar jag tillfället att meddela några beriktiganden och rättelser med anledning af nya fynd, hvilka kasta ljus öfver några förut mindre noggrant kända former.

SUBCÆSIA (jfr afd. II, s. 33).

H. *penduliforme n. subsp.

Dahlst., Herb. Hier. Scand., Cent. IV, n. 18.

Caulis gracilis flexuosus parce pilosus, superne sat stellatus sparsim glandulosus. *Folia basalia* parva, exteriora ovalia — subcordato-ovalia late dentata, intermedia ± ovalia — oboblonga, intima ± lanceolata angusta acuta, crebre et irregulariter et ± argute dentata; *fol. caulina* 0—1(—2) infimum v. unicum petiolatum ± lanceolatum basi sat profunde subulato-dentatum v. lineare subintegrum, summum integrum lineare, omnia sat obscure viridia, subtus parce stellata, in nervo in marginibus et in petiolis sat dense et molliter pilosa, supra sparsim pilosa, exteriora præsertim subtus ± violascentia. *Inflorescentia* parva oligocephala (1—3) v. raro polycephala (6—8) contracta, ramis curvatis summis approximatis cum pedicellis gracilibus acladioque 5—15 mm. longo sat dense floccosis glandulis gracilibus sat densis

et pilis sparsis nigris mollibus obtectis. *Involucra* parva angusta gracilia basi ovata subdecurrente. *Squamæ* angustæ sublineares, exteriores obtusiusculæ, interiores ± acutæ ± late viridi-marginatæ ± comatæ, ubique floccis sparsis — subdensiusculis et glandulis nigris gracilibus densiusculis pilisque obscuris mollibus brevibus sparsis — sat densiusculis obtectæ. *Calathidium* parvum sat obscure luteum. *Stylus* subluteus fuscohispidulus, siccus leviter obscurascens.

Utmärkt af sina små, ganska rikhåriga, mörka, undertill m. l. m. violetta blad, sin smala korgställning och små, smala holkar med smala fjäll, de rikliga, späda glandlerna på holkar och skaft samt de fina och korta vanligen m. l. m. mörka håren. Påminner till bladen mest om *H. *pendulum* men äfven om *H. *prolixum* och isynnerhet till det inre basalbladets och stjelkbladets tandning äfven om *H. *maculosum*. Till holkarnes bekläddnad erinrar den både om *H. *pendulum* och *H. *prolixum*, hvilka utan tvifvel äro dess närmaste slägtingar.

Anträffad på *Gotland* i Lärbro s:n vid Vägome på gamla strandvallar i tallskog (K. JOHANSSON); Fleringe s:n (FR. LÖNNKVIST); Fårösund (I. TRÄGÅRDH); Slite (G. WESTERGREN).

H. EUDÆDALUM STENSTR. in litt.

Cum *H. triangulari* indumento et forma involucrorum hæc forma sat congruit, differt autem præsertim squamis latioribus obtusioribus glandulisque validioribus. Ceterum foliis basalibus longe petiolatis, exterioribus cordato-ovalibus — oblongis v. obovatis — oboblongis rotundato-obtusis late et sparsim dentatis, intermediis ovali — ovato-oblongis v. ellipticis obtusiusculis — breviter acutis basi ovato-contractis angustius dentatis dentibus basalibus ± irregularibus imis 2 fere liberis, foliis intimis ± ovato-lanceolatis acutius et magis irregulariter et profundius dentatis ± acutis, caule 1- v. etiam 2- raro 3-folio, caulino infimo ± ovato petiolato v. ± lanceolato brevius v. vix petiolato nunc densius et profundius magis irregulariter dentato nunc leviter et sparsius dentato, summo v. summis parvis angustis argutius dentatis obtusiusculis — acutis cauleque elatiore sat est insigne. *Stylus* obscurus.

Till holkarne är denna form ytterst lik *H. *triangulare*, men är lätt skild genom gröfre glandler, bredare, trubbigare och bredt grönkantade fjäll med skarpare framträdande stjernluddsrand samt glesare inflorescens med längre akladium. I anseende till de gröfre och mera bredfjälliga holkarne liknar den äfven *H. *cæsiomurorum* men saknar alldeles hår bland glandlerna. Från *H. *triangulare* är den dessutom väl skild genom smalare blad med, utom på de yttre basalbladen, hopdragen bladbas, genom mera trubbiga eller (hos de inre) kortspetsade basalblad, af hvilka flertalet ofta ha största bredden ofvan midten, genom gröfre och glesare tandning, långa bladskaft, ofta ända till 3-bladig stjelk med små blad, af hvilka endast det nedre är skaftadt, samt genom stora och mörkare gula korgar. Till de långskaftade bladen och deras form erinrar den något om *H. pancæolum*. Den bildar utan tvifvel en mellanlänk mellan de tre nu nämnda formerna, dock stående närmast

de två först nämnda, och bevisar, hur nära de formgrupper, som representeras å ena sidan af *H. triangulare* och *H. cæsiomurorum* och å andra sidan af *H. panæolum* och *H. porrigens* stå till hvarandra.

Anträffad i *Småland*, Vrigstads s:n, Stora Ekenäs m. fl. st. (G. WETTER) och i *Vermland*, Stafnäs s:n, Stömne bruk (K. O. E. STENSTRÖM).

SUBVULGATA (jfr afd. II, s. 74).

H. *meticeps ALMQU. var. **pseudometiceps** DAHLST. n. var.

DAHLST., Herb. Hier. Scand., Cent. V, n. 26.

A forma primaria foliis magis lutescenti-viridibus, subtus sæpius magis violaceis, minus inæqualiter sparsius sed acutius dentatis, folio caulino sparsius et acute sed non inæqualiter subulato-dentato, involucris brevibus crassioribus magis badiofuscis, squamis latioribus magis inconspicue viridi-marginatis apice piceis sæpius magis comatis obtusioribus, glandulis minoribus parcioribus, floccis in marginibus squam. usque ad apicem sæpius magis conspicuis ligulisque brevioribus sat recedens.

Ehuru endast genom relativa karaktärer skild från hufvudformen, är denna biform likväl såväl genom sin tydligt afvikande habitus som sin geografiska utbredning utan tvifvel att anse som en, om än i sen tid utvecklad, varietet af densamma. Bladen äro vanligen smalare, af mera gulgrön färg och oftast undertill lifligt violetta. Basen är oftast mera nedlöpande än hos hufvudformen och tandningen är glesare, oftast skarpare men mindre oregelbunden och går mindre långt upp mot spetsen. Stjelkbladet har, då det är väl utveckladt, ej den för hufvudformen egendomliga, långa och sylhvassa tandningen, utan är visserligen skarpt men mindre djupt och tätt tandadt och tänderna hafva bredare bas. Holkarna hafva alltid mera brunaktig färg, äro kortare och nedlöpa mindre tydligt på skaften. Stjernluddet i fjällens kanter är tydligare och går ofta ända upp mot de mera trubbade och tydligare hårtofsade spetsarne.

Anträffad i *Småland* i magra björkängar flerestädes vid Bordsjö i Askeryds s:n (förf.) och vid Husqvarna (C. O. v. PORAT).

H. *lepistoides K. JOHANSS. *β* **bifolium** DAHLST., n. var.

DAHLST., Herb. Hier. Scand., Cent. III, n. 53.

A forma primaria foliis basalibus brevioribus latioribus basi sæpius cordatis, foliis caulinis sæpius 2, infimo ± ovato breviter acuto basi sæpius truncata v. subhastata dentibus latioribus, involucris brevibus squamis angustioribus minus conspicue stellato-limbatis nec non ligulis brevioribus sat conspicue diversum.

Genom de bredare och kortare, mera kortspetsade bladen, hvilka oftast hafva tvär eller hjertlik till pillik bas, och de kortare holkarne får denna form ett från hufvudformen serdeles afvikande utseende. Till holkarnes beklädnad deremot förefinnes föga skillnad. Genom sina korta holkar och bredare, mera groftandade blad erinrar den rätt mycket om *H. *mundulum*, med hvilken den utan tvifvel äfven är i viss mån beslägtad. Den skiljes dock lätt genom de mera regelbundna tänderna och deras anordning, hvari dess större slägtskap med *H. *lepistoides* tydligt träder i dagen.

Anträffad i *Småland* vid Lutarp i Eksjö s:n på gräsrikare, steniga sluttningar i en löfäng (förf.). Ej långt derifrån fans typisk *H. *lepistoides*.

H. *pycnodon Dahlst.

H. murorum var. silvaticum Fr. Herb. Norm. II, n. 7.[1] — Dahlst. Herb. Hier. Scand., Cent. III, n. 70. — H. *marginellum Dahlst. var. sagittæfolium Dahlst. Bot. Not. 1892.

Såsom jag nu öfvertygat mig om, kan ej *H. *marginellum* Dahlst. *β sagittæfolium* Dahlst. l. c. skiljas från den såsom *H. *pycnodon* på anf. ställe af mig utdelade formen. Båda äga samma egendomliga, täta tandning med breda tänder, hvilkas sidor äro rundade, och hvilka isynnerhet på de yttre basalbladen följa på hvarandra utan fria mellanrum. Den förra är visserligen storbladigare med i följd deraf något mindre täta men längre tänder. Dylika exemplar påträffades dock bland normala exemplar af den sistnämde. Holkarnes beklädnad är fullkomligt densamma, dock äro hos den förra glandlerna mindre och otydligare, hvarföre den på anförda ställe beskrifvits såsom mindre glandulös än den i verkligheten är. På den småländska formen framträda glandlerna genom sin storlek bättre, hvarföre i beskrifningen bör inryckas, att de äro på skaften temligen tättsittande, hvilket äfven vid noggrannare granskning synes på östgötaexemplaren. Serdeles karaktäriska för ifrågavarande form äro de djupt och bredt tandade basalbladen med tänderna, hvilka äga konvexa sidor, oftast sittande utan mellanrum och af hvilka de yttre äro starkt tillbakaböjda, ofta krökta med små uddtänder på sin bas, de bugtiga bladkanterna och de tätt och djupt, oregelbundet inskurna inre basalbladen och stjelkbladen. Holkarne äro ljusgrå och korta med från bred bas hastigt afsmalnande fjäll, hvilka i kanten äro stjernludna och klädda af temligen rikliga, gråa hår och något sparsammare, små och fina glandler. Skaften hafva något gröfre och tätare glandler samt få eller spridda, korta, grå hår. Formen står till sina karaktärer emellan *H. *sagittatum*, *H. *expallescens* och *H. *expallidiforme* och påminner äfven något om *H. *marginellum*. Den torde lämpligast kunna placeras i närheten af *H. *expallescens* och den sistnämda. Den är utan tvifvel en lika god underart som någon af dessa, och då det i Herb. Hier. Scand. anf. st. gifna namnet bäst karaktäriserar densamma, vill jag för densamma behålla namnet *H. *pycnodon*.

Anträffad i *Östergötland*, Ödeshög s:n, mellan Öninge och Orrnäs (G. A:n Malme): *Småland*, Femsjö s:n, Elmås (E. Fries); Eksjö s:n, mellan Brevik och Kyringstorp på öppna steniga ängsbackar (förf.); Smedstorp (G. Wetterhall): *Öland*, Borgholm och Borgehage (C. Nordström): *Blekinge*, Mörrum (A. Karlsson).

Utom området funnen i *Vestergötland* vid Hjelmared nära Alingsås (K. O. E. Stenström).

[1] Åtminstone i Riksmuseets exemplar.

CÆSIA (jfr afd. III, p. 4).

H. *grophosum Dahlst. & K. Johanss., n. subsp.

Dahlst., Herb. Hier. Scand., Cent. IV, n. 19.

Ab *H. *exaltato*, cui habitu est sat similis, hæc forma differt foliis basalibus sparsius magis regulariter et minus profunde dentatis magis obscure viridibus, folio caulino sparsius v. saltim minus profunde dentato, involucris crassioribus obscurioribus glandulis validioribus atris sparsis v. subdensiusculis pilis brevibus obscuris v. apice breviter albidis crassis sparsis — subdensiusculis floccis ubique sparsis v. ad basin squam. exteriorum subdensis in marginibus inferne crebrioribus superne sparsioribus sed vulgo conspicuis obsitis, pedicellis albido-floccosis superne subdense glandulosis et parce pilosis squamisque latioribus, extimis et intermediis obtusiusculis — sat obtusis, intimis ± acutis, omnibus dorso apiceque ± piceis.

Står ganska nära *H *exaltatum*, men är från denna lätt skild genom sin mörkare grönska, glesare eller åtminstone kortare tandade basalblad, antingen kortare tandade eller med något olikstora men på långt när ej så långa tänder som hos den nyssnämda försedda stjelkblad, af hvilka blott vanligen ett enda är utveckladt, mörkare holkar med bredare, i spetsen tjärfärgade fjäll, som liksom holkskaften äro klädda af tätare och större glandler och i allmänhet kortare, tjockare och mörkare samt glesare hår med oftast kort, hvit spets, och för öfrigt genom större och mörkare korgar. Bladen variera från elliptiska eller bredt lancettlika till aflångt lancettlika med glesare och bredare eller tätare och smalare, alltid i en skarp och lång glandeludd utlöpande tänder. Har till holkarne flera likheter med *H. *penduliforme* och motsvarar måhända såsom *cæsium*-form denna *silvaticum*-artadt utbildade form.

Anträffad under ett par år på *Gotland* vid Lilla Gåsemora nära Ava på Fårö (K. Johansson).

H. *meridionale n. subsp.

Dahlst., Herb. Hier. Scand., Cent. IV, n. 25.

Ab *H. *constricto* Norrl. v. *H. *gravastello* Dahlst., quibus est valde similis, hæc forma differt involucris angustioribus sed vulgo majoribus, squamis paucioribus latioribus magis obtusis ± anguste ovato-lanceolatis marginibus convexis (nec triangulari-lanceolatis) præsertim ad basin magis conspicue et late floccoso-limbatis pilis tenuioribus glandulis minoribus ligulisque saturatius coloratis latioribus et dentibus brevioribus latioribus instructis. Caule ceterum sæpe bifolio folio infimo petiolato, foliis basalibus 2—3 ± elliptico-lanceolatis — ovato-lanceolatis obtusis v. intimo breviter acuto sparsim et breviter dentatis, caulinis ± ovatis acutis sparsim et acute ad basin sæpe longe et subinæqualiter dentatis apice longo integro nec non inflore-

scentia ± paniculata subcontracta ramis acladium 10—30 mm. longum paullo superantibus sat diversum.

Denna form är ganska anmärkningsvärd för sin nära slägtskap med *H. *sagittatum*, hvars motsvarande *cæsium*-form den utan tvifvel är. Denna slägtskap framträder tydligt i holkarnes utseende. Båda formerna äga samma utseende på fjällen, hvilka äro ovanligt breda samt äga konvexa sidor och trubbiga spetsar. Beklädnaden är också i hufvudsak densamma, ehuru håren äro rikligare och glandlerna färre hos *H. *meridionale* i full öfverensstämmelse med förhållandet hos andra *cæsium*-former. Holkarne äro äfven gröfre. Den är äfven intressant i ett annat afseende, emedan den och *H. *gravastellum* samt *H. *constrictum*, hvilka möjligen blott äro tvenne raser af samma form och hvilka såsom *cæsium*-former motsvara *H. *expallidiforme*, äro de enda *cæsium*-artadt utbildade paralellformer till former af *Subvulgata*. De bevisa, att de hårigare formerna af denna formgrupp, hvilket för öfrigt antydes i flera af deras karaktärer, stå ganska nära vissa former af *Subcæsia*. Öfriga former af *Subvulgata* ha i allmänhet *vulgatum*-artadt eller t. o. m. *subrigidum*-artadt utbildade paralellformer.

Anträffad på *Gotland* i Vestkinde s:n vid Skäggs (K. JOHANSSON) och i *Södermanland* i Lilla Malma s:n nära Grindskogen (J. MALM).

H. *chondrodes DAHLST.

Såsom jag genom sednare undersökningar öfvertygat mig om är *H. cæsium* FR. *β chondrodes* DAHLST., p. 14, alldeles identisk med den såsom *H. metaliceps* K. JOHANSS. *β lageniceps* K. JOHANSS. sid. 122 urskilda formen, för hvilka båda sålunda namnet *chondrodes* bör bibehållas. De af LÖNNROTH samlade exemplaren, åt hvilka jag gaf detta sednare namn, äro former, vuxna på solöppna lokaler. Hos dessa framträder i hög grad likheten med *H. cæsium*. Hos de af JOHANSSON samlade exemplaren, som växt inuti och i kanten af buskmark, är likheten mindre i ögonen fallande. Emellertid torde att döma af flera beaktansvärda likheter hela artgruppen *H. lepidotum* vara närmare beslägtad med *Cæsia* än med *Vulgata genuina*, hvarpå äfven följande form tydligt antyder.

H. *submetaliceps DAHLST. n. subsp.

DAHLST., Herb. Hier. Scand., Cent. IV, n. 13.

Habitu cæsiiforme. *Caulis* 1-phyllus, inferne sat dense pilosus ceterum fere glaber, apice magis floccosus. *Folia basalia* 2—3, extimum ovato-oblongum obtusum, reliqua ± ovato-lanceolata — lanceolata parce late et breviter dentata acuta; caulinum ± ovato-lanceolatum sessile basi cuneata sparsim irregulariter longe et acute dentatum apice acuto — cuspidato, omnia supra glabra sæpe obscure maculata, subtus in nervo dorsali ± stellata et in marginibus sparsim pilosa, in petiolis pilis frequentioribus longis mollibus obsita. *Inflorescentia* furcato-paniculata ramis sat erectis acladium 10—15 mm. longum ± longe superantibus, inferne sparsim superne

densius stellatis et pilis sparsis basi crassa nigra apice longo albo obtectis eglandulosis v. apice glandulis solitariis obsitus. *Involucra* mediocria sat angusta e plumbeo viridi-nigrescentia basi ovato-turbinata postea ovata. *Squamæ* latæ basi lata cito in apicem ± acutum attenuatæ, dorso marginibusque præsertim ad basin floccis sparsis inæqualiter adspersis, pilis densiusculis basi crassa nigra et apice longe albidis glandulisque parvis sparsis obtectis. *Calathidium* mediocre sat læte luteum. *Stylus* obscurus.

Liknar habituelt *H. cæsium* Fr., isynnerhet smalbladiga exemplar af densamma, men har glesare tandning och mera gröna blad samt är framförallt skild genom sina smalare holkar med mera hopdragen bas, de bredare och hastigt afsmalnande, äfven i sjelfva spetsarne något luddiga fjällen och sina mörka stift. Är att anse såsom en med *H. *metaliceps* och *H. *chondrodes* beslägtad, *cæsium*-artadt utbildad form, som står närmast den sednare, från hvilken den är skild genom sina mörka, gröna, glestandade blad, sin *cæsium*-artade habitus, de mörkare holkarne med smalare bas och bredbasiga holkfjäll samt holkarnes om *H. *caligatum* eller *H. *subnævosum* påminnande beklädnad. Till holkarnes och fjällens form liknar den mycket den sistnämnda men är fullkomligt skild genom bladens olikartade tandning.

Funnen på *Gotland* vid Bjerges på en solbelyst grusvall (K. Johansson).

VULGATA GENUINA (jfr. afd. III, p. 63.).

H. *cunctans K. Johanss. in litt.

Dahlst., Herb. Hier. Scand., Cent. IV, n. 37.

Inflorescentia *H. *smolandico*, caule foliisque *H. subramoso* var. *xanthostylo* sat simile. Ab illo differt involucris crassioribus, squamis latioribus intimis clare viridi-marginatis, glandulis densiusculis, pilis brevibus obscuris apice breviter albidis floccis ad margines squam. exteriorum et ad apices interiorum ubique sparsis obsitis styloque obscuro sicco fere nigro, ab hoc autem caule elatiore, foliis basalibus minus dentatis, caulinis (numero 2—3) magis angustis ± æqualiter et longe pinnato-dentatis supra medium sæpius latioribus omnibus minus pilosis est distinctum.

Står ganska nära de nyssnämnda formerna och kan tillsvidare jemte *H. *smolandicum* föras under *H. *macrotonum*. Från båda är den dock skild genom sina mörka stift och sina bredare och mera rent grönkantade fjäll. Påminner i detta afseende om vissa till *H. *anfractum* hörande former, bland annat om *H. *chlorodes*.

Funnen i *Småland* vid Tahe m. fl. st. i Månsarps s:n, samt på Taberg (K. Johansson).

H. *bathylepium Dahlst., afd. III, p. 142.

Till denna form hör den i mitt »Herb. Hier. Scand.», Cent. V, n. 35 under namnet *H. *oinopolepis* utdelade formen från Tenhult i Småland (samlad af K. Johansson).

H. PARDALINUM Dahlst. n. sp.

Dahlst., Herb. Hier. Scand., Cent. III, n. 100.

Caulis altus — elatus rigidus et strictus, inferne v. interdum totus leviter flexuosus ± violascens 5—10-folius, inferne sat densiuscule pilosus, superne parce v. ad basin foliorum densius pilosus, apice fere glaber et leviter floccosus. *Folia basalia* sub anthesi rarius 3—5 in rosulam congesta v. vulgo magis remota et sæpe emarcida ± late — anguste lanceolata, nonnulla interdum supra medium latiora, exteriora obtusiuscula, reliqua ± acuta in petiolum mediocre — breve ± longe descendentia æqualiter et argute dentata, subtus ± violascentia; *caulina* sensim in bracteas adeuntia per caulem æqualiter dispersa internodia ± æquantia v. rarius paullo longiora, inferiora ± anguste ovato — obovato-lanceolata breviter acuta, superiora lanceolata — ovato lanceolata magis acuta, omnia infimo v. infimis 2 sæpe ± petiolatis exceptis sessilia, supra glabra ± fusco-maculata, subtus in pagina sparsim in nervo dorsali præsertim ad basin pilis mollibus sat longis densius obsita, in margine sparsim et molliter ciliata v. pilis abortivis scabriuscula, efloccosa v. summa in nervo dorsali parce floccosa, omnia ± crebre subæqualiter et argute dentata. *Inflorescentia* 3—7-cephala parva contracta simplex — composita sat determinata, ramis et pedicellis brevibus rectis acladium 5—10 mm. longo paullo v. vix superantibus dense albido-floccosis glandulis parvis lutescentibus sparsis et pilis albidis raris v. solitariis (præsertim v. solum in acladio evolutis) obtectis. *Involucra* brevia plerumque crassiuscula atro-viridia v. sat virescentia basi ± rotundata. *Squamæ* ± latæ imbricatæ, exteriores subtriangulares obtusæ, intermediæ et interiores e basi lata sensim in apicem obtusum v. obtusiusculum — subacutum attenuatæ, intimæ ± acutæ, pleræque ± late viridi-marginatæ glandulis sat longis parvis et minutis immixtis ± lutescentibus densiusculis obtectæ. *Calathidium* parvum sat obscure luteum. *Ligulæ* angustæ. *Stylus* luteo-ferrugineus.

En synnerligen distinkt och isolerad form, hvars slägtskapsförhållanden ännu äro mig oklara, utmärkt af sitt *rigidum*-artade utseende, sina jemt och skarpt tandade, ofvan oftast rikligt mörkfläckiga blad och sin korta, hopträngda inflorescens med grönsvarta holkar, hvilkas breda och öfvervägande trubbade fjäll äro klädda af oliklånga, gulaktiga glandler utan stjernludd och hår men med rikliga »mikrotricher» i de inre fjällens breda gröna kanter, samt genom små korgar med i rostgult dragande stift.

På grund af bladform, tandning, holkfjällens beklädnad m. m. är den tydligen att räkna till gruppen *Vulgata*. Möjligen är den att anse såsom aflägset beslägtad med de

mera *rigidum*-artadt utbildade formerna af *H. porrigens*. Likheten med dessa former i afseende på holkarnes beklädnad, stiftfärgen m. m. är ganska stor. Denna likhet kan likväl måhända endast vara tillfällig, hvarföre jag föredrar att uppställa den som egen art.

Anträffad på *Gotland* först af K. J. LÖNNROTH i en lund nedanför Gerungs i Rute s:n på solbelyst och stenig mark och sedermera på en mager, sandig, af gles björk och hassel bevuxen sluttning i kanten af en skog vid Risungs i nyssnämnda socken af K. JOHANSSON.

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Index alphabeticus nominum partium I, II et III.

Namnförteckning

till delarne I, II och III.

Nomina typis variis impressa ordinem systematicum significant, hac ratione:
De olika typer, hvarmed namnen äro tryckta, angifva gruppernas och formernas olika systematiska värde sålunda:

Subsectiones,
Species,
Subspecies,
Varietates,
Synonyma.

HIERACIUM.

A.

B.

C.

D.

R.

S.

T.

U.

V.

KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR Bandet 26 N:o 4.

ZUR

PALÄOZOISCHEN FLORA

DER

ARKTISCHEN ZONE

ENTHALTEND

DIE AUF SPITZBERGEN, AUF DER BÄREN-INSEL UND AUF NOVAJA ZEMLJA VON DEN SCHWEDISCHEN EXPEDITIONEN ENTDECKTEN PALÄOZOISCHEN PFLANZEN.

VON

A. G. NATHORST.

MIT 16 TAFELN.

DER K. SCHWEDISCHEN AKADEMIE DER WISSENSCHAFTEN VORGELEGT DEN 7. JUNI 1893.

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INHALT.

EINLEITUNG.

Die erste Angabe über das Vorkommen paläozoischer Pflanzenfossilien auf Spitzbergen verdanken wir E. Robert, der einen 1838 in Belsound entdeckten Abdruck erwähnt, welcher nach der Bestimmung Adolphe Brongniart's wahrscheinlich »à la famille des gigantesques lépidodendrons» gehören dürfte.[1] Die Abbildung lässt über die Richtigkeit der Bestimmung kaum einige Zweifel übrig, da aber sämmtliche von Nordenskiöld und Blomstrand 1858 und 1861 auf Spitzbergen untersuchten Kohlenlager sich als tertiär erwiesen hatten, sprach Heer[2] die Vermuthung aus, dass das vermeintliche *Lepidodendron* wahrscheinlich ein Farnstrunk sei, dies um so mehr, als die von Robert als *Calamites* und *Sigillaria* angeführten Stücke nicht zu diesen Gattungen gehören könnten.[3] Auch Nordenskiöld hatte die Robert'sche Angabe in Zweifel gezogen und zwar auf solche Weise, dass er eine Verwechselung mit Versteinerungen aus einem anderen Lande vermuthete.[4]

Während der schwedischen Polarexpedition 1868 wurde auch die Bären-Insel (Beeren Eiland) zwischen Norwegen und Spitzbergen besucht. In Verbindung mit dem dortigen Kohlenlager fanden Nordenskiöld und Malmgren eine grosse Menge von Pflanzenfossilien, welche sich als der Steinkohlenformation angehörig erwiesen, und welche in einer besonderen Arbeit von Heer beschrieben wurden.[5] Die von ihm und Nordenskiöld früher ausgesprochene Vermuthung, dass auch die Kohlenlager der Bären-Insel tertiär seien, hatte sich daher als unrichtig erwiesen, und noch bevor Heer diese Arbeit abgeschlossen hatte, empfing er die Nachricht, dass während des Sommers 1870 wirkliche Steinkohlenpflanzen auch auf Spitzbergen von H. Wilander und mir entdeckt waren, eine Entdeckung, welche er in seiner fossilen Flora der Bären-Insel in einem Zusatze kurz erwähnt. Die betreffenden Steinkohlenpflanzen aus Spitzbergen sind später von Heer in einer besonderen Arbeit beschrieben.[6] Dann wurde 1873 von Nordenskiöld die Steinkohlenflora

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[1] E. Robert, Géologie et minéralogie, p. 91. Texte, vol. 5 und Atlas, Géologie, I, pl. 19, fig. B. in Gaimard, Voyages en Scandinavie, en Laponie au Spitzberg et aux Feröe.

[2] Heer, Flora fossilis arctica. Vol. 1. Zürich 1867. S. 34—35.

[3] »Was aber als *Calamites* oder *Sigillaria* bezeichnet ist, hat mit diesen Gattungen nichts gemein» (Heer, l. c. S. 35). Diese Bemerkung ist ganz richtig.

[4] Nordenskiöld, Utkast till Spetsbergens geologi. Svenska Vet. Akad. Handlingar. Bd 6, N:o 7. S. 15 und 30. Stockholm 1867.

[5] Heer, Fossile Flora der Bären Insel. Svenska Vet. Akad. Handlingar. Bd 9, N:o 5. Stockholm 1871. Auch in Flora fossilis arctica, Vol. 2.

[6] Heer, Beiträge zur Steinkohlenflora der arktischen Zone. Svenska Vet. Akad. Handlingar. Bd 12, N:o 3. Stockholm 1874. Auch in Flora fossilis arctica. Vol. 3. Wird beim Citiren im Folgenden als Heer, Steinkohlenflora etc. bezeichnet.

im Roberts-Thal, an der Recherche-Bay, auf Spitzbergen entdeckt und seiner Zeit von HEER bearbeitet.[1] Endlich hat dieser auch die von NORDENSKIÖLD im Sommer 1875 auf Novaja Zemlja zusammengebrachten paläozoischen Pflanzenfossilien in einem kleinen Aufsatze[2] besprochen.

Die geologische Expedition an die Westküste Spitzbergens, welche 1882 von mir und G. DE GEER unternommen wurde,[3] war für unsere Kenntniss ihrer paläozoischen Flora nicht ohne Erfolg. Es wurden nämlich mehrere neue Lokalitäten mit Steinkohlenpflanzen entdeckt, dann fand ich zum ersten Mal auch Pflanzenfossilien in den devonischen Lagern (des Liefde-Bay-Systems), und endlich konnten wir konstatiren, dass die pflanzenführenden Lager im Roberts-Thal ihren scheinbaren Platz über den marinen Permocarbonlagern durch eine Inversion bekommen hatten. Auch jene Lager gehören demzufolge zur selben Stufe wie die übrigen, und nicht, wie HEER seiner Zeit angenommen hatte, zur produktiven Kohlenformation. Es giebt daher nur eine Stufe im Carbon Spitzbergens, welche Pflanzenfossilien geliefert hat, und zwar liegt dieselbe unter den marinen Permocarbonlagern. Doch kommen wahrscheinlich in dieser Stufe verschiedene Horizonte von untergeordneter Bedeutung vor, eine Frage, deren Untersuchung noch übrig bleibt, welche aber durch die Aufrichtung der Lager und durch die dabei stellenweise entstandene Zerquetschung der weichen pflanzenführenden Schiefer etc. etwas erschwert ist.

Leider war es 1882 infolge ungünstiger Witterungsverhältnisse nicht möglich die Bären-Insel zu erreichen, obschon wir zwei Versuche dort zu landen machten. Ich muss dies sehr lebhaft bedauern, da zweifelsohne das Auffinden vieler Pflanzenfossilien dieser sehr interessanten Flora zu erwarten stand und es vielleicht möglich gewesen wäre, neue pflanzenführende Horizonte daselbst zu entdecken. Wie wir im Folgenden sehen werden, ist nämlich die fossile Flora der Bären-Insel von der Spitzbergens ziemlich verschieden, so dass sie nicht als gleichaltrig angesehen werden können. 1892 wurde die Insel gelegentlich von Herrn AXEL HAMBERG besucht, welcher dann einige wenige Pflanzenfossilien sammelte, von denen ein paar Stücke recht interessant sind und welche im speciellen Theile dieser Arbeit erwähnt werden.

Es war ursprünglich meine Absicht, nur die neuentdeckten Arten der paläozoischen Flora Spitzbergens zu beschreiben. Bei der Vergleichung mit den schon von HEER beschriebenen Sammlungen, erwies es sich aber durchaus nothwendig, auch diese einer Revision zu unterwerfen, und vorliegende Arbeit enthält dementsprechend ein Verzeichniss sämmtlicher bisher auf Spitzbergen, auf der Bären-Insel und auf Novaja Zemlja von den schwedischen Expeditionen gesammelten paläozoischen Pflanzen. HEER hatte insofern unter ungünstigen Verhältnissen gearbeitet, als er nicht gleichzeitig alle Materialien vergleichen konnte, und seine Bestimmung der Pflanzenfossilien des Roberts-Thals wurde auch durch die Angabe NORDENSKIÖLDS beeinflusst, dass dieselben einer von den unteren

[1] HEER, Beiträge zur fossilen Flora Spitzbergens. Svenska Vet. Akad. Handlingar. Bd 14, N:o 5. Stockholm 1876. Auch in Flora fossilis arctica. Vol. 4. Wird beim Citiren im Folgenden als HEER, Beiträge etc. bezeichnet.

[2] HEER, Über fossile Pflanzen von Novaja Semlja. Svenska Vet. Akad. Handlingar. Bd 15, N:o 3. Stockholm 1878. Auch in Flora fossilis arctica. Vol. 5.

[3] A. G. NATHORST, Redogörelse för den tillsammans med G. DE GEER år 1882 företagna geologiska expeditionen till Spetsbergen. Bihang till k. svenska Vet. Akad. Handlingar. Bd 9, N:o 2. Stockholm 1884.

Lagern weitaus getrennten Abtheilung des Carbon-Systems angehörten. Dazu kommt noch, dass wir während der zwischenliegenden Jahre durch die Arbeiten von Stur, Weiss und Solms in Oesterreich und Deutschland, von Zeiller und Renault in Frankreich, von Kidston in Schottland und England viele neue Aufschlüsse über die entsprechenden Pflanzenformen Europas bekommen haben. Schon aus diesem Grunde erwies sich eine Revision der älteren Bestimmungen mit Rücksicht auf den gegenwärtigen Standpunkt der Wissenschaft als wünschenswerth. Beim vorliegenden Versuche dieselbe auszuführen habe ich, soweit es nöthig war, auch mehrere der Heer'schen Originale wieder zeichnen lassen. Es soll endlich nicht unerwähnt bleiben, dass ich mehrere wichtige Aufschlüsse sowie Vergleichsmaterial von Herrn Robert Kidston in Stirling erhalten habe, wofür ich ihm hier meinen herzlichsten Dank ausspreche.

Sämmtliche Originale der in dieser Arbeit beschriebenen Arten sind in der paläophytologischen Abtheilung des naturhistorischen Reichsmuseums in Stockholm aufbewahrt. Dieselbe enthält folglich die ganze bisher bekannte paläozoische Flora der arktischen Zone, mit alleiniger Ausnahme der spärlichen Reste, welche von M'Clintock auf der Melville-Insel gesammelt wurden, und welche im ersten Bande der Flora fossilis arctica von Heer beschrieben sind.[1]

[1] Ich lasse hier ausser Betracht die noch sehr zweifelhaften Reste aus dem nordwestlichen Alaska, welche von Göppert (Abhandl. d. schles. Ges. für vaterl. Kultur für 1861, S. 204) und Eichwald (Geogn. paleont. Bemerkungen über die Halbinsel Mangischlak und die Aleut. Inseln. S. 114. St. Petersburg 1871) erwähnt worden sind.

I. Die paläozoische Flora Spitzbergens.

Kurze Übersicht des geologischen Baues von Spitzbergen.[1]

Die geologischen Systeme, welche auf Spitzbergen auftreten, sind: Grundgebirge, Hekla-Hook-System, Devon (Liefde-Bay-System), Carbon, Perm, Trias, Jura, Tertiär und Quartär. Von diesen sind nur das Grundgebirge und das Hekla-Hook-System gefaltet. Was das Alter des letztgenannten betrifft, so dürfte es am wahrscheinlichsten entweder präkambrisch oder kambrisch sein. Es wird von Quarziten, Thonschiefern, Glimmerschiefern, Kalksteinen (mitunter bituminös), Dolomit u. s. w. aufgebaut, und die Gesteine erinnern in der That an gewisse Ablagerungen in den skandinavischen Hochgebirgen, von welchen sie wahrscheinlich die Fortsetzung gegen Norden darstellen. Man hat bisher umsonst nach Versteinerungen im Hekla-Hook-System gesucht, auffallend ist jedoch das Vorkommen bituminöser Kalksteine (Stinkkalk), welche ich 1882 im Safe-Haven entdeckte. Man fragt sich natürlich, ob das betreffende System nicht sogar das ganze metamorphosirte Silursystem darstellen könnte, eine Frage, welche noch nicht zu entscheiden ist. Es ist aber dabei zu bemerken, dass die devonischen Lager in der Dickson-Bay, welche *Pteraspis* und *Cephalaspis* oder *Acanthaspis* geliefert haben,[2] und welche nach Lankester entweder zum oberen Silur oder zum unteren Devon gehören dürften, doch bei weitem nicht die untersten Lager des ganzen Liefde-Bay-Systems darstellen. Es ist demzufolge nicht umöglich, dass wir in diesen das oberste Silur zu suchen haben, was erst durch eine Untersuchung der westlichen Seite der Wijde-Bay, wo ich nicht selbst gewesen bin, ermittelt werden kann.

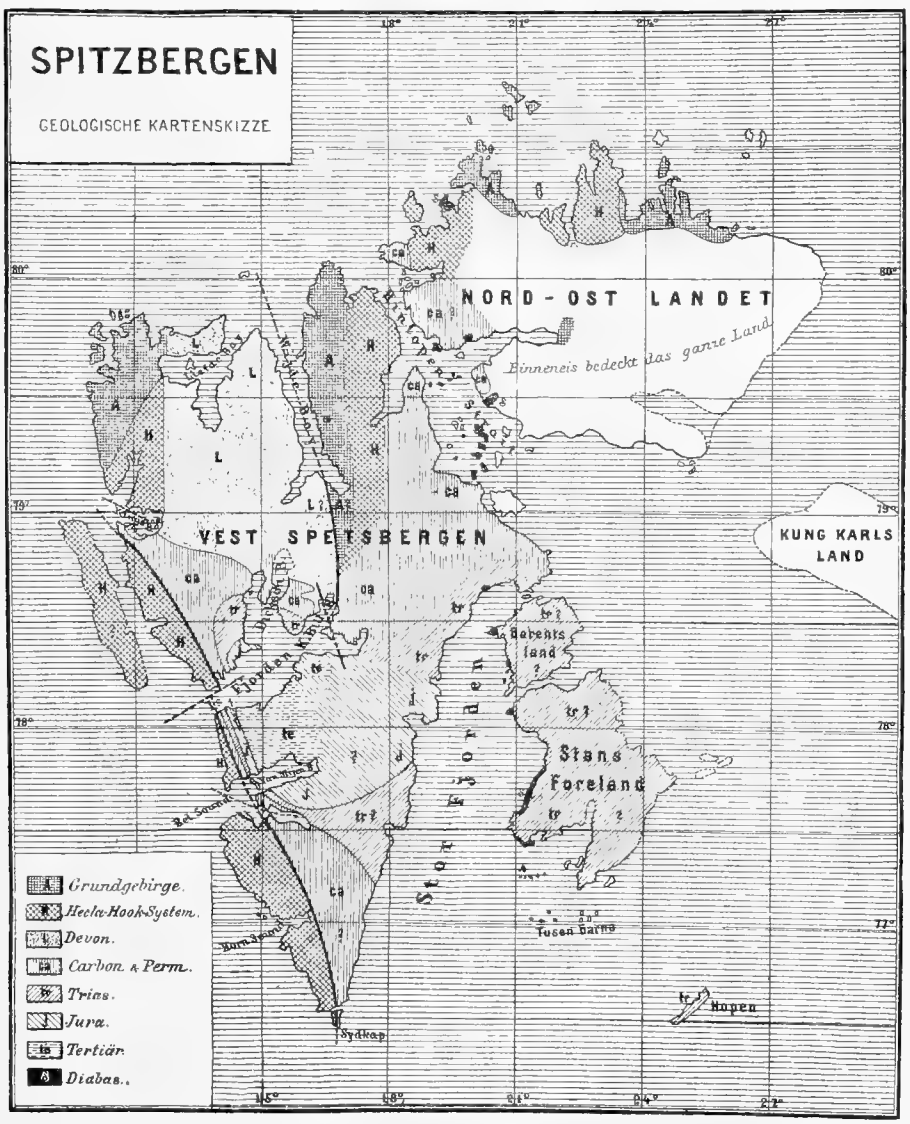
Wie schon oben erwähnt, sind nur das Grundgebirge und das Hekla-Hook-System gefaltet. Wenn daher alles Übrige Tafel ist, so soll damit nicht gesagt werden, dass Störungen hier fehlen. Vielmehr ist längs dem Westrande alles steil aufgerichtet, mitunter sogar umgebogen, und zwar einer gewaltigen Flexur zufolge, welche meistens zu einer Verwerfung mit geschleppten Flügeln entwickelt ist. Die Westküste Spitzbergens stellt demgemäss einen

[1] Eine ausführliche Darstellung der Geologie Spitzbergens wird in einer demnächst zu erscheinenden Arbeit gegeben werden.

[2] E. Ray Lankester, Report on fragments of fossil fishes from the palæozoic strata of Spitzbergen. Svenska Vetenskaps-Akademiens Handlingar, Bd 20, N:o 9. Stockholm 1884.

A. Smith Woodward, The devonian fish-fauna of Spitzbergen. Ann. Mag. Nat. Hist. July 1891.

vom Hekla-Hook-System aufgebauten Horst dar, gegen welchen die jüngeren Ablagerungen mit Inbegriff des Tertiärs aufgerichtet sind. Hier kommen selbstverständlich auch lokale Faltungen und Quetschungen vor. Sobald man sich aber vom Westrande in das Innere des Landes begiebt, werden die Lager allmählich horizontal, und ganz West-Spitzbergen mit Ausnahme des Westrandes und solcher Stellen, wo Grundgebirge und Hekla-Hook-Lager durch Erosion blossgelegt sind, wird folglich von Tafelgebirgen aufgebaut. Dasselbe gilt auch von Barents-Land und Stans-Foreland im Osten des Storfjordes, wogegen Prinz Charles' Vorland vor der Westküste von den gefalteten Hekla-Hook-Lagern aufgebaut sein dürfte. Vergleiche ferner die Darstellung hierüber, die ich neben untenstehender Kartenskizze schon bei SUESS (Antlitz der Erde Bd. 2, S. 84 ff.) mitgetheilt habe.



A. Die Flora des Liefde-Bay-Systems (Die devonische Flora).

Das Vorkommen der devonischen Pflanzenfossilien.

Obschon das Liefde-Bay-System eine sehr grosse Fläche des nordwestlichen Theiles von Spitzbergen einnimmt, so ist es doch verhältnissmässig wenig studirt. Dies rührt davon her, dass es an der Westküste Spitzbergens, wo die genauesten geologischen Untersuchungen ausgeführt sind, nur in den innersten Zweigen des Eisfjordes zugänglich ist, und zwar an der Westseite der Klaas-Billen-Bay, in der Dickson-Bay und im Inneren der Ekman-Bay, welche beide letzten nur selten besucht werden. In der Liefde-Bay und der Wijde-Bay, wo ich nicht selbst gewesen bin, dürfte die beste Gelegenheit zu einer Untersuchung der betreffenden Ablagerungen vorhanden sein.

Obschon die Devonlager, wie erwähnt, nicht gefaltet sind, so ist doch die ursprüngliche horizontale Lagerung bei den Grenzen derselben durch Flexuren gestört. Das ganze Liefde-Bay-System scheint nämlich in einem grossen präcarbonischen Graben zwischen den älteren Ablagerungen eingesenkt zu liegen. Während die westliche Seite der Wijde-Bay von den diesbezüglichen horizontalen oder nur wenig geneigten Ablagerungen aufgebaut ist, wird dagegen die östliche Seite desselben Fjordes aus kristallinischen Schiefern des Grundgebirges zusammengesetzt. Diese Verschiedenheit setzt sich auch im Inneren der Klaas-Billen-Bay fort, so dass die transgredirenden Untercarbonlager und die Permocarbonlager, welche an der westlichen Seite des Fjordes auf dem Devon ruhen, dagegen an der Ostseite unmittelbar auf dem Grundgebirge abgelagert sind. Es besteht demzufolge kein Zweifel darüber, dass die Devonlager eingesenkt und abradirt waren, schon bevor die hiesigen Carbonlager zum Absatz gelangten. Gegen die Grenzlinie des Systemes in der Klaas-Billen-Bay sind die Devonlager sehr steil aufgerichtet und auch auf solche Weise gepresst, dass eine falsche Schieferung (Cleavage) entstanden ist. Wenn man aber diese Lager in den Querthälern etwas gegen Westen verfolgt, so nehmen sie allmählich eine horizontale Lagerung ein, und wenn man die Dickson-Bay erreicht hat, liegen sie beinahe vollständig horizontal, alles ist wieder Tafel. Noch westlicher aber, in der Ekman-Bay, gegen die westliche Grenze des grossen präcarbonischen Grabens, scheinen die Lager, nach den Angaben von Nordenskiöld und De Geer, wieder etwas aufgerichtet zu sein.

In der Dickson-Bay sind Pflanzenreste nicht selten, jedoch kommen sie dort nur als kleine Trümmer zerstreut vor (Taf. I, Fig. 9), was auch im Mimers-Thal der Fall ist. Ausser diesen nicht näher zu bestimmenden Resten kommen aber auf der Westseite der Klaas-Billen-Bay, zusammen mit Schuppen von *Porolepis posnaniensis* Kade sp.[1] und

[1] Vergl. A. Smith Woodward, l. c

Leperditia isochilinoides RUPERT JONES,[1] mehrere Pflanzenreste vor, von welchen die auf Taf. I, Fig. 1—7, 12 abgebildeten die besterhaltenen sind. Im Mimers-Thal fand ich ferner in einer kleinen Seitenschlucht eine Ablagerung von weichem Thonschiefer mit Knollen von Thoneisenstein, welche reich an Fischresten waren, und zwar nach LANKESTER und SMITH WOODWARD zu *Psammosteus arenatus* AG., *Asteroplax scabra* A. S. WOODW., *Onychodus arcticus* A. S. WOODW. gehörend, wozu noch schöne aber nicht näher bestimmbare Schuppen von *Rhizodontiden* und Zähne von *Holoptychiiden* kommen, welche dort nicht selten sind. Diese Fischreste kündigen nach den erwähnten Autoren ein jüngeres, und zwar oberdevonisches, Alter für die betreffenden Schichten an, während diejenigen in der Dickson-Bay und am Ufer der Klaas-Billen-Bay zum Unterdevon gehören würden. In den oberdevonischen Knollen von Thoneisenstein fand ich mit den Fischresten zusammen die beiden auf Taf. II, Fig. 6 und 7 abgebildeten Stammreste, in einem losen Stück grünlichen Sandstein auf demselben Platz die Blattreste auf Taf. II, Fig. 1 und 2; in einem ebenfalls grünlichen Sandstein, welcher etwas höher als die Fischreste vorkommt, fand ich das Stück Taf. II, Fig. 8. Die in den Figuren 3—5 derselben Tafel abgebildeten Reste wurden in losen Geschieben des Mimers-Thals gefunden.

Beschreibung der Arten.

Unbestimmbare blattstielartige Pflanzenreste.

Taf. I, Fig. 1—11, Taf. II, Fig. 5.

In den unterdevonischen Ablagerungen Spitzbergens, d. h. in denjenigen, welche durch das Vorkommen von *Pteraspis* und *Porolepis* charakterisirt sind, kommen Pflanzenreste nicht selten vor. Die meisten derselben stellen nur kleine Trümmer dar, wie auf Taf. I, Fig. 8—11. An der Westseite der Klaas-Billen-Bay finden sich aber mit *Porolepis* und *Leperditia isochilinoides* zusammen auch grössere Stücke, von welchen die besten auf Taf. I, Fig. 1—7 abgebildet sind. Wie schon ein Blick auf die Figuren lehrt, ist der botanische Werth dieser Reste gleich Null. Sie scheinen allerdings am meisten Farnspindeln zu ähneln, und man dürfte sie wohl am besten auch ohne weiteres für solche halten können, obschon ähnliche Reste theils als *Psilophyton*, theils als Algen beschrieben sind. Das auf Taf. I, Fig. 1 abgebildete Stück hat in der That eine gewisse Ähnlichkeit mit DAWSONS *Psilophyton robustius*, sowohl nach den Abbildungen[2] wie nach Exemplaren, die ich von Sir WILLIAM DAWSON erhalten habe, ähnelt aber auch DAWSONS Fig. 80 a, Pl. VII, welche als Blattstiel eines Farnes gedeutet wird, eine Deutung, welche mir für sämmtliche betreffenden Reste aus Spitzbergen am wahrscheinlichsten vorkommt. Auch Taf. I, Fig. 2 und 3, bei welchen die Sekundärsegmente mehr gegenständig gestellt sind, scheinen sich an dieselbe Form anzuschliessen, während Fig. 4—11 wohl ohne weiteres als unzweifel-

[1] RUPERT JONES, Notes on the palæozoic bivalved Entomostraca. Ann. Mag. Nat. Hist. October 1883.

[2] DAWSON, The fossil plants of the devonian and upper silurian formations of Canada. Montreal 1871. Pl. XII, Fig. 138.

haftere Reste von Farnspindeln betrachtet werden können. Freilich habe ich auch ähnliche als *Psilophyton* bezeichnete Formen von DAWSON bekommen, schliesse mich aber in der Deutung dieser Reste gänzlich an SOLMS[1] an, nach welchem nur »*Psilophyton princeps*» so »fassbare Charactere» zeigt, dass es als selbstständiger Typus betrachtet werden kann, während die übrigen »Arten», wie auch SCHENK meint,[2] besser als Farnblattstiele oder als »Erhaltungszustände von Pflanzen, über welche sich in dem Zustand, in welchen sie vorliegen, nichts Bestimmtes sagen lässt», aufgefasst werden dürften. Die meisten der vorliegenden Abdrücke sind glatt, doch zeigt das Exemplar Taf. I, Fig. 5 einige kleine rundliche Erhöhungen, welche ganz regellos gestellt sind. Taf. II, Fig. 5 stellt einen Rest aus dem Mimers-Thal dar, welcher mit kleinen stachelartigen Erhöhungen besetzt ist, was auch bei mehreren Farnspindeln vorkommt.

Obschon der botanische Werth dieser Reste, wie schon erwähnt, beinahe gleich Null ist, so verhält sich die Sache in geologischer Hinsicht etwas anders. Denn wenn wir etwa ähnliche Reste im Carbon oder in jüngeren Ablagerungen treffen, dann pflegen sie doch mit Blättern zusammen vorzukommen. In den devonischen oder obersilurischen Ablagerungen treffen wir aber nur diese eigenthümlichen Reste ohne Blätter, was darauf zu deuten scheint, dass diese noch immer von einer so zarten Beschaffenheit waren, dass sie nicht aufbewahrt werden konnten.

Ausser in Canada, wo ähnliche Dinge, nach DAWSON, vom obersten Silur bis zum obersten Devon vorkommen,[3] finden sie sich auch im Devon Schottlands, Belgiens und wohl auch Livlands, denn EICHWALD's *Aulacophycus* dürfte ohne Zweifel auch hierher gehören. Auch einige von den von STUR als Algen gedeutete Reste der »silurischen» (devonischen) Etagen H—h_1 in Böhmen[4] dürften wohl zur nämlichen problematischen Formenreihe gehören.

Unbestimmbarer Abdruck.

Taf. II, Fig. 3.

In einem losen Geschiebe von grünlichem Sandstein im Mimers-Thal fand ich die betreffenden Reste. Dieselben bilden im Gestein recht tiefe Eindrücke von keilförmiger Gestalt, in welchen ziemlich tiefe Rinnen vom Grunde gegen den Aussenrand fächerförmig ausstrahlen.

Was die Natur dieser Abdrücke betrifft, so habe ich selbst keine Meinung darüber. Ich bemerke nur, dass ich unter den mir von DAWSON gesandten devonischen Pflanzenresten aus Amerika auch einen Abdruck einiger sogenannten *Psilophyton*-Früchte bekommen habe, welche büschelförmig gestellt sind und in einem, dem unserigen ähnlichen, Sandstein

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[1] SOLMS, Einleitung in die Paläophytologie. Leipzig 1887. S. 195.

[2] SCHENK, Die fossilen Pflanzenreste. Breslau 1888. S. 59.

[3] Ähnliche Dinge sind neuerdings auch aus den Vereinigten Staaten Amerikas von D. P. PENHALLOW beschrieben worden (PENHALLOW, Notes on erian plants from Newyork and Pennsylvania. Proc. U. S. Nat. Museum. Vol. XVI, p. 105 ff. 1893). *Bemerkung während des Druckes.*

[4] STUR, Die Silurflora der Etagen H—h_1 in Böhmen. Sitzber. Akad. der Wissensch. Wien. Bd. 84. 1881. S. 330.

entsprechende rinnenförmige Abdrücke hervorgebracht haben. Man könnte auch an Abdrücke eines *Rhodea*- oder *Rhacopteris*-ähnlichen Blattsegmentes denken, was mir aber eben nicht sehr wahrscheinlich vorkommt.

FILICES.

Cyclopteris sp.

Taf. I, Fig. 12.

Zusammen mit den oben beschriebenen *Psilophyton*-ähnlichen Blattstielresten fand ich an der Westseite der Klaas-Billen-Bay auch den auf Taf. I, Fig. 12 abgebildeten Abdruck eines grossen *Cyclopteris*-ähnlichen Fiederchens oder einer *Aphlebia*-Bildung. Die fächerförmig gestellten Nerven sind recht stark, dichotom verzweigt. Der Abdruck erinnert sehr an *Cyclopteris Brownii* Dawson aus den Devonlagern Nordamerikas,[1] obschon die vorliegenden Materialien nicht genügen, um die Frage über die Identität beider endgültig zu entscheiden. Dawson vergleicht seine Art mit einer von H. D. Rogers aus dem oberen Devon Pennsylvaniens abgebildeten Pflanze,[2] welche mir aber von Dawson's Art ganz verschieden vorkommt.

LYCOPODIACEÆ.

Lepidodendron.

Taf. II, Fig. 7.

In einer Knolle von Thoneisenstein im Mimers-Thal fand ich das betreffende Stück, zusammen mit den oben (S. 11) erwähnten Fischresten. Das Exemplar bildet einen dünnen, etwas gewölbten kohligen Ueberzug, auf welchem die Stellen, welche den Blattpolstern entsprechen, als Löcher hervortreten, so dass die unterliegende Gesteinmasse durch dieselben sichtbar wird. Die Zeichnung ist durch Versehen in umgekehrter Stellung wiedergegeben worden, denn es ist wohl wahrscheinlich, dass die Löcher gegen unten verschmälert, oben dagegen abgerundet waren. Da die Ausfüllungen der Löcher etwas erhöht sind, so dürfte es wahrscheinlich sein, dass die Blattpolster durch Abnutzung zerstört sind, um so mehr, da das ganze Stück Spuren von Abnutzung zeigt. Sonst muss es sich um irgend welche innere Rindenfläche handeln.

Eine nähere Bestimmung des fraglichen Restes ist selbstverständlich nicht ausführbar. Ich erwähne nur, dass ich ein Stück (»alte Rinde») von *Lepidodendron corrugatum* Dawson,[3] aus den mittleren Carbonlagern Canadas, von Sir William Dawson erhalten habe, welches dem vorliegenden durchaus ähnlich sieht, nur dass die Rinde zwischen den Blattpolstern etwas mehr runzelig ist, was aber auch stellenweise auf dem vorliegenden Exemplar zu

[1] Dawson, Further observations on the devonian plants of Maine, Gaspé and New York. Quarterly Journal Geol. Soc. London. Vol. 19, 1863, p. 463, pl. 17, fig. 6.

[2] H. D. Rogers, The geology of Pennsylvania. Vol. 2, part. 2, pl. 22. 1858.

[3] Dawson, Report on the fossil plants of the lower carboniferous and millstone grit formations of Canada. Montreal 1873, p. 19.

beobachten ist. Wie wir später sehen werden, kommt aber auch in den Untercarbonlagern Spitzbergens ein etwas ähnliches *Lepidodendron* vor.

Bergeria sp.

Taf. II, Fig. 8.

Die PRESL'sche Benennung *Bergeria* scheint mir noch immer als die zweckmässigste für jene Lepidodendraceen-Reste mit quadratischen Rhombenflächen, deren Erhaltungszustand aber eine sonstige nähere Bestimmung nicht gestatten, beibehalten werden zu können. Denn auf solche Weise sagen wir genau, was wir von denselben wissen, weder mehr noch weniger. Der vorliegende Rest kommt als dünner Kohlenüberzug auf einem Stück grünlichen schiefrigen Sandstein vor, welches ich in einer Seitenschlucht des Mimers-Thals, auf einem bedeutend höheren Horizonte, als die Thoneisensteinknollen mit Fischresten gefunden habe. Die Figur giebt ganz genau das Aussehen des Stückes wieder, doch zeigen einige der obersten Rhombenflächen auch einen vertikal gestellten rinnenförmigen Eindruck, welcher diagonal durch die ganze Fläche fortläuft, etwa wie es ZEILLER für *Ulodendron minus* beschrieben hat,[1] obschon ein ähnlicher Character auch bei verschiedenen »Bergeria»-Formen vorkommt.

Ich halte es für gänzlich verfrüht, eine bestimmte Meinung über die generische Stellung des vorliegenden Restes auszusprechen, denn dazu reicht sein Erhaltungszustand nicht aus. Was hier hervorgehoben werden soll, ist nur der Umstand, dass ähnliche Formen auch anderswo in subcarbonischen Lagern und Culmschichten vorkommen, wie *Ulodendron minus* L. & H. oder *Sigillaria discophora* KÖNIG sp.,[2] *Lepidodendron tetragonum* GEINITZ,[3] *Lepidodendron nothum* UNGER,[4] *Lepidodendron australe* M'COY und *L. nothum* FEISTMANTEL.[5] etc. Was die gegenseitige Stellung dieser Reste betrifft, bleibt allerdings noch vieles zu ermitteln übrig. Ich verweise in dieser Hinsicht insbesondere auf die Arbeiten von KIDSTON und ZEILLER, sowie auf die von SOLMS gelieferte Zusammenfassung.[6]

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[1] ZEILLER, Observations sur les genres *Ulodendron* et *Bothrodendron*. Bull. soc. géol. de France 3e série, t. 14, p. 168. 1885. — Description de la flore fossile du bassin houiller de Valenciennes. Paris 1886, 1888, p. 483, pl. 73, fig. 2; pl. 74, fig. 5.

[2] KIDSTON, On the relationship of *Ulodendron* to *Lepidodendron*, *Bothrodendron*, *Sigillaria* and *Rhytidodendron*. Ann. Mag. Nat. Hist. 5th series, vol. 16. 1885. — Additional notes on some british carboniferous lycopodes. Ann. Mag. Nat. Hist. July 1889.

[3] H. B. GEINITZ, Darstellung der Flora des Hainichen-Ebersdorfer und des Flöhaer Kohlenbassins. Taf. III, Fig. 1. Leipzig 1854.

[4] RICHTER und UNGER, Beitrag zur Paläontologie des Thüringer Waldes. 2. Theil. Sandstein- und Schieferflora. Denkschr. Akad. d. Wiss. Wien. Math.-naturw. Cl. Bd. 11. 1856. S. 175. Taf. X, Fig. 4. — SZAJNOCHA, Ueber einige carbone Pflanzenreste aus der Argentinischen Republik. Sitzb. Akad. d. Wiss. Wien. Math.-naturw. Cl. Bd. 100. Abth. 1. 1891.

[5] O. FEISTMANTEL, Palæozoische und mesozoische Flora des östlichen Australiens. Palæontographica. Suppl. 3. Lief. 3. Heft 2 und 3. Cassel 1878.

[6] SOLMS, Einleitung in die Paläophytologie. l. c.

Bothrodendron? sp.

Taf. II, Fig. 6, 6 a.

Ein Stück aus den fischführenden Thoneisensteinknollen im Mimers-Thal zeigt auf seiner Oberfläche den vorliegenden Abdruck einer inneren Rindenfläche. Hie und da sind noch sehr kleine kohlige Reste der Rinde selbst erhalten. Dass wir in der That mit dem Reste eines *Bothrodendrons* zu thun haben, scheint mir aus der längsrunzeligen Skulptur der Oberfläche des Abdruckes hervorzugehen (Fig. 6 a), die mit der von *Bothrodendron tenerrimum*, welches im Folgenden beschrieben wird, übereinzustimmen scheint. Auch die gedrängte Stellung der Bündelspuren scheint mehr für *Bothrodendron* als für *Ulodendron minus* zu sprechen, mit welchem letzgenannten (als Abdruck der Innenseite der Rinde) der Rest sonst verglichen werden könnte.

Unbestimmbarer Abdruck.

Taf. II, Fig. 4.

Das betreffende Stück wurde in einem losen Geschiebe eines weissen Sandsteins im Mimers-Thal gefunden, welcher wahrscheinlich zu einem tieferen Horizonte als die Thoneisensteinknollen mit Fischresten gehört. Der Rest stellt ein Fragment eines beblätterten Astes oder Fruchtstandes dar. Die Blattnarben sind undeutlich und verwischt, die Blätter scheinen kurz und dick gewesen zu sein. Eine nähere Bestimmung dieses Restes ist selbstverständlich nicht durchführbar.

GYMNOSPERMÆ?

Psygmophyllum Williamsoni n. sp.

Taf. II, Fig. 1, 2.

In einem losen Stück grünlichen Sandsteinschiefer aus der Fischschlucht im Mimers-Thal liegen mehrere Reste von *Psygmophyllum*-Blättern zusammen. Das Stück wurde in unmittelbarer Nähe der fischführenden Thoneisensteinknollen gefunden und dürfte aus den dieselben umittelbar überlagernden Schichten stammen. Fig. 1 stellt das vollständigste Blatt dar, welches durch seine verhältnissmässig breite Form von *Psygmophyllum flabellatum* L. & H. sp.[1] erheblich abweicht. Die Nerven sind ziemlich fein, z. Th. verwischt, an anderen Stellen aber mit der Loupe deutlich sichtbar, hie und da gabelig getheilt. Auch die seitlichen derselben scheinen sämmtlich durch wiederholte Gabelung von denjenigen Bündeln herzurühren, welche in den Blattgrund eintreten, und nicht vom Bündelstrange des Blattrandes, wie bei *Ginkgo*. Das Exemplar Fig. 2 zeigt am oberen Blattrand regelmässig gestellte längliche Eindrücke, und ähnliche können auch auf dem Exemplar Fig. 1 unter

[1] *Noeggerathia flabellata* Lindley & Hutton, Fossil flora of Great Britain. I. Pl. 28, 29.

günstiger Beleuchtung beobachtet werden. Ihre nähere Natur lässt sich aber an dem vorliegenden Material nicht ermitteln.

Blätter wie die vorliegenden werden bekanntlich in neuerer Zeit gewöhnlich zu *Ginkgophyllum* SAPORTA gebracht. Ohne bestreiten zu wollen, dass solches zuweilen berechtigt sein kann, möchte ich doch die Meinung aussprechen, dass es in allen zweifelhaften Fällen zweckmässiger sein dürfte, die Benennung *Psygmophyllum*, welche über die systematische Stellung der Reste nichts aussagt, beizubehalten. Die vorliegenden Blätter sind deshalb von besonderem Interesse, weil sie die ältesten Reste dieses Blatttypus darstellen.

Rückblick.

Die vorliegenden Pflanzenreste des alten rothen Sandsteins von Spitzbergen sind noch zu dürftig, um einen eingehenden Vergleich mit der Devonflora anderer Gegenden zu gestatten. Es ist eigentlich nur hervorzuheben, dass auch hier die untere Abtheilung der Ablagerung durch jene unsicheren *Psilophyton*-ähnlichen Pflanzenreste bezeichnet wird, über deren Stellung man sich am besten jedes Urtheils bis auf weiteres enthält.

Die Pflanzenreste der oberen Stufe schliessen sich dagegen an die untere Carbonflora mit Resten von *Lepidodendron*, *Bergeria* und *Bothrodendron* an. Weitaus das grösste Interesse bietet das Vorkommen der *Psygmophyllum*-Reste, da es ja möglich ist, dass dieselben die Anwesenheit von Gymnospermen schon in dieser uralten Ablagerung ankündigen. Samen von Gymnospermen kommen bekanntlich in den unteren Carbonablagerungen Spitzbergens vor, obschon die Pflanze, zu welcher sie gehören, noch nicht bekannt ist.

Es ist anzunehmen, dass eine eingehendere Untersuchung des alten rothen Sandsteins von Spitzbergen, als diejenige, welche bisher hat ausgeführt werden können, eine Menge von besser erhaltenen Pflanzenresten liefern wird.

B. Die Steinkohlenflora (die Untercarbonflora).

Das Vorkommen der Steinkohlenpflanzen.

Die marinen Permocarbon-Ablagerungen Spitzbergens werden von einer Sandsteinformation mit Einlagerungen von Schiefer- und Kohlenrändern unterlagert, welche auch Pflanzenreste geliefert hat. Es sind bisher nur unbedeutende Kohlenlager in diesen untercarbonen Lagern Spitzbergens gefunden worden, während die Kohlenlager der Bären-Insel dagegen sogar abbauwerthig sein sollen.

Was Spitzbergen betrifft, so sind die Steinkohlenpflanzen dort bisher an 8 verschiedenen Lokalitäten beobachtet worden, von welchen sich 4 im Belsund, 4 im Eisfjorde befinden. Wahrscheinlich wird dieselbe Formation auch an mehreren anderen Orten angetroffen werden, nämlich da, wo die untersten Lager der Carbonablagerungen blossgelegt sind, wie südlich vom Quad-Hook, in der Lomme-Bay, im Hornsund, am Südkap etc. Wenden wir uns jetzt zu den Lagern im Belsund und im Eisfjorde.

Belsund. 1. Ostufer der Recherche-Bay im Roberts-Thal. Hier fand Nordenskiöld 1873 auf der nördlichen Seite des Flusses, am Gletscherrande, steil aufgerichtete, mit einander wechselnde Sandstein- und Schieferlager. Diese sind stellenweise voll von Pflanzenresten, und die hier eingesammelten Arten sind von Heer in seinen Beiträgen zur fossilen Flora Spitzbergens (l. c.) beschrieben worden. Nordenskiöld nahm an, dass diese Lager die Permocarbonlager bedeckten, eine Beobachtung, welche allerdings ganz richtig ist, nur dass diese scheinbare Überlagerung auf einer Inversion beruht. Bei einem Besuche der Lokalität, welchen ich 1882 mit G. de Geer unternahm, konnten wir nämlich die ganze invertirte Reihenfolge der betreffenden Lager durch das ganze Permocarbon bis ins Perm hinauf schrittweise verfolgen. Die pflanzenführenden Lager im Roberts-Thal gehören demzufolge auch dem Untercarbon an. Leider war Heer bei Beschreibung der Arten von der Vorstellung beeinflusst, dass dieselben einem höheren Horizonte angehörten, was nicht ohne Einfluss auf die Bestimmung einiger Arten geblieben ist.

2. Südseite des Mitterhuks. Hier fand ich 1882 einige niedergefallene Stücke mit *Sphenopteris bifida*, *Lepidodendron acuminatum* etc., welche darlegen, dass auch hier pflanzenführende Lager im Steilabsturze des Berges anstehen. Leider waren sie hier gänzlich unzugänglich.

3. Nordseite des Mitterhuks. Hier traf De Geer 1882 ein pflanzenführendes Lager, welches reich an Pflanzenresten, und zwar hauptsächlich an Lepidodendronstämmen und Stigmarien war. Diese Lokalität verdient eine umfassendere Bearbeitung.

4. Unterhalb des Ingeborgs-Fjells an der Nordseite des Belsunds, wo die Lager steil aufgerichtet sind, kommen im Sandsteine hie und da kleine Linsen von kohlenhaltigem Schiefer und Stigmarienthonen vor. Dieselben dürften ursprünglich zusammenhängende Lager gebildet haben, welche aber bei der Aufrichtung der Schichten zusammengepresst und gequetscht wurden. In diesen kleinen Schieferpartien fand ich 1882 einige Pflanzenreste, während Abdrücke von Stämmen recht häufig im Sandsteine sind. Die meisten dieser Abdrücke sind ohne Oberflächenstruktur, doch wurde auch ein etwa 15 cm breiten *Lepidodendron*-Stamm beobachtet. Auf einer kleinen Insel dicht nebenbei hat NORDENSKIÖLD 1873 eine *Knorria* im Sandsteine gefunden.

Eisfjord. 5. Safe-Haven. In den steil aufgerichteten Schichten, an der Westseite des Busens, traf ich 1882 auf einen bituminösen Schiefer mit schönen Abdrücken von *Sphenopteris bifida*. Diese waren, obschon häufig, beinahe die einzigen Pflanzenreste, welche hier vorkamen.

6. Gipshuk. An der Westseite des Berges, am Ostufer der Klaas-Billen-Bay, fanden H. WILANDER und ich 1870 die Steinkohlenpflanzen, welche von HEER beschrieben sind, und welche hauptsächlich aus *Lepidodendron Veltheimianum* und aus prachtvollen Exemplaren von *Stigmaria ficoides* bestanden. Als ich 1882 die Lokalität wieder besuchte, war das pflanzenführende Lager durch Schutt und Eis unzugänglich geworden, und alles, was ich hier finden konnte, waren einige Exemplare von *Sphenopteris bifida*, welche früher nicht aus dieser Lokalität bekannt waren.

7. An der Nordseite des Nordenskiöld-Gletschers, im Inneren der Klaas-Billen-Bay, sah ich 1870 in einigen grossen Sandsteinblöcken Abdrücke von *Stigmaria* etc., welche beweisen, dass die Untercarbonlager auch hier pflanzenführend sind. Die Blöcke waren zu gross, um mitgebracht werden zu können, und die Zeit gestattete bei jener Gelegenheit nicht, die anstehenden Lager aufzusuchen. Später habe ich diese Lokalität nicht wieder besucht.

8. An der Westseite der Klaas-Billen-Bay, der vorigen Lokalität fast gegenüber, liegt die kleine Bucht Mimers-Bay, auf deren nördlicher Seite der schöne Pyramidenberg sich bis zu 867 Meter erhebt. Der Gipfel des Berges, welcher eine pyramidenförmige Gestalt mit treppenförmigen Absätzen behauptet, besteht aus dem Cyathophyllumkalk der Permocarbonlager, welche ganz horizontal über den etwas gebogenen untercarbonen Sandsteinlagern liegen. Doch sind die architektonischen Verhältnisse hier etwas verwickelt, was ich in meiner Geologie Spitzbergens näher besprechen werde. Die untercarbonen Sandsteinlager kommen hier in Kontakt mit den ebenfalls aufgerichteten Liefde-Bay-Lagern, und nicht sehr weit oberhalb des Kontaktes findet sich ein bituminöser Schiefer, wohl 3,6—4,5 Meter mächtig, und dazu etwas Kohle. In diesem Schiefer fand ich 1882 die einzigen Exemplare von *Bothrodendron tenerrimum*, die bisher auf Spitzbergen gefunden sind, dazu *Sphenopteris bifida* (spärlich), *Sphenopteris Kidstoni*, *Stigmaria* und am häufigsten grosse, plattgedrückte, striirte Farnspindeln, welche bis 8—9 Centimeter breit sind. Der umgebende Sandstein hat in losen Blöcken *Knorria*, Farnspindeln und besonders prachtvolle Stigmarien geliefert, von welchen letztgenannten die grössten ihres Umfangs wegen leider nicht mitgebracht werden konnten.

In der obigen Darstellung der verschiedenen Fundstätten habe ich keine detaillirte Angabe der Schichtenreihe innerhalb der untercarbonen Lager gegeben. Dies rührt daher, dass alle Lokalitäten zu solchen Stellen gehören, wo diese Lager mehr oder weniger aufgerichtet und dazu noch von Eis, Schnee und Schutt so bedeckt sind, dass man die detaillirte Schichtenfolge nicht beobachten kann. Obschon ich überzeugt bin, dass verschiedene Horizonte unter den untercarbonen Lagern vorkommen, so konnten doch, der erwähnten Ursachen zufolge, keine solche festgestellt werden, da alle Lager zu wenig blosgelegt sind. Bis wir eine horizontale Reihe der Schichten in einem Steilabhang finden, wo sie in ihrer ganzen Mächtigkeit der Untersuchung zugänglich sind, müssen wir daher eine Gliederung in Horizonte entbehren.

Falls ich mit dem Fernrohr richtig beobachtet habe, so dürften insbesondere einige Küstengebirge zwischen dem Eisfjord und dem Belsund in dieser Hinsicht Aufschlüsse liefern können. Noch besser dürften sich aber die Verhältnisse auf der Bären-Insel gestalten, wo die Lager beinahe horizontal sind und wo sehr wahrscheinlich verschiedene Horizonte ohne Schwierigkeit aufgesucht werden können. Wie wir später sehen werden, scheinen die bisher bekannten pflanzenführenden Lager auf der Bären-Insel, im Gegensatz zur bisherigen Annahme, nicht gleichalterig mit denen auf Spitzbergen zu sein.

Beschreibung der Arten.

FILICES.

Calymmatotheca bifida Lindley & Hutton sp.

Taf. III, Fig. 1—3.

Sphenopteris bifida Lindley and Hutton, Fossil Flora of Great Britain. Vol. I, plate 53.
» » Schimper, Traité de pal. végét. I, p. 412.
Todea Lipoldi Stur, Culmflora. S. 71, Taf. XI, Fig. 8.
Sphenopteris frigida Heer, Beiträge zur fossilen Flora Spitzbergens, l. c. S. 6, Taf. I, Fig. 1—6.
Sphenopteris rutæfolia Schmalhausen, Die Pflanzenreste der Steinkohlenformation am östlichen Abhange des Uralgebirges S. 4, Taf. I, Fig. 1—5. Mém. Acad. Sciences. St. Petersbourg. T. 31, N:o 13. 1883.
Calymmatotheca bifida L & H. sp., Kidston, Catalogue of the palæozoic plants in the department of geology and palæontology, British Museum. 1886.
» » Kidston, On the fructification of some ferns from the carboniferous formation. Trans. Roy. Soc. Edinburgh. Vol. 23, part 1, p. 140, pl. VIII, fig. 1—6 a, pl. IX, fig. 16, 17. Edinburgh 1887.

Die schönen Exemplare, welche ich 1882 im Safe-Haven entdeckte, komplettiren in erwünschter Weise die von Heer beschriebenen Bruchstücke derselben Art aus dem Roberts-Thal. Ich habe keinen Unterschied zwischen ihr und *Sphenopteris bifida* Lindley & Hut-

TON[1] auffinden können, und schon HEER hebt die nahe Uebereinstimmung mit derselben hervor, nur meinte er, dass die Fiederchen bei dieser stielrund sind, eine Vermuthung, welche in der ungenügenden Abbildung LINDLEYS und HUTTONS seinen Grund hat. In der That hat HEER sämmtliche Exemplare, welche er zur Untersuchung bekommen hatte, als *Sphenopteris bifida* etikettirt, und er dürfte erst später zu der anderen Auffassung gelangt sein, wohl hauptsächlich infolge seiner Meinung, dass die Ablagerung im Roberts-Thal einem höheren Horizonte angehörte.

Infolge der Pressung des Gesteins ist die Nervatur nicht deutlich zu beobachten, und HEERS Fig. 1 b und 2 b dürften etwas schematisirt sein.

HEER hat schon bemerkt, dass STURS *Todea Lipoldi*[2] der vorliegenden Art ungemein ähnlich ist. STUR hebt »die geflügelte Rhachis der Primärabschnitte und die linearen an der Spitze abgerundeten Lappen» als Unterschiede von *Sphenopteris bifida* hervor, während KIDSTON, der Gelegenheit hatte die schottische Pflanze zu untersuchen, beide vereinigt. In der That dürfte es schwierig sein, eine Verschiedenheit zwischen unserer Figur 3 und der STUR'schen Pflanze aufzufinden. Bei Fig. 1 und 2 sind die Lappen durch Druck etwas zusammengepresst.

Auch *Sphenopteris rutæfolia* bei SCHMALHAUSEN dürfte, wie auch KIDSTON meint, zu dieser Art gehören. KIDSTON glaubt allerdings, dass SCHMALHAUSENS Pflanze nicht dieselbe wie EICHWALDS *Gleichenites rutæfolius* ist, hat aber wahrscheinlich übersehen, dass SCHMALHAUSEN selbst angiebt, dass die Abbildungen in der Lethæa rossica »sehr wenig naturgetreu» sind, und dass seine Exemplare z. Th. aus EICHWALDS Sammlung stammen.

Wie KIDSTON dargelegt hat, gehört die Pflanze zur Gattung *Calymmatotheca*; auf Spitzbergen sind aber bisher keine fertilen Exemplare gefunden worden.

Vorkommen. Ausser im Roberts-Thal, wo die Pflanze 1873 entdeckt wurde, ist sie auf der Südseite des Mitterhuks und am Ufer am Ingeborgs-Fjell im Belsund gefunden worden. Im Eisfjorde fanden sich die besten Exemplare im Safe-Haven und andere sind am Gipshuk gesammelt worden, wozu auch noch einige am Pyramidenberge gefundenen Stücke der betreffenden Art angehören dürften.

Sphenopteris Kidstoni n. sp.

Taf. IV, Fig. 4, 5.[3]

Beim Zerspalten einer Schieferplatte vom Pyramidenberge fanden sich die in Fig. 4 abgebildeten Abdrücke, welche sich sehr nahe an Exemplare von *Calymmatotheca affinis* LINDLEY & HUTTON sp. aus der »Calciferous Sandstone Series» Schottlands, die ich Herrn KIDSTON verdanke, anschliessen. Die Nervatur ist meistens nicht gut erhalten, kann jedoch stellenweise mit der Loupe beobachtet werden und scheint hier mit derjenigen der erwähnten Pflanze

[1] SCHMALHAUSEN scheint übersehen zu haben, dass dieser Name schon von LINDLEY und HUTTON benutzt war, als er eine andere, neue Art mit demselben Namen belegte. Die Pflanzenreste der artinskischen und perm. Ablagerungen im Osten des europäischen Russlands, S. 35. Mém. du Comité géolog., Vol. II, N:o 4. S:t Petersbourg 1887.

[2] STUR, Die Culmflora des mährisch-schlesischen Dachschiefers. S. 71, Taf. XI, Fig. 8.

[3] Fig. 5 stellt die Lappen ein wenig zu breit und zu scharf begrenzt dar.

übereinzustimmen. Da aber der Bau des ganzen Blattes nicht bekannt und die Nervatur nicht hinreichend gut erhalten ist, habe ich es für zweckmässig erachtet, die spitzbergische Pflanze bis auf weiteres getrennt zu behandeln, statt eine Identität zu behaupten, welche vorläufig nicht bewiesen werden kann. Hierdurch wird wenigstens jeder Nachtheil vermieden.

Unter den Culmfarnen kommt *Diplothmema Ettingshauseni* STUR (Culmflora, S. 29, Taf. VI, Fig. 9, VII, Fig. 1, 2) unserer Art am nächsten.

Vorkommen. Auf Spitzbergen ist die Pflanze bisher nur vom Pyramidenberge bekannt.

Sphenopteris Sturi n. sp.

Taf. III, Fig. 4 (und Fig. 1 rechts).

Nur die beiden abgebildeten Fragmente liegen vor, von welchen das Exemplar Fig. 4, welches das beste ist, ein anscheinend wiederholt dichotom getheiltes Fiederchen mit schmalen linearen Lappen darstellt. Die Nervatur kann nicht beobachtet werden.

Obschon bedeutend kleiner und demzufolge eine andere Art darstellend, hat die vorliegende Pflanze mit Rücksicht auf die Theilung des Blattes eine gewisse Ähnlichkeit sowohl mit *Rhodea gigantea* STUR (Culmflora S. 35, Taf. XI, Fig. 2), wie mit *Rhodea Hochstetteri* STUR (l. c. S. 34, Taf. VIII, Fig. 2), insbesondere mit dieser. Doch gehört sie ganz gewiss keiner von beiden Arten an.

Vorkommen. Safe-Haven.

Sphenopteris flexibilis HEER.

Taf. III, Fig. 5—8.

Sphenopteris flexibilis HEER, Beiträge etc., S. 8, Taf. I, Fig. 11—26.
Sphenopteris geniculata HEER (non GERMAR), l. c. S. 7, Taf. I, Fig. 7—10.
Sphenopteris distans HEER (non STERNBERG), l. c. S. 8, Taf. II, Fig. 1—6.
Staphylopteris sp., HEER, l. c. S. 11, Taf. V, Fig. 26, 26 b.

Dieser Farn ist bis jetzt nur im Roberts-Thal gefunden worden, wo er, obschon allerdings recht häufig, doch nur mit kleinen Fiederstücken vorkommt. Da die Abbildungen in HEERS Arbeit nicht ganz gelungen sind, theile ich hier zwei sehr genau ausgeführte, etwas vergrösserte Zeichnungen der beiden besten Exemplare mit. Man wolle demzufolge nur diese Figuren beim Vergleiche mit anderen Pflanzen berücksichtigen. Wie aus denselben erhellt, ist auch hier der Nervenverlauf nicht deutlich zu beobachten, und zwar weil die Oberfläche der Läppchen mit Längsstreifen versehen sind. HEERS vergrösserte Zeichnungen sind als gänzlich schematisirt zu betrachten, und sie stellen auch die Begrenzung gegen das Gestein all zu scharf dar.

Zu *Sphenopteris flexibilis* gehören, wie HEERS Originale zeigen, auch seine *Sph. distans* und *geniculata*. Bei jener liegen die Läppchen der Fiederchen etwas näher zusammen und scheinen demzufolge etwas breiter als HEERS Abbildungen von *Sph. flexibilis*, während die Originale in der That mit dieser vollständig übereinstimmen. Was HEER als *Sph. geniculata* bezeichnet hat, sind schlecht erhaltene Exemplare derselben Pflanze. HEERS

Abbildungen zeigen nur die hin- und hergebogenen Spindeln der Fiederchen. Bei günstiger Beleuchtung kann man aber mit der Loupe auf sämmtlichen Exemplaren die mit *Sphenopteris flexibilis* übereinstimmende Blattlamina ringsum die Spindel der Läppchen deutlich beobachten.

Kidstons Vermuthung,[1] dass *Sphenopteris flexibilis* zu *Calymmatotheca affinis* gehören würde, ist, wie schon aus unseren Abbildungen hervorgeht, nicht richtig. Dasselbe gilt auch von seiner Annahme, dass *Sph. geniculata* Heer mit *Calymm. bifida* identisch sein könnte. Seine Vermuthung ist aber mit Rücksicht auf die von Heer mitgetheilten Figuren leicht begreiflich.

Dagegen scheint unsere Pflanze der *Sphenopteris distans* Sternberg so nahe zu kommen, besonders wie diese von Geinitz und Stur beschrieben worden ist,[2] dass eine Identität beider mir nicht unmöglich erscheint. Doch dürfte es, bis vollständigere Exemplare der spitzbergischen Pflanze vorliegen, am besten sein, diese Frage offen zu lassen.

Zusammen mit dieser Pflanze kommen recht häufig Marattiaceensporangien vor, welche wahrscheinlich zur selben Art gehören. Diese Zusammengehörigkeit beweisen kann man allerdings nicht, denn ich habe keine Exemplare gefunden, wo die sterilen und fertilen Fiedern noch in Verbindung sind, was bei dem Vorkommen so kleiner Bruchstücke leicht begreiflich ist. Gewöhnlich liegen die Sporangien so dicht zusammen, dass man ihre ursprüngliche Stellung nicht beobachten kann. Heer hat einige solche als *Staphylopteris* sp. abgebildet und beschrieben, wobei er eine kreisförmige Stellung der Sporangien annahm, allerdings die Sporangien nicht als solche deutend, sondern sie »vielleicht als die in sternförmig gestellte Lappen zertheilte Indusia eines Farn» betrachtend. In der Figurerklärung fügt er noch hinzu, dass es »noch eher die kreisförmig gestellten Staubbeutel eines Nadelholzes und dann vielleicht zu *Cordaitis* oder *Rhynchogonium* gehörend», sein könnte. Wenn nun diese kreisförmige Stellung richtig wäre, dann würden wir es am ehesten mit einer *Calymmatotheca* zu thun haben. Das mir vorliegende Original Heers von *Staphylopteris* ist aber nicht gut erhalten, und Heers Figur ist etwas schematisirt, indem sie die behauptete kreisförmige Stellung der Sporangien viel zu scharf angiebt. Sicher ist nur zu beobachten, dass 3 (möglicherweise 4?) Sporangien zusammenhängen, wie es unsere Fig. 7 rechts zeigt, während von der Stellung der übrigen nichts Bestimmtes zu ermitteln ist. Auch die kleine rundliche Partie, um welche herum die Sporangien in Heers Figur angehaftet erscheinen, dürfte vom Zeichner eingetragen sein; ich kann wenigstens keine solche bemerken. Ich glaube demzufolge, dass es bei der mangelhaften Erhaltung dieses Exemplares am besten sein dürfte, keine Schlussfolgerungen daraus zu ziehen.

Das in unserer Taf. III, Fig. 7 abgebildete Exemplar dürfte eine richtigere Vorstellung über den Bau der fertilen Fiedern geben. Hier sehen wir die Sporangien auf einer hin- und hergebogenen Spindel angehaftet, und zwar stehen unten rechts 3 (möglicherweise 4?), höher oben 2 zusammen, während sie an der Spitze einzeln sind, was mit der Form und Theilung des sterilen Blattes eine gewisse Analogie darbietet. Zu bemerken ist nur, dass die Spindel, welche die verschiedenen Sporangiengruppen verbindet, nicht

[1] Catalogue etc. l. c. p. 67.

[2] Vergl. besonders Geinitz, Darstellung der Flora der Hainichen-Ebersdorfer und des Flöhaer Kohlenbassins. 1854. Taf. II, Fig. 3—7. Stur, Culmflora S. 23, 138, Taf. VI, Fig. 2—5, XXXII, Fig. 2—5.

überall deutlich verläuft. Doch glaube ich um so mehr, diese Stellung als ziemlich sicher annehmen zu müssen, als HEER ein analoges Exemplar in seiner Taf. I, Fig. 19 abgebildet hat. Das Original dieser Figur habe ich leider nicht wiederfinden können, und merkwürdiger Weise spricht HEER gar nicht davon, nur sagt er, dass die auf derselben Figur abgebildete Blattspindel wahrscheinlich zu *Sphenopteris flexibilis* gehören dürfte. Auch andere Exemplare scheinen darzulegen, dass die Sporangien eine solche Stellung, wie sie unsere Fig. 7 angiebt, hatten. Immerhin wären bessere Materialien erwünscht, um diese Frage endgültig entscheiden zu können.

Was den Bau der einzelnen Sporangien betrifft, so habe ich an denselben keine Spur eines Ringes beobachten können, die Oberfläche zeigt nur eine Skulptur von langgezogenen Zellen (Taf. III, Fig. 8) wie z. B. bei *Hawlea* (bei STUR, siehe unten). Wie sie sich öffnen, habe ich nicht ermitteln können. Man findet sie nicht selten paarweise, wie in Fig. 8, doch glaube ich nicht, dass sie in solchen Fällen die beiden Hälften eines aufgesprungenen Sporangiums darstellen, sondern dass es sich um zwei verschiedene Sporangien handelt. Zuweilen kann man die Andeutung eines Längskieles bemerken, was möglicherweise aber zufällig ist.

Insofern die vorliegenden Thatsachen es zu ermitteln erlauben, dürfte die Stellung der Sporangien am ehesten für die Einreihung unserer Pflanze in eine neue Gattung sprechen, welche von den von STUR, ZEILLER und KIDSTON[1] beschriebenen Gattungen abweicht. Es dürfte aber zweckmässig sein, neue Materialien abzuwarten, bevor die Aufstellung einer solchen geschieht.

Vorkommen. *Sphenopteris flexibilis* HEER ist bis jetzt nur im Roberts-Thal gefunden worden, wo sie in gewissen Lagern recht häufig ist.

Adiantites bellidulus HEER.

Taf. III, Fig. 13—19.

Adiantites bellidulus HEER, Beiträge etc., S. 10, Taf. II, Fig. 12—16.
Adiantites concinnus HEER (non GOEPPERT), l. c. S. 8, Taf. I, Fig. 8 b, 8 c, Taf. II, Fig. 17—21.
Spenophyllum bifidum HEER, l. c. S. 16, Taf. II, Fig. 23, 24.

HEER hat in seinen Beiträgen zur fossilen Flora Spitzbergens zwei *Adiantites*-Arten aus dem Roberts-Thal beschrieben, von welchen er die eine mit *Adiantites concinnus* GÖPPERT (*Sphenopteris adiantoides* LINDLEY & HUTTON) vereinigt, während er die andere als *Adiantites bellidulus* n. sp. aufnimmt. Diese würde von der vorigen Art durch die schmäleren Fiederchen getrennt sein. Nach den mir vorliegenden Materialien lässt es sich aber gar nicht bezweifeln, dass, wie unsere Abbildungen — zu welchen noch mehrere Zwischenformen hätten hinzugefügt werden können — es zeigen, Uebergänge zwischen

[1] Vergl. besonders STUR, Zur Morphologie und Systematik der Culm- und Carbonfarne. Sitzb. Acad. der Wiss. Wien. Bd. 88, Abth. 1. Juli 1883. — Die Carbonflora der Schatzlarer-Schichten. Abth. I. Abhandlungen der k. k. geol. Reichsanstalt Bd. 11, Abth. 1. Wien 1885. — R. ZEILLER, Fructifications de fougères du terrain houiller. Ann. des sciences naturelles. 6:e Série. Botanique, tome 16, p. 177. — Bassin houiller de Valenciennes. Description de la flore fossile. Paris 1888. — KIDSTON, On the fructification and internal structure of carboniferous ferns. Trans. Geol. Soc. Glasgow. Vol. 9. 1889.

beiden vorhanden sind. Wir haben es demzufolge nur mit einer Art zu thun. Die Blättchen sind dazu nicht so symmetrisch wie in Heers Figuren, vielmehr etwas schief und unsymmetrisch, wie Fig. 15 und 16 bei Heer am besten zeigen. Nur das von Heer in seiner Taf. II, Fig. 21 abgebildete Blättchen hat eine symmetrische Form und dürfte wohl, wie Heer meint, ein Endblatt der Fieder darstellen. Heer hielt die breitere Form für identisch mit Lindleys und Huttons *Sphenopteris adiantoides*, eine Vergleichung, die mir aber nicht gelungen scheint, da die Fiederchen der englischen Pflanze durchschnittlich grösser sind und eine andere Form besitzen. Dagegen scheint unsere Art mit Göpperts *Cyclopteris tenuifolia*[1] so sehr übereinzustimmen, dass ich es für wahrscheinlich halte, dass sie mit dieser identisch ist. In den von H. B. Geinitz abgebildeten Exemplaren dieser Art[2] sehen wir beide Blattformen zusammen, d. h. sowohl schmälere wie breitere Fiederchen. Auch Heer hat allerdings die Ähnlichkeit mit dieser Art hervorgehoben, betrachtet aber Göpperts Pflanze als mit *Sphenopteris adiantoides* identisch, was meiner Meinung nach kaum richtig sein kann. Stur giebt in seiner Culmflora[3] zwei Abbildungen derselben Art (*Adiantites tenuifolius* Gp. sp.), von welchen die eine breitere Blättchen, die andere dagegen schmälere hat, ganz wie die beiden Formen auf Spitzbergen. Dass ich dessenungeachtet unsere Pflanze nicht mit *Adiantites tenuifolius* identificire, geschieht nur aus Vorsicht, da die spitzbergischen Exemplare gegenwärtig nur in kleinen Bruchstücken vorliegen. Ueberdies scheinen die Blättchen zuweilen etwas länger gestielt zu sein. Heer hat auf seiner Taf. II, Fig. 16 allerdings ein Stück abgebildet, welches seiner Meinung nach zeigen soll, dass die Blättchen »paarweise zu einem gefiederten Blatt vereinigt sind». Dies ist aber entschieden nicht der Fall. Die muthmassliche Spindel auf seiner Fig. 16 ist nur ein Kiel im Gestein, kein Abdruck eines Pflanzenrestes, und das Blättchen rechts, welches anscheinend einem anderen gegenüber sitzt, ist in der That umgekehrt und kann demzufolge nicht mit dem Blättchen links in Verbindung stehen. Heer vergleicht die Pflanze auch mit *Adiantites oblongifolius* Göppert; nach Sturs Beschreibung und Abbildung dieser Art[4] weicht sie aber durch das Vorkommen eines Mittelnerven bestimmt von der unsrigen ab.

Zu *Adiantites bellidulus* Heer führe ich auch sein *Sphenophyllum bifidum* (l. c. S. 16, Taf. II, Fig. 23), welche zwei auf solche Weise wie in unseren Fig. 13 und 14 getheilten Blättchen darstellt, die am Grunde vereinigt zu sein scheinen. Heer hebt übrigens selbst hervor, dass es »nicht mit voller Sicherheit zu bestimmen ist, ob sie (die Blätter) zu *Sphenophyllum* gehören».

Vorkommen. Die Pflanze ist bisher nur im Roberts-Thal gefunden worden, wo sie in gewissen Lagern häufig zu sein scheint, kommt aber nur in Bruchstücken vor.

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[1] Göppert, Die Gattungen der fossilen Pflanzen. Lief. 5 u. 8, Taf. IV u. V, Fig. 11, 12.

[2] Geinitz, Hainichen-Ebersdorf, Taf. II, Fig. 9.

[3] Stur, Culmflora, S. 65, Taf. XVI, Fig. 2, 3.

[4] Stur, l. c. S. 286, Taf. XXXIV, Fig. 2—5.

Adiantites longifolius Heer sp.

Taf. X, Fig. 1.

Sphenophyllum longifolium Heer (non Germar), Beiträge etc. S. 15, Taf. II, Fig. 22, 22 b.

Als *Adiantites* eher als *Sphenophyllum* glaube ich den Rest aufnehmen zu müssen, welchen Heer als *Sphenophyllum longifolium* beschrieben hat. Das keilförmige Blättchen ist nicht symmetrisch, sondern etwas schief und stellt offenbar nur einen Theil eines breiteren Blättchens dar. In Heers Figur scheint es, als wäre es vorn in mehrere kurze Lappen getheilt, während in der That nur zwei Einschnitte vorhanden sind, welche wohl als zufällige Risse zu betrachten sind.

Der Rest scheint am meisten mit *Adiantites antiquus* Ettingshausen sp.[1] übereinzustimmen. Bei diesem haben die letzten Abschnitte auch eine keilförmige Gestalt und etwa dieselbe Grösse wie das vorliegende Exemplar, und obschon sie gewöhnlich ganzrandig sind, zeigen sie doch zuweilen (Culmflora Taf. XVI, Fig. 5, oben rechts) ähnliche Risse am Rande wie das Exemplar aus Spitzbergen. Auch die vergrösserte Textfigur, welche Ettingshausen von dieser Art gegeben hat,[2] spricht für eine nahe Übereinstimmung mit der spitzbergischen Pflanze; da aber von dieser nur Bruchstücke vorliegen, dürfte es vorläufig am besten sein, die beiden Arten nicht zu vereinigen. Ausser mit *Adiantites* könnte man das Exemplar aus Spitzbergen auch mit einigen *Rhachopteris*-Formen vergleichen, doch bieten diese keine so grosse Übereinstimmung dar.

Es ist wahrscheinlich, dass Heer, beim Vergleich mit *Sphenophyllum longifolium* Germar, von der Meinung beeinflusst war, dass die Lager im Roberts-Thal zu den produktiven Steinkohlenablagerungen gehörten. Übrigens wäre das Vorkommen eines *Sphenophyllum* in dem Untercarbon Spitzbergens nicht ganz befremdend, da, ausser *Sphenophyllum tenerrimum* und *dichotomum* aus den Culmlagern Europas, auch ein grossblättriges *Sphenophyllum* von Feistmantel aus den Culmlagern Australiens beschrieben ist.[3]

Vorkommen. Ausser dem abgebildeten Exemplare liegen noch einige Bruchstücke, sämmtlich vom Roberts-Thal, vor.

Cardiopteris sp.

Taf. III, Fig. 9.

Nur das abgebildete Exemplar, welches den Abdruck der Oberseite eines einzelnen Blättchens darstellt, liegt vor. Der Abdruck ist ziemlich tief und konkav, infolge dessen die Oberfläche etwas gewölbt gewesen sein muss. In Form und Nervatur stimmt das

[1] Stur, Culmflora, S. 66, Taf. XVI, Fig. 4—6; Taf. XVII, Fig. 3—4.

[2] Ettingshausen, Die fossile Flora des mährisch-schlesischen Dachschiefers. S. 98, Fig. 7. Denkschr. Acad. der Wiss. Wien. Bd. 25. 1866.

[3] O. Feistmantel, Palæozoische und mesozoische Flora des östlichen Australiens. Palæontographica Suppl. 3, Lief. 3, Heft 2, S. 73, Taf. II, Fig. 1. Cassel 1878.

Blättchen mit *Cardiopteris polymorpha* Göppert sp.[1] überein, da aber auch *Cardiopteris Hochstetteri* Ettingshausen sp. ähnliche Blättchen besitzt, obschon sie bei dieser Art nach Stur[2] abwechselnd (nicht gegenständig) an der Hauptspindel gestellt sind, so ist es unmöglich, ein einzelnes Blättchen wie das vorliegende mit Sicherheit zu bestimmen, wobei allerdings bemerkt werden kann, dass sowohl Feistmantel wie Kidston[3] die genannten Arten für identisch betrachten.

Dazu kommt aber noch der Umstand, dass ich ganz ähnliche Blättchen aus der »Calciferous Sandstone Series» Schottlands unter dem Namen *Cardiopteris nana* Eichwald sp., von Herrn Kidston bekommen habe. Auf meine Anfrage, warum er Eichwalds *Cyclopteris nana*[4] zu *Cardiopteris* gebracht habe, hat mir Herr Kidston brieflich mitgetheilt, dass er nach Exemplaren aus Schottland schliessen muss, dass die Hauptspindel des Blattes, welche, wie bisher bekannt, unten ungetheilt und mit sitzenden Blättern von der gewöhnlichen *Cardiopteris*-Form versehen war, oben getheilt wurde und gestielte Blättchen (wie bei Eichwalds und Schmalhausens Figuren, l. c.) trug.

Dies ist noch ein Umstand, welcher dafür spricht, dass man am klügsten thut, ein isolirtes *Cardiopteris*-Blättchen nicht unter einem besonderen Artnamen aufzuführen, wie es auch Stur seiner Zeit hervorgehoben hat.[5]

Sphenopteridium? (Archæopteris) sp.

Taf. III, Fig. 12.

Aus dem Roberts-Thal stammt das einzig erhaltene Bruchstück, welches am meisten mit gewissen *Sphenopteridium*(*Archæopteris*)-Formen übereinzustimmen scheint, obschon auch an *Triphyllopteris* gedacht werden könnte. Der Mittelnerv ist auf der Zeichnung etwas zu schwach, auf der linken Seite desselben sehen wir unten das Fragment eines Läppchens, dann ein anderes Fragment etwas höher rechts, und endlich noch ein solches links oben, welches wahrscheinlich unmittelbar unter dem Endläppchen steht. Der Rest kann besonders mit *Sphenopteridium dissectum* Göppert sp.[6] und mit *Archæopteris Tschermaki* Stur[7] des Culms verglichen werden, obschon er selbstverständlich nicht näher bestimmbar ist.

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[1] Göppert, Ueber die fossile Flora der silurischen, der devonischen und unteren Kohlenformation. Nova acta etc. Vol. 27, 1860, S. 502, Taf. XXXVIII, Fig. 5, 6 (var. *rotundifolia*). — Feistmantel, Das Kohlenkalkvorkommen bei Rothwaltersdorf etc. Zeitschr. d. deutsch. geol. Gesellsch. 1873. S. 522, Taf. XVI, Fig. 21—24. — Schimper, Traité de pal. vég. I, p. 452.

[2] Stur, Culmflora, S. 48, Taf. XIV, Fig. 2, 3.

[3] Kidston, Catalogue etc. p. 84.

[4] Eichwald, Lethæa rossica, vol. I, p. 64, Taf. I a, Fig. 7. — Schmalhausen, Pflanzenreste der Steinkohlenformation am östlichen Abhange des Ural-Gebirges. Mém. de l'Acad. imp. des sciences de St. Pétersbourg. 7me Sér. Vol. 31. N:o 13.

[5] Stur, Culmflora, S. 288 (182).

[6] Göppert, l. c. S. 495, Taf. XXXVII, Fig. 3—5. — Feistmantel, l. c. S. 523, Taf. XVI, Fig. 25—27.

[7] Stur, l. c. S. 57, Taf. XII, Fig. 1; XVI, Fig. 1.

Farnspindeln.

Taf. IV, Fig. 1, 2; Taf. V, Fig. 1—3; Taf. X, Fig. 2, 3.

Cordaites borassifolius HEER (non STERNB. sp.), Beiträge etc. S. 22, Taf. V, Fig. 16, 17.
Cordaites principalis HEER (non GERMAR) l. c. S. 22, Taf. V, Fig. 12—15.
Cordaites palmæformis HEER (non GOEPPERT sp.) l. c. S. 23, Taf. II, Fig. 29, 30; V, Fig. 8 b.
Rhynchogonium crassirostre HEER (folia), l. c. S. 20, Taf. V, Fig. 3 b, c, 4 b, c.
Rhynchogonium costatum HEER (folia), l. c. S. 20, Taf. V, Fig. 10, 11.

Schon HEER hat vom Roberts-Thal mehrere Farnspindeln beschrieben, welche er zu *Sphenopteris flexibilis* und *Sph. frigida* gebracht hat (l. c. Taf. I, Fig. 22—26, 28; Taf. II, Fig. 7—11 b), obschon sie allerdings nicht in Verbindung mit den betreffenden Blättern gefunden sind. Aus derselben Lokalität führt er ferner Fragmente von scheinbar bandförmigen breiten Blättern an, welche er mit verschiedenen Arten von *Cordaites* vergleicht. In der That sind einige dieser Reste so dünn und blattähnlich, dass eine Verwechselung mit Cordaitenblättern leicht begreiflich wird, zumal nur kleine Stücke vorliegen. Schon eine genauere Untersuchung der HEER'schen Originale zeigt aber, für einen Theil derselben genügend, dass sie keine Blätter, sondern Farnspindeln sind. So kann man z. B. auf dem Original zu HEERS Taf. II, Fig. 30 stellenweise Eindrücke von Schuppen oder Stacheln beobachten, ganz wie auf HEERS Farnspindeln auf derselben Tafel, Fig. 8 und 9. Fig. 29 scheint auf der einen Seite einen Zweig abzugeben, die beiden muthmasslichen Blätter bei HEER Taf. V, Fig. 14 hängen in der That zusammen, wie zwei Abschnitte desselben Wedels. Fig. 12 b derselben Tafel ist eine gabelige Farnspindel u. s. w. Man braucht ferner nur die muthmasslichen *Rhynchogonium*-Blätter auf HEERS Taf. V. Fig. 4 c, 10, 11 mit den gestreiften Farnspindeln auf seiner Taf. II, Fig. 11, 11 b zu vergleichen, um einzusehen, dass sie übereinstimmende Reste sind, eine Vermuthung, welche durch die Untersuchung der Originale vollends bestätigt wird. Wenn noch einige Zweifel übrig bleiben könnten, so werden dieselben vollständig beseitigt durch die Beschaffenheit der grossen Farnspindeln, welche ich 1882 am Pyramidenberge sammelte, und welche mit HEERS muthmasslichen Cordaitenresten durchaus übereinstimmen. Ich verweise besonders auf Fig. 3 unserer Taf. V, welche ein etwa 25 Centimeter langes Exemplar einer fein gestreiften Farnspindel in etwa halber natürlicher Grösse darstellt. Dies Exemplar ist in der That so gedrückt und blattähnlich, dass es sehr wohl für ein Cordaitenblatt hätte gehalten werden können, falls nicht die Spindel glücklicherweise einen Seitenzweig (rechts gegen oben) abgegeben hätte. Man sieht daraus, dass sogar 20 Cm. lange blattähnliche Farnspindelstücke vorkommen können, ohne dass nothwendig ein Seitenzweig vorhanden sein muss. Nach alledem kann es als erwiesen betrachtet werden, dass HEERS muthmassliche *Cordaites*- und *Rhynchogonium*-Blätter nur gestreifte Farnspindeln sind. Ich füge zugleich hinzu, dass keine *Cordaites*-Blätter bisher auf Spitzbergen gefunden sind.

Für die Farnspindeln aus dem Roberts-Thal weise ich auf HEERS Arbeit hin und werde hier gelegentlich nur jene betrachten, welche ich 1882 am Pyramidenberge gesammelt habe, und von welchen einige besonders durch ihre kolossale Grösse ausgezeichnet sind. Es scheint, dass wenigstens zwei verschiedene Formenreihen getrennt werden können.

Die eine zeichnet sich durch eine gestreifte Spindel aus, deren Seitensegmente am Grunde nicht mit Stacheln versehen sind. Zu dieser Form gehören die auf Taf. V, sämmtlich in $^1/_2$ natürlicher Grösse abgebildeten Exemplare. Fig. 1 stellt den Abdruck eines etwa 44—45 Cm. langen, 8—9 Cm. breiten Exemplares dar, dessen ganze Oberfläche mit deutlichen Längsstreifen versehen ist. Die Kohlensubstanz ist an einigen Stellen erhalten, kaum millimeterdick. Nach unten ist ein Zweig in der Richtung gegen das Gestein abgegangen, dann sehen wir den Rest eines solchen links, dann rechts und die Andeutung noch eines vierten links oben (wo die Spindel etwas gebogen ist). Es geht daraus hervor, dass die Abschnitte eine alternirende oder spiralige Stellung an der Hauptrachis behauptet haben. Man könnte fragen, ob das vorliegende Exemplar nicht eher einen Stamm statt einer Spindel darstellt, was mir aber infolge der überaus dünnen Kohlenrinde sowohl auf diesem wie auf anderen Exemplaren nicht wahrscheinlich vorkommt. Ausser dem betreffenden Exemplare liegen mehrere Fragmente von ebenso breiten Spindeln vor. Ein solches dürfte möglicherweise die etwas erweiterte Basis der Hauptspindel darstellen. Ob die gestreifte Spindel Fig. 3, Taf. V zur selben Art gehört, lässt sich selbstverständlich nicht entscheiden. Dieselbe ist, wie schon erwähnt, überaus blattähnlich, dünn und mit sehr feinen Streifen versehen. Ein anderes Exemplar derselben Form ist etwa 44 Cm. lang, vollständig parallelseitig und giebt ebenfalls Seitenzweige ab, deren Abstand jedoch nicht angegeben werden kann, da nicht alle erhalten sind. In wie weit Taf. V, Fig. 2 hierher gehört, vermag ich nicht zu sagen. Recht ähnliche Spindeln sind von Ludwig aus dem oberdevonischen Schiefer bei Sinn beschrieben worden.[1]

Die andere Formenreihe der grossen Spindeln zeichnet sich dadurch aus, dass diese stachelig oder höckerig gewesen sind, und dass die Stacheln eine grössere Querausdehnung im Verhältniss zur Achse der Spindel behaupten. Auf Taf. IV, Fig. 1 habe ich ein solches Exemplar abbilden lassen. Dasselbe ist ein Abdruck, welcher im Sandstein des Pyramidenberges vorkommt, und welcher die Eindrücke der Stacheln über den grössten Theil der Oberfläche beobachten lässt, während andere Exemplare, wie Taf. X, Fig. 2, diese Eindrücke nur am Grunde der Primärsegmente beobachten lassen, was wohl davon abhängt, ob die äussere Rinde erhalten war oder nicht. Dass wir es mit wirklichen Stacheln und nicht mit Spreuschuppen zu thun haben, scheint daraus hervorzugehen, dass die Eindrücke derselben, obschon sie in Sandstein vorkommen, sehr scharf sind, wobei man in mehreren dieser Eindrücke noch die Reste eines recht dicken Kohlenbelegs beobachten kann. Wie aus Taf. IV, Fig. 1 hervorgeht, war die Stellung der Primärabschnitte auf der Hauptspindel eine abwechselnde (oder spiralige).

Es soll nicht unerwähnt bleiben, dass ein Exemplar dieser Form, welches etwa 37 Cm. lang ist, und welches auch in Sandstein liegt, stellenweise recht fein gestreift ist, so dass es etwas an die glatte Form Taf. V, Fig. 3 erinnert, obschon die Eindrücke der Stacheln auch hier am Grunde der Primärabschnitte deutlich sind. Ich glaube nicht, dass die Abwesenheit der Stacheln auf den Exemplaren in Schiefer durch die Zusammenpressung derselben erklärt werden kann, denn die Stacheln waren zu fest, um auf solche Weise gänzlich verwischt werden zu können, was auch dadurch bewiesen wird, dass man auf bedeu-

[1] Ludwig, Fossile Pflanzenreste aus der paläolitischen Formation etc. Palæontographica, Bd. 17, S. 121, Taf. XXV, Fig. 6, 8, 10.

tend kleineren gleichfalls in Schiefer vorkommenden Exemplaren dennoch ähnliche Quereindrücke beobachten kann (vergl. HEER, Beiträge etc., Taf. II, Fig. 7, 10). Die eigenthümliche, beinahe dictyoxylonähnliche Struktur des Exemplares Taf. X, Fig. 2 verdient endlich auch besonders hervorgehoben zu werden.

Welche Blätter die grossen Spindeln getragen haben, davon wissen wir augenblicklich nichts. Die auf Taf. IV, Fig. 4 abgebildeten Exemplare von *Sphenopteris Kidstoni* sind die einzigen Blattreste, welche mit ihnen zusammen gefunden worden sind, womit aber selbstverständlich nicht gesagt sein soll, dass sie auch zusammen gehören. An derselben Stelle kommen möglicherweise auch Reste von *Calymmatotheca bifida* vor.

Das Hauptinteresse bei den betreffenden Spindeln liegt gegenwärtig besonders in ihrer Grösse und in dem Umstande, dass Farne mit so kolossalen Wedeln auf Spitzbergen bei etwa 78° 35′ n. Br. gelebt haben können. Wenn wir die Spindel mit früher beschriebenen Exemplaren der Culmflora vergleichen, so erhellt sogleich, dass die unserigen nicht nur mit diesen bezüglich ihrer Grösse wetteifern können, sondern dass sie dieselben sogar übertreffen. *Calymmatotheca Stangeri* STUR und *C. Larischi* STUR können allerdings mit unserer Taf. IV, Fig. 1 und Taf. X, Fig. 2 in Hinsicht auf ihre Grösse verglichen werden, während sie gegen unsere Taf. V, Fig. 1 bedeutend zurückbleiben. Wenn auch die Breite dieser Spindel durch die Pressung etwas vergrössert sein kann, so bleibt sie doch immerhin bedeutend grösser als irgend welche andere Farnspindel aus entsprechenden Ablagerungen.

Von den kleineren Spindelresten mögen hier noch zwei erwähnt werden. Die eine, auf Taf. IV, Fig. 2 wiedergegebene, aus dem Sandstein des Pyramidenberges, zeigt eine gabelige Spindel, und in der Gabel der Zweige scheint die Andeutung einer Knospe vorhanden zu sein. Der linke Zweig sendet links noch einen Seitenzweig aus, und ein ähnlicher tritt auch auf der entsprechenden Stelle des rechten aus, während die übrigen Zweige desselben, mit Ausnahme der obersten, undeutlich sind. Ob wir es mit einer *Diplothmema* (STUR, Culmflora) zu thun haben, lässt sich selbstverständlich nicht entscheiden. Wenn nicht die kleine knospenähnliche Andeutung vorhanden wäre, so hätte man allerdings auch an die schon angeführte *Calymmatotheca*-Arten denken können. Auch sind ZEILLERS *Mariopteris*[1] und STERZELS *Dicksoniites Pluckeneti* SCHLOTH. sp.[2] in Betracht zu ziehen.

Ein anderes Exemplar, welches auch eine besondere Erwähnung verdient, ist unsere Fig. 3 auf Taf. X. Dasselbe liegt auf derselben Platte wie das Exemplar Taf. V, Fig. 2, ist aber z. Th. von anderen Fragmenten etwas bedeckt. Wenn es auf der Abbildung in richtiger Stellung placirt wäre, so würden die Seitenabschnitte nach unten gerichtet sein. Bis andere Exemplare gefunden werden, dürfte es aber am besten sein, keine Schlussfolgerungen aus dem vorliegenden zu ziehen.

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[1] ZEILLER, Note sur le genre *Mariopteris*. Bull. soc. géol. de France. 3me sér., t. 7, p. 92. 1879. — Bassin houiller de Valenciennes. Flore fossile, p. 159 ff.

[2] STERZEL, Ueber *Dicksoniites Pluckeneti* SCHLOTH. sp. Bot. Centralblatt. I. S. 282, Taf. VI. — Vergl. dazu noch die ausführliche Darstellung von POTONIÉ, Ueber einige Carbonfarne. III. Jahrb. d. k. preuss. geol. Landesanst. für 1891. S. 1 ff.

CALAMARIEÆ.

Calamites? sp.

Calamites radiatus HEER, Beiträge zur Steinkohlenflora der arktischen Zone. l. c. S. 4, Taf. I, Fig. 1, 3 (non 2).

Das Vorkommen von *Calamites*-Resten auf Spitzbergen muss noch als zweifelhaft betrachtet werden. Nach den Abbildungen, welche l. c. gegeben sind, wollte es allerdings erscheinen, als könnte darüber kein Zweifel existiren, bei der Untersuchung der Originale wird man aber zweifelnd. Was zuerst das Exemplar bei HEER, Taf. I, Fig. 1 betrifft, so existirt der oberste Knoten in der That nicht, und die rundlichen Warzen, welche bei den beiden anderen Knoten gezeichnet sind, sind ebenfalls nicht zu sehen. Man wird übrigens über die Knotennatur selbst sehr zweifelhaft. Was von HEER als Knoten aufgefasst ist, sind Kohlenpartien, welche sich quer über den Abdruck erstrecken. Wo aber diese Kohlenpartien stellenweise nicht erhalten sind, wie z. B. auf der linken Seite des unteren »Knoten», kann auf dem Abdruck nicht die geringste Spur eines Quereindrucks oder einer Knotenlinie beobachtet werden. Auch die Streifen sind auf der Figur sehr schematisirt; nur oben rechts kann man einige beobachten, welche aber nicht regelmässig gestellt sind. Meiner Meinung nach lässt sich vom betreffenden Exemplare die Zusammengehörigkeit mit *Calamites* in keiner Weise darthun, eine Meinung, welche noch mehr durch den mir vorliegenden Gegenabdruck bestätigt wird.

Als zu *Calamites* bestimmt nicht gehörend kann jedenfalls Fig. 2 betrachtet werden, welche sehr idealisirt gezeichnet ist, und in der That nur einen unregelmässigen Abdruck eines unbestimmbaren Rindenfragmentes darstellt.

Die meiste Ähnlichkeit mit *Calamites* bietet das Exemplar, welches HEER in seiner Fig. 3 hat abbilden lassen. Um von dieser Figur eine richtige Vorstellung von dem Original zu bekommen, muss man jedoch alle Streifen des unteren Theiles sowie die vom oberen Theile rechts als weggefallen annehmen, da in der That nur der Abdruck oben links gestreift ist, während die übrigen Theile eine sehr rauhe skulpturlose Oberfläche zeigen. Ob der muthmassliche Knoten ein solcher ist oder ob er nur einen Bruch im Stammfragment darstellt, lässt sich nicht entscheiden. Da wir uns ferner der Streifung der Farnspindeln erinnern, so bleibt es auch in diesem Falle zweifelhaft, ob wir einen Calamitenrest vor uns haben.

Ich kann schliesslich nicht umhin die Eigenthümlichkeit hervorzuheben, dass, obschon Calamitensteinkerne sonst diejenigen Reste sind, welche sogleich die Aufmerksamkeit der Sammler auf sich ziehen, so ist doch bisher kein einziger solcher Rest weder von Spitzbergen noch von der Bären-Insel mitgebracht worden, was allerdings nicht sehr für das Vorhandensein dieser Pflanzen dortselbst spricht, wenngleich freilich künftige Fünde vielleicht solche zum Vorschein bringen können.

Vorkommen. Sämmtliche hier besprochene Exemplare wurden 1870 von WILANDER und mir am Gipshuk gesammelt.

LYCOPODIACEÆ.

Lepidodendron Veltheimianum Sternberg mit Var. **acuminatum** Schimper (non Göppert?).

Taf. XII, Fig. 12—15.

Lepidodendron Robert in Gaimard, Voyages en Scandinavie etc. Texte t. 5, p. 91. Atlas pl. 19, fig. B.
Sagenaria acuminata Schimper, Terrain transition des Vosges, p. 338, pl. 26, fig. 1—5.
Lepidodendron Veltheimianum Heer, Beiträge zur Steinkohlenflora der arktischen Zone. S. 4, Taf. IV, Fig. 1—6; V, Fig. 3.
Lepidodendron Sternbergi Heer (non Brongniart), Beiträge zur fossilen Flora Spitzbergens. S. 11, Taf. III, Fig. 1, 2, 5—18, 20; IV, Fig. 3—4; V, Fig. 2 b, 5 c.
Lepidodendron selaginoides Heer (non Sternberg), Ibidem, S. 14, Taf. III, Fig. 21.
Lycopodites filiformis Heer, Ibidem, S. 11, Taf. III, Fig. 23 –25.
Walchia linearifolia Heer (non Goeppert), Ibidem, S. 23, Taf. II, Fig. 28.
?*Sphenophyllum subtile* Heer, Ibidem, S. 16, Taf. II, Fig. 25—26.
Lepidodendron Veltheimianum Schimper (ex parte), Traité, II, p. 29.
» » Kidston (ex parte), Catalogue, p. 160.

Die ersten aus Spitzbergen beschriebenen Exemplare des *Lepidodendron Veltheimianum* sind die, welche von Wilander und mir 1870 am Gipshuk gesammelt wurden, und welche einen Theil der Originale zu Heers »Beiträge zur Steinkohlenflora der arktischen Zone» darstellen. Es ist aber wahrscheinlich, dass auch das von Robert aus dem Belsund mitgebrachte Exemplar derselben Art angehört. Die Exemplare vom Gipshuk sind überhaupt nicht sehr gut erhalten, einige derselben lassen jedoch hinsichtlich ihrer Zusammengehörigkeit mit der betreffenden Art kaum einen Zweifel übrig.

Zu *Lepidodendron Veltheimianum* gehören ferner, wie schon Stur[1] und Kidston vermuthet haben, die Reste aus dem Roberts-Thal, welche Heer als *Lepidodendron Sternbergi* beschrieben hat, jedoch mit Ausnahme seiner Fig. 3, 4 und 19 auf Taf. III. Auf mehreren Exemplaren kann der Bau der Blattpolster gut beobachtet werden, und diese stimmen in allen Punkten mit denen von *L. Veltheimianum* überein und zeigen ganz deutlich die charakteristischen Querrunzeln etc. Die meisten Exemplare gehören zur Varietät *acuminatum* Schimper. Auch Heers *Lepidodendron selaginoides* ist, wie Kidston meinte, hierher zu bringen.

Dasselbe gilt ferner von *Lycopodites filiformis* Heer, wie das mir vorliegende Original deutlich zeigt. Was in Heers Abbildungen als Blätter dargestellt ist, sind nur die abgebrochenen Reste derselben, zwischen welchen jedoch einige vollständige Blätter, etwa wie in seiner Fig. 15, zu sehen sind. Diese Blätter sind von Heer übersehen worden, und so kommt es, dass er diese Form als *Lycopodites* auffassen konnte.

Walchia linearifolia bei Heer scheint mir ferner nur als ein blatttragender Zweig von *Lepidodendron Veltheimianum* gedeutet werden zu können. Das Original ist allerdings nicht wiederzufinden, man braucht aber nur die von Geinitz abgebildeten blatttragenden Äste von *L. Veltheimianum* zu vergleichen (Hainichen-Ebersdorf Taf. IV, Fig. 1), um über die Zusammengehörigkeit dieser Art überzeugt zu werden, was auch von einigen

[1] Verhandl. d. k. k. geol. Reichsanstalt 1877. S. 81.

von HEER nicht abgebildeten Exemplaren von *L. Veltheimianum* aus dem Roberts-Thal bestätigt wird. HEER war wohl auch hier von der Vorstellung beeinflusst, dass die Ablagerung zu einem bedeutend höheren Horizonte gehörte.

Aber auch HEERS *Sphenophyllum subtile* scheint mir hierher zu bringen zu sein, und zwar als ein schlecht erhaltener Zapfenrest mit zerrissenen Sporangienträgern. Es liegen nämlich einige solche Zapfenreste vor, welche der HEER'schen Figur überaus ähnlich sind. Da ich aber HEERS Original leider nicht wiederfinden konnte, so kann diese Vermuthung nicht bewiesen werden, obschon ich über die Richtigkeit derselben selbst keinen Zweifel hege.

Ausser vom Gipshuk und aus dem Roberts-Thal, liegen Reste von *Lepidodendron Veltheimianum* auch vom Mitterhuk im Belsund, und zwar sowohl von dessen Südseite wie Nordseite, vor. Sie gehören sämmtlich zur Varietät *acuminatum* der Autoren, welche ich meinerseits eher für eine selbständige Art als für eine Varietät betrachten möchte, obschon es in praktischer Hinsicht vielleicht unmöglich ist, eine Trennung der beiden Formen durchzuführen. Ich habe zwei Abdrücke von *acuminatum* auf Taf. XII, Fig. 12 (vergrössert 13) und 14 (vergrössert 15) abbilden lassen, um die Beschaffenheit der Blattpolster dieser typischen Form desselben zu zeigen. Fig. 12 stellt einen Abdruck der Rinde dar, welche auf der Gegenplatte noch erhalten ist. Die Blattpolster sind gegen oben und unten sehr zugespitzt, und mit ihrem oberen und unteren Ende in einander verlaufend. Die Blattnarbe ist nicht zu beobachten, man sieht nur an deren Stelle einen etwas schiefen rinnenförmigen Eindruck. Ich habe ein ganz übereinstimmendes Exemplar aus der »Calciferous Sandstone Series» Schottlands durch Herrn KIDSTON erhalten, woraus hervorzugehen scheint, dass die Blattbasen noch anwesend sind, in Folge dessen keine Narben beobachtet werden können. Die Oberfläche der Polster ist durch sehr charakteristische Eindrücke (resp. Runzeln) ausgezeichnet, welche jedoch noch besser auf dem anderen Exemplare, welches wir jetzt betrachten wollen, zu beobachten sind. Dies, Fig. 14, vergrössert 15, ist ebenfalls ein Abdruck der Rindenoberfläche, der Gegenabdruck ist nicht erhalten. Die Runzeln der Blattpolster treten hier am unteren Theile derselben als kurze von jeder Seite gegen die Mitte und etwas schräg gegen unten gerichtete Eindrücke hervor, während der obere Theil des Polsters nur punktförmige Eindrücke zeigt. Die Blattnarbe ist rundlich, und auf wenigstens einer derselben glaube ich die drei gewöhnlichen Lepidodendronmale beobachten zu können. Eigenthümlich ist die dreieckige Partie, unmittelbar oberhalb der Blattnarbe, welche in gewisser Beleuchtung als eine Fortsetzung derselben aussieht. In der Mitte dieser Partie läuft eine kielförmige Erhöhung, und auch die Seiten werden von ähnlichen Erhöhungen begrenzt. Während die mittlere wohl STURS »Ligulargrube» entsprechen dürfte, wage ich über die übrigen keine bestimmte Meinung auszusprechen.

Während es mir kaum zweifelhaft erscheint, dass die spitzbergische Pflanze mit jener Form, welche von SCHIMPER und anderen Autoren zu GÖPPERTS *Sagenaria acuminata* gebracht worden ist, identisch sein muss, dürfte es nach STURS Beschreibung derselben[1] als sehr zweifelhaft betrachtet werden, ob die betreffenden Autoren recht hatten, als sie ihre Exemplare mit GÖPPERTS Pflanze vereinigten. Ich meinerseits glaube wenig-

[1] STUR, Culmflora, S. 366, 397, Taf. XXXIX, Fig. 4.

stens am besten zu thun, wenn ich SCHIMPERS *Sagenaria acuminata* bis auf weiteres als eine von GÖPPERTS getrennte Art betrachte. Wenigstens richtet man hierdurch keinen Schaden an, während dasselbe nicht von dem entgegengesetzten Verfahren, bevor die Zusammengehörigkeit bewiesen worden ist, gesagt werden kann.

Zu SCHIMPERS *Lepidodendron Veltheimianum acuminatum* gehören, ausser der von SCHIMPER selbst aus den Vogesen beschriebenen Pflanze,[1] wohl auch die von O. FEISTMANTEL aus Rothwaltersdorf als *L. Veltheimianum* beschriebenen Exemplare Fig. 31 und 32. *Lepidodendron Losseni* WEISS[2] (= *L. gracile* A. ROEMER) dürfte ebenfalls hierher zu rechnen sein, ebenso wie *Lycopodites? subtilis* A. ROEMER,[3] welches schon von SCHIMPER mit *Lepidodendron Veltheimianum* vereinigt worden ist.

Es scheint mir sogar nicht ganz unmöglich, dass auch ROEMERS *L. Jaschei*[4] hierher gehören könnte, denn bei einigen Exemplaren aus Spitzbergen, und zwar bei denen, welche etwas schematisch bei HEER in »Steinkohlenflora der arktischen Zone» Taf. IV, Fig. 1 und in »Beiträge zur fossilen Flora Spitzbergens» Taf. III, Fig. 2 abgebildet sind, sind die Blattpolster recht weit von einander getrennt, obschon allerdings nicht in dem Grade, wie bei *L. Jaschei.* Der Bau der Blattpolster bei dieser Art zeigt jedenfalls, dass dieselbe, wenn auch nicht mit der vorliegenden identisch, doch immerhin mit dieser nahe verwandt sein muss.

Dass *Lepidodendron acuminatum* SCHIMPER auch in der »Calciferous Sandstone Series» bei Edinburgh vorkommt, ist schon oben erwähnt. Auch in Australien dürfte diese Art in den untercarbonischen Lagern zu Hause sein, denn die von FEISTMANTEL[5] als *L. rimosum* beschriebene Pflanze kann wohl nicht von *L. acuminatum* getrennt werden. Es ist hierbei zu bemerken, dass der Name *rimosum* nicht von FEISTMANTEL selbst, sondern von CLARKE gegeben war, und dass FEISTMANTEL selbst die Meinung ausspricht, dass in der betreffenden Pflanze eher »eine der Formen des vielgestaltigen *Lepidodendron Veltheimianum* STBG. vorliegt».

Lepidodendron acuminatum wird, wie schon erwähnt, jetzt meistens mit *L. Veltheimianum* vereinigt. Über die Richtigkeit oder Unrichtigkeit dieser Auffassung kann ich mich nicht aussprechen, denn die spitzbergischen Exemplare reichen nicht hin, um diese Frage zu entscheiden. Mir ist es aber auffallend, dass bisher kein typisches Exemplar von *Lepidodendron Veltheimianum* auf Spitzbergen gefunden ist. Am meisten nähern sich demselben die von HEER in seiner Steinkohlenflora Taf. IV, Fig. 2 und 3 und in seinen »Beiträge» Taf. III, Fig. 1 abgebildeten Exemplare. Diese Abbildungen sind aber, wie auch die übrigen in demselben Werk, nicht wenig schematisirt, und die Originale sind in der That recht undeutlich, so dass man den Bau ihrer Blattpolster nicht sicher ermitteln kann, obschon sie immerhin relativ breiter als bei *acuminatum* zu sein scheinen.

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[1] Terr. transition des Vosges, p. 338, pl. XXVI, fig. 1—5.

[2] Zur Flora der ältesten Schichten des Harzes. Jahrb. d. k. preuss. geol. Landesanstalt für 1884, S. 169, Taf. VI, Fig. 6, 7.

[3] Palæontographica, III, S. 46, Taf. VII, Fig. 12.

[4] WEISS, l. c. S. 168, Taf. VI, Fig. 4.

[5] Palæontographica, Suppl. III, Lief. III, Heft 2, S. 77, Taf. V, Fig. 2.

Es ist daher möglich, dass sie wirklich zu *Lepidodendron Veltheimianum* gehören, und da ich ferner nicht bestreiten kann, dass Übergänge zwischen beiden Formen vorhanden sind, habe ich dieselben, wie hier geschehen, zusammengebracht.

Lepidodendron Veltheimianum kommt bekanntlich auch in einem *Ulodendronstadium* vor, und gegenwärtig werden wohl von den meisten Autoren die grossen Narben als Anhaftungsstellen der Fruchtzapfen betrachtet. Andrerseits wurde hiergegen eingewendet, dass man auch endständige Fruchtzapfen gefunden hat. Heer hat z. B. einen solchen in seinen »Beiträge» Taf. III, Fig. 8 abgebildet (eine neue Abbildung desselben Exemplares enthält unsere Taf. X, Fig. 17). Gegen Kidstons Vermuthung, dass dieselbe Art sowohl endständige wie seitliche (sessile) Zapfen getragen haben könnte, hebt Zeiller[1] die Möglichkeit hervor, dass die endständigen Zapfen nicht zu *L. Veltheimianum*, sondern zu einer anderen Art gehören können, z. B. zu *L. acuminatum*. In der That ist es sehr wahrscheinlich, dass der von Heer beschriebene Zapfen zu unserem *acuminatum* gehört, da mehrere solche Zapfenreste recht häufig zusammen mit den Zweigresten dieser Form vorkommen. Damit ist allerdings nicht bewiesen, dass auch andere endständige Zapfen, welche zusammen mit *L. Veltheimianum* vorkommen, zu *acuminatum* gehören, und die Frage bleibt demzufolge ebenso offen wie vorher. Wir werden übrigens unten sehen, dass am Gipshuk eine *Halonia* zusammen mit den Lepidodendronresten vorkommt, wodurch die Sache etwas verwickelt wird.

Da Solms bemerkt,[2] dass Abbildungen, welche die Zugehörigkeit der Zapfen mit notorischen Lepidodendronzweigen darlegen, »in der Literatur nur spärlich zu finden sind», habe ich es für angemessen gehalten, ein schönes diesbezügliches Exemplar von *Lepidodendron elegans* aus der Goldenberg'schen Sammlung (jetzt in Stockholm) hier auf Taf. XVI, Fig. 11 abbilden zu lassen.

Vorkommen. Auf Spitzbergen ist das typische *acuminatum* im Roberts-Thal gefunden. Ferner habe ich ausgezeichnete Exemplare auf der Südseite des Mitterhuks im Belsund angetroffen, während De Geer die beiden abgebildeten auf dessen Nordseite gefunden hat. Die am Gipshuk im Eisfjorde gefundenen Exemplare sind meistens nicht gut erhalten, doch würden einige derselben ebenfalls am ehesten zu *acuminatum* zu bringen sein. Andere dagegen dürften zu *Veltheimianum* gehören, was auch von einem Exemplar aus dem Roberts-Thal, sowie von einem anderen von der Nordseite des Mitterhuks im Belsund gilt (Taf. IX, Fig. 3, das kleine Stück oben links).

Lepidodendron Heeri n. sp.

Taf. VI, Fig. 3—10; VII, Fig. 8—13; VIII, Fig. 1—2; X, Fig. 4—10, 11(?).

Lepidodondron Sternbergi Heer (ex parte), Beiträge zur fossilen Flora Spitzbergens, Taf. III, Fig. 19.

Die Blattpolster dieser Art sind bei typischen Exemplaren dicht gestellt, polygonal, zuweilen ziemlich regelmässig hexagonal, mit der Blattnarbe dicht am oberen Ende des Polsters, so dass man hier nicht von einer oberen und unteren, durch die Narbe getrennte Abtheilung des Polsters sprechen kann. Die Blattnarbe selbst ist rundlich, und

[1] Flore fossile du bassin houiller de Valenciennes, p. 455.

[2] Einleitung in die Paläophytologie, S. 238—239.

zeigt meistens nur ein Mal im unteren Theile, zuweilen auch die sog. Ligulargrube (Taf. VI, Fig. 7). An einem Exemplare, Taf. VI, Fig. 9, sieht man auch die beiden Male auf jeder Seite des mittleren (Fig. 10 vergrössert). Obschon diese Male hier deutlich hervortreten, lässt es sich wohl denken, dass sie nur zufällig sind. Die Medianleiste ist häufig nicht zu beobachten, während sie bei gewissen Formen deutlicher ist. Es kommt nämlich ausser der typischen Form noch eine andere vor, deren Blattpolster oben rundlich sind, während sie gegen unten in die Länge gezogen sind, mit deutlicher Medianleiste. Solche Blattpolster kommen nur auf kleinen Zweigen vor (Taf. VII, Fig. 8, X, Fig. 5 vergrössert), und man kann deutliche Übergänge zwischen denselben und der normalen Form beobachten. Wenn die Blattpolster gegen aussen etwas verlängert sind, so hat die Blattnarbe selbstverständlich nur einen schiefen Abdruck am oberen Ende des Polsters hervorbringen können (Taf. VII, Fig. 9—12).

Eine besondere Besprechung verdienen die beiden Exemplare Taf. VII, Fig. 9 (vergrössert Fig. 10) und Taf. VIII, Fig. 2 (vergrössert Taf. X, Fig. 6). Jenes stellt links den Abdruck der Rindenoberfläche dar, und an den Blattnarben haftet noch etwas Kohle. Diese Abdrücke der Blattpolster finden sich im grauen Thone. Unter dieser Thonschicht, welche nur einen Bruchtheil eines Millimeters beträgt, kommt eine glatte Fläche vor, Taf. VII, Fig. 9 und 10 rechts, welche gegen oben konvexe Narben von der Form eines Cirkelsektors zeigt. Am unteren Ende dieser Narben steht ein rundliches Mal, welches ohne Zweifel dem schon erwähnten Mal am unteren Ende der Blattnarbe (Taf. VI, Fig. 7) entspricht.

Wie sind nun diese Narben zu deuten und wie sind sie entstanden? Dass sie in unmittelbarem Zusammenhang mit den Abdrücken der Blattpolster stehen, lässt sich durch Präpariren direkt beweisen, denn wenn man die dünne Thonschicht unter den Abdrücken der Blattpolster links wegnimmt, kann man die Verbindung direkt beobachten. Taf. X, Fig. 6 zeigt dies sehr deutlich, obschon die Narben hier eine unregelmässige Form behaupten.

Angesichts dieser Verhältnisse scheint mir die glatte Fläche mit den halbmondförmigen Narben von der Epidermis oder Cuticula, in welcher Löcher für die Blätter vorhanden waren, herzurühren. Diese Cuticula muss sich aber vom Stamme losgetrennt haben, so dass etwas Thonschlamm in den Zwischenraum eindringen konnte. In dieser Schlammschicht hat nun die ihrer Cuticula beraubte Zweigoberfläche mit den Blattpolstern einen Eindruck gemacht, während die Cuticula ihrerseits einen Abdruck im umgebenden Schlamme hervorbringen konnte. Die Narben, welche sich im Abdruck der Cuticula finden, sind, da sie den Öffnungen in dieser entsprechen, selbstverständlich keine Eindrücke, sondern treten vielmehr als kleine Erhöhungen hervor. Nach der Form derselben in Taf. VII, Fig. 10, wo sie ganz regelmässig sind, zu urtheilen, dürften die Blätter oben gewölbt, unten gekielt gewesen sein. Anhaftende Blätter dieser Art habe ich nur einmal beobachtet, und zwar an dem Zweiglein Taf. X, Fig. 4 (vergrössert Fig. 4a). Wie aus diesem Exemplar erhellt, waren sie sehr kurz, nach oben gebogen.

Eine andere Erscheinung, welche noch besprochen werden mag, ist die zonenweise geschehene Veränderung der Blattpolster, welche in einigen Fällen vorkommt. In Taf. VIII, Fig. 2 sehen wir die Polster unten ganz normal, dann werden sie dicht gedrängt, klein und rhombisch, dann grösser und unregelmässig polygonal, d. h. die ganze

Erscheinung erinnert an die alternirenden Narben der Blätter, Schuppenblätter und fertilen Blätter bei *Cycas*. In Fig. 1 derselben Tafel sind die Polster unten klein und quergezogen, rhombisch, werden aber nach oben zu grösser und nehmen dann allmählich ihre normale Form wieder an, was ich nach Entfernung der Kohlenrinde am oberen Ende des betreffenden Exemplares konstatiren konnte. Auch in Taf. X, Fig. 8 sehen wir, wie die Blattpolster unten normal, dagegen am oberen Ende des Zweigstückes kleiner und rhombisch werden. Ähnliche Veränderungen sieht man bei Halonien und Ulodendren in der Nähe der grossen Narben, was bei unserer Pflanze aber auf einer anderen Ursache beruhen muss, da keine solche Narben vorhanden sind, und da die Veränderungen sich quer über die ganze Oberfläche erstrecken. Vielmehr dürfte jene Erscheinung ihre Ursache in periodischen Veränderungen des Wachsthums haben.

Ausser dieser Variabilität bei den Blattpolstern, kann man zuweilen auch eine Ausdehnung derselben beobachten, so dass sie vorn etwas zugespitzt werden. Taf. X, Fig. 10 in doppeltem Massstabe zeigt eine solche Veränderung, welche mit der Verzweigung in Verbindung stehen dürfte. Wir sehen, dass die unteren, ziemlich regelmässig polygonalen Polster auf dem linken Zweig oben etwas zugespitzt werden. Auch das Exemplar Taf. X, Fig. 11 in doppelter Grösse dürfte hierher gehören, obschon die Polster ungewöhnlich verlängert sind. Am oberen Ende dieses Exemplares ist noch ein Steinkern von Thon beibehalten, welcher die hohle Rinde ausgefüllt hat. Auf der Oberfläche desselben kann man mit der Loupe und unter dem Mikroskop deutliche Abdrücke von kleinen, wie es scheint, rektangulären Zellen beobachten.

Es erübrigt noch eine andere Erscheinung zu besprechen. Das Exemplar Taf. VI, Fig. 9, welches den Abdruck eines Zweiges darstellt, hat eine kleine rundliche Fläche, welche keine Abdrücke der Blattpolster zeigt. Diese Fläche ist etwas erhöht und stellt wohl den Abdruck des entrindeten Holzes dar, d. h. die Rinde muss hier beschädigt gewesen sein. Dass es sich um eine Anhaftungsstelle von einem seitlichen Organ handeln könnte, scheint mir durchaus ausgeschlossen zu sein, da die Blattpolster keine Änderung ihrer Stellung zeigen und keine Spur eines grösseren Gefässbündels, neben den kleinen, welche zu den Blättern geführt haben, zu beobachten ist. Ein anderes Exemplar, Taf. X, Fig. 9, zeigt ebenfalls zwei ähnliche Partien, aber hier sind die Blattpolster in der Nähe derselben sehr verkleinert und zusammengedrängt, doch in keiner Weise regelmässig geordnet. Das wahrscheinlichste ist wohl, dass es sich hier um eine Beschädigung des Zweiges schon während dessen Lebenszeit handelt, so dass die die beschädigte Stelle umgebende Fläche davon beeinflusst wurde.

Mit früher bekannten Arten scheint *Lepidodendron Heeri* keine nähere Ähnlichkeit zu zeigen, obschon es erwünscht gewesen wäre, wenn auch grössere Stammfragmente hätten untersucht werden können.

Vorkommen. Die meisten Exemplare dieser Art wurden von mir am Ingeborgs-Fjell gesammelt, während einige andere in De Geers Sammlung von der nördlichen Seite des Mitterhuks im Belsund vorhanden sind. Auch liegen einige Exemplare aus dem Roberts-Thal vor, und möglicherweise gehört auch zu dieser Art ein schlecht erhaltenes Exemplar, welches in einem losen Sandsteingeschiebe auf der Westseite der Klaas-Billen-Bay in der Nähe des Pyramidenberges gefunden wurde.

Lepidodendron spetsbergense n. sp.

Taf. VII, Fig. 1—7; IX, Fig. 3, 4 (?); X, Fig. 14, 15.

Lepidodendron Sternbergi Heer (ex parte), Beiträge etc., l. c. S. 13, Taf. III, Fig. 3, 4.

Bei dieser Art sind die Blattpolster sowohl nach oben wie nach unten in die Länge gezogen, einander wenigstens bei mittelgrossen Zweigen nicht seitlich berührend, und werden bei zunehmendem Zuwachs mehr und mehr von einander getrennt. Die Blattnarbe befindet sich im oberen Drittel oder wenigstens in der oberen Hälfte des Polsters und besitzt eine quer-ovale Gestalt. Ich habe in derselben zuweilen ein Mal wie bei der vorigen Art beobachten können, auch ist die »Ligulargrube» hier und da zu sehen (Taf. VII, Fig. 2). Die Rinde scheint länglich gestreift gewesen zu sein und ist sogar mitunter stark gerunzelt (Taf. VII, Fig. 1, rechts, Fig. 3), etwa wie bei *Lepidodendron rimosum*. Ein Mediankiel im unteren Theile des Polsters kann zuweilen beobachtet werden (Taf. VII, Fig. 7, 2).

Wenn die Blattnarbe nahe dem oberen Ende des Polsters steht, wie in Taf. VII, Fig. 4, so erhält das Exemplar eine gewisse Ähnlichkeit mit der vorigen Art, obschon ich kaum glaube, dass sie zusammen gehören können, da die Blattpolster auch hier nach unten viel mehr zugespitzt sind, während sie an ebenso grossen Exemplaren von *L. Heeri* (Taf. VI, Fig. 5, 8) immer dicht gedrängt stehen, mit einem ganz anderen Umriss. Es kommen allerdings Bruchstücke vor, bei welchen es schwer zu sagen ist, ob sie zu dieser oder jener Art gehören. Solche Bruchstücke dürfen aber nicht als Übergänge betrachtet werden, ebenso wenig wie fragmentarische blattlose Zweigstücke von verschiedenen recenten *Pinus*-Arten beweisen, dass die Arten nicht getrennt werden können, nur weil wir solche Fragmente nicht unterscheiden können. Ich glaube demzufolge, die Arten bis auf weiteres getrennt halten zu müssen. Sollte es sich aber später erweisen, dass sie zusammen gehören, dann dürfte für beide der Name *L. Heeri* beibehalten werden können.

Dass Heers Fig. 3 und 4 auf seiner Taf. III auch zu unserem *L. spetsbergense* gehört, scheint mir nicht bezweifelt werden zu können. Das Original seiner Fig. 3 ist sehr verwischt, von Fig. 4 gebe ich hier eine neue Abbildung, Taf. X, Fig. 14, mit einem Blattpolster desselben vergrössert in Fig. 15. Daraus erhellt, dass es mit unserem Taf. VII, Fig. 1 vollständig übereinstimmt.

Heer hielt diese Form für Aststücke, mit abgefallener Rinde. Dies kann wohl nicht richtig sein, obschon ich nicht überzeugt bin, dass es sich um die äusserste Rindenfläche handelt. Leider liegt der Gegenabdruck zu unserer Taf. VII, Fig. 1 nicht vor. Ein anderes, mit diesem ganz übereinstimmendes Exemplar aus derselben Lokalität ist noch grösser, etwa 12 Cm. breit und 25 Cm. lang, während ganz strukturlose möglicherweise hierher gehörende Stammstücke desselben Fundortes sogar eine Breite von mehr als 20 Cm. messen, ohne jedoch in ihrer ganzen Breite vorzuliegen.

Von schon beschriebenen *Lepidodendron*-Arten hat die vorliegende Art einige Ähnlichkeit mit *Lepidodendron rimosum* Sternberg,[1] bei welchem auch die Blattpolster getrennt sind, während die zwischenliegende Oberfläche mit länglichen Runzeln versehen

[1] Vergl. Schimper, Traité de pal. vég. II, p. 33.

ist. Die Blattnarbe hat jedoch eine ganz andere Gestalt, und ist etwa in die Mitte des Polsters gestellt.

Auch Abdrücke von älteren Stammstücken von DAWSONS *Lepidodendron corrugatum*[1] sehen nicht unähnlich aus, obschon die Blattpolster vorn nicht so weit in die Länge gezogen sind.

Vorkommen. Die meisten Exemplare dieser Art wurden von DE GEER auf der Nordseite des Mitterhuks im Belsund gesammelt. Ein einziges Exemplar (Taf. VII, Fig. 6) habe ich vom Ingeborgs-Fjell bekommen, während drei andere aus dem Roberts-Thal vorliegen. Möglicherweise kommt die Art auch am Pyramidenberg vor.

Lepidodendron sp.

Taf. X, Fig. 12, 13 (vergrössert).

Nur das kleine abgebildete Fragment liegt vor. Die Blattpolster sind länglich oval, oben und unten stumpf, von einander getrennt, mit einer rundlichen Blattnarbe am oberen Ende. Vielleicht ist es nur eine Form von *Lepidodendron spetsbergense*, wenngleich die Stellung der Blattpolster auf dem Stamme und die runden Narben sogar an *Cyclostigma* erinnern. Das Fragment ist selbstverständlich nicht bestimmbar, ich wollte es aber nicht unerwähnt lassen.

Vorkommen. Zusammen mit der vorigen Art auf der Nordseite des Mitterhuks im Belsund.

Knorrien und andere Abdrücke verschiedener mittlerer und innerer Rindenflächen.

Taf. VI, Fig. 1, 2; VIII, Fig. 4—8; IX, Fig. 1, 2, 4, 5; X, Fig. 7, 21 (vergrössert), 22.

Wie gewöhnlich kommen neben den Abdrücken der Rindenoberfläche auch hier solche von anderen Rindenflächen vor, deren Zusammengehörigkeit mit den oben beschriebenen Resten nicht sicher zu ermitteln ist, weshalb es angemessen erscheint, dieselben besonders zu besprechen.

Taf. VI, Fig. 1 zeigt den Abdruck einer inneren Rindenfläche eines grossen Stammes vom Gipshuk, wo er schon 1870 von WILANDER und mir gesammelt wurde. Ein anderes Stück, Fortsetzung des abgebildeten, hat eine Länge von etwa 40 Cm., bei einer Breite von 23 Cm., ohne jedoch mit dem ganzen Durchmesser vorzuliegen. Die Rinde scheint mit mehreren Längsrissen aufgebrochen zu sein und macht demzufolge einen etwas sigillarienähnlichen Eindruck. An mehreren Stellen können in schiefen Reihen ziemlich entfernt von einander gestellte Wülste beobachtet werden. Sie zeigen zuweilen, obschon hier nicht deutlich, eine kleine Vertiefung, die als die Durchgangsstelle der Blattspur (oder eines Kanales) gedeutet wird. Die hauptsächliche Bedeutung dieses Exemplares liegt in seiner Grösse, welche erkennen lässt, dass die Lepidodendreen auf Spitzbergen ebenso gross wie im mittleren Europa wuchsen, was mit dem Vorkommen der grossen Stigmarien an derselben Lokalität vollständig im Einklang steht.

[1] DAWSON, Report on the fossil plants of the lower carboniferous and millstone grit formations of Canada, p. 19. Montreal 1873. Geol. Survey of Canada.

HEER hat aus derselben Lokalität einen Abdruck abgebildet,[1] welchen er als die innere Rinde gedeutet hat. »Die Warzen sind ganz flach, treten kaum merklich hervor, sind in die Länge gezogen und sind oben mit einem ganz seichten Längseindruck versehen.» Da die Zeichnung dieses Exemplares, welches wohl als eine ächte *Knorria* aufgefasst werden muss, in HEERS Arbeit nicht ganz gelungen erscheint, so habe ich auf Taf. X, Fig. 22 eine kleine Partie desselben Stückes wieder abbilden lassen.

Die vom Gipshuk stammenden, soeben besprochenen Abdrücke kommen dort mit *Lepidodendron Veltheimianum* zusammen vor, und es ist wohl wahrscheinlich, dass wenigstens das grosse Stammstück zu dieser Art gehört, wenn es auch nicht bewiesen werden kann. Dagegen ist es zweifelhaft, ob die *Knorria*-Form, wie HEER annahm, auch zur selben Art gehört.

Das kleine Exemplar Taf. VIII, Fig. 3 zeigt einen dem letztgenannten ähnlichen Bau. Es ist die Ausfüllung (Steinkern) eines Rindenrohres, mit spiralig gestellten Wülsten, welche den Längseindruek deutlich zeigen. Es stammt vom Ingeborgs-Fjell. Das Exemplar Taf. VIII, Fig. 5, aus derselben Lokalität, zeigt eine längsrunzelige Oberfläche mit länglichen Wülsten, die zuweilen in ihrer Mitte einen kleinen Längseindruck erkennen lassen.

Wie Taf. VI, Fig. 2 zu deuten ist, vermag ich nicht zu sagen, man könnte allerdings an *Bothrodendron* denken; die Oberfläche ist mit etwas welligen Streifen und drei kleinen rundlichen Narben versehen.

Hier sollte auch *Cyclostigma Nathorsti* HEER (Beiträge zur Steinkohlenflora etc. S. 6, Taf. I, Fig. 5), aus der inneren Bucht der Klaas-Billen-Bay, erwähnt werden. Die Oberfläche ist von unregelmässigen Längsstreifen durchzogen, wie HEERS Figur etwas schematisch zeigt, wogegen die in derselben Figur befindlichen Narben in der That nicht oder nur als undeutliche und zufällige Eindrücke existiren. Der Rest ist auf keinen Fall bestimmbar und sollte als Art eingezogen werden, ja es lässt sich überhaupt nicht sagen, ob es sich um einen *Lepidodendron*-Rest oder um eine Farnspindel handelt.

Dasselbe gilt auch für das Exemplar unserer Taf. IX, Fig. 4, welches wahrscheinlich einen vollständig entrindeten *Lepidodendron*-Rest darstellt, obschon es nicht ganz unmöglich wäre, dass es eine Farnspindel ist. Der Rest stammt vom Pyramidenberg, wo die grossen Farnspindeln vorkommen. Die Art der Verzweigung scheint allerdings am meisten für *Lepidodendron* zu sprechen.

Eigenthümlich ist das Exemplar Taf. IX, Fig. 1, welches von der Nordseite des Mitterhuks im Belsund vorliegt, und welches einen plattgedrückten Steinkern (in schwarzem bituminösen Schiefer) darstellt, allerdings mit einem sehr dünnen Kohlenüberzug. Die Oberfläche ist mit feinen, aber sehr scharfen, länglichen, etwa $^1/_2$ Mm. von einander entfernten, hie und da schief anastomosirenden Streifen (Furchen) und überdies mit in Schrägzeilen gestellten Narben versehen. Diese lassen sich aber nur bei gewisser Beleuchtung erkennen, und die Figur ist demzufolge insofern etwas schematisirt, als sie dieselben ein wenig zu deutlich darstellt. Sie scheinen im Verhältniss zur gestreiften Oberfläche etwas tiefer zu liegen, und treten dadurch hervor, dass die Streifen nicht über dieselben ver-

[1] HEER, Beiträge zur Steinkohlenflora der arktischen Zone l. c. Taf. IV, Fig. 4.

laufen (Fig. 2). Ihr Umriss ist ziemlich unbestimmt, sie scheinen aber gegen unten etwas verschmälert zu sein.

Wie im vorhergehenden verzichte ich auch hier gänzlich darauf, eine Deutung dieses Abdruckes in Bezug auf die Natur der betreffenden Rindenfläche[1] wie auf dessen Artbestimmung zu geben. Doch könnte allerdings *Bothrodendron Wijkianum* in Betracht gezogen werden, bei welchem auch breite Narben und eine nicht unähnliche Streifung vorkommen, wennschon die Streifen nicht so weit verlaufen und nicht so deutlich von einander getrennt sind. Die Deutung des vorliegenden Fossils muss demzufolge der Zukunft vorbehalten werden.

Auch das Exemplar Taf. IX, Fig. 5 (vergrössert Taf. X, Fig. 21) bleibt zweifelhaft. Die Stellung der Narben macht zunächst einen *Cyclostigma*-ähnlichen Eindruck. Diese Narben scheinen deshalb scharf hervorzutreten, weil sie durch eine Kohlenpartie bezeichnet sind. Wird aber diese Partie durch Verbrennung entfernt, was nur mit Schwierigkeit gelingen kann, so treten die Narben als kleine, rundliche, gegen die Umgebung nicht scharf begrenzte Gruben hervor (Taf. X, Fig. 21), in welchen keine Male zu sehen sind. Ringsum diese Gruben erscheint eine Anordnung von Streifen, wie die Figuren besser als Beschreibung zeigen. Nach diesem Baue dürfte es sich wohl am ehesten um eine sog. *Aspidiaria*-Form handeln. Das Exemplar stammt vom Pyramidenberge.

Die Formen, welche jetzt zu besprechen sind, gehören zu den sogenannten Knorrien, von welchen allerdings auch vorher schon ein paar Beispiele erwähnt wurden. *Knorria* ist bekanntlich nur ein Erhaltungszustand verschiedener Lepidophyten, und zwar nicht ein Kern oder Abdruck der inneren Rinde, sondern einer mittleren Fläche derselben. Man kennt Knorrien von *Lepidodendron*, ferner von einer *Lepidodendron*-ähnlichen Pflanze, welche Renault als eine selbständige Gattung *Knorria* beschrieben hat,[2] und dazu noch von *Bothrodendron*, wie schon Solms vermuthete, und später von Potonié bestätigt worden ist, was ich übrigens selbst vor mehreren Jahren konstatirt hatte, obschon ich darüber bisher nichts veröffentlicht habe. Über die Zusammengehörigkeit mit *Bothrodendron* wird näher bei der Beschreibung der Ursaflora der Bären-Insel berichtet. Im Übrigen verweise ich auf die Darstellungen, welche Solms[3] und Potonié[4] geliefert haben.

Für die auf Spitzbergen gefundenen Knorrien könnte man annehmen, dass sie zu *Lepidodendron* gehörten, was aber nicht bewiesen werden kann. Unsere Taf. VII, Fig. 13 zeigt allerdings ein Exemplar von *Lepidodendron Heeri*, dessen rechter Zweig einen knorrienähnlichen Kern umschliesst. Doch sind die Wülste hier (ob nur in Folge der Kleinheit des Zweiges?) unregelmässig entwickelt (Taf. X, Fig. 7 vergrössert) und ausserdem vielleicht durch Druck etwas deformirt.

Ein anderes ebenso kleines Exemplar hat regelmässigere Wülste und nähert sich z. Th. auch der Aspidiarienform.

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[1] Potonié hat eine übersichtliche Zusammenstellung der verschiedenen Rindenflächenformen gegeben (Naturw. Wochenschr. Bd. 7, 1892, S. 477), doch dürfte auch diese nicht gänzlich erschöpfend sein.

[2] Renault et Zeiller, Flore fossile de Commentry, p. 520, pl. LX, fig. 1. St. Étienne 1890.

[3] Solms, Einleitung in die Palæophytologie, S. 205.

[4] Potonié, Die Zugehörigkeit der fossilen provisorischen Gattung *Knorria*. Naturw. Wochenschr. Bd. 7, 1892, S. 61.

Taf. VIII, Fig. 4 und 7 stellen die beiden Seiten eines plattgedrückten Steinkerns vom Ingeborgs-Fjell dar. Das Exemplar ist insofern von Interesse, als die eine Seite (Fig. 4) zur *imbricata*-Form gehört, während die andere (Fig. 7) etwas an *acicularis* erinnert. Ähnliche Verschiedenheiten desselben Stammes sind auch bei einem von POTONIÉ von der Bären-Insel abgebildeten Exemplar zu sehen, indem der untere Theil des Stückes das Aussehen von *Knorria imbricata* hat, während der obere etwas an *Knorria acicularis* erinnert, wie auch schon von anderen Autoren ähnliche Unregelmässigkeiten hervorgehoben sind.

Auch dass grosse Exemplar Taf. VIII, Fig. 8, ein Sandsteinkern vom Pyramidenberg, gehört zur *Knorria imbricata* und zwar zu der Form, welche gewöhnlich zu *Lepidodendron Veltheimianum* gebracht wird. Die Figur ist mittelst Photographie direkt dem Originale entnommen.

Durch die entferntere Stellung der Wülste gehört dagegen das Exemplar Taf. VIII, Fig. 6 vom Ingeborgs-Fjell zur Formenreihe der *Knorria Selloni*; dasselbe ist auch durch eine sehr ausgeprägte feine Längsstreifung ausgezeichnet.

Ausser an den erwähnten Lokalitäten sind Knorrienformen auch an anderen Stellen beobachtet worden. So hat NORDENSKIÖLD 1873 ein Exemplar auf einem kleinen Inselchen in der Nähe des Ingeborg-Fjells gefunden. In der Nähe habe ich im steil aufgerichteten, quarzitähnlichen Sandstein grosse Stammstücke von verwischten Selloni-ähnlichen Knorrien gesehen, welche aber nicht aus der steilen Wand herausgeschlagen werden konnten.

Halonia.

Taf. IX, Fig. 6; X, Fig. 23.

Das auf Taf. IX, Fig. 6 abgebildete Stück stammt vom Gipshuk, und wurde 1870 dort von WILANDER und mir gefunden. Der Zweig zeigt theils kleinere längliche und undeutliche Eindrücke, theils zwei grössere Narben, die eine nahe dem unteren Ende und die andere ein Stück von oben. Während diese nur als eine Einsenkung im Gestein hervortritt, zeigt jene einen scharf begrenzten ovalen Eindruck, in dessen Mitte sich eine kleine Erhöhung findet. Da die Kohlenrinde sich hier erhalten hat, ist die ovale Erhöhung in die Kohle selbst eingesenkt, als Abdruck des Holzes oder einer inneren Rindenfläche.

Ich war zuerst der Meinung, dass dies Exemplar von einem *Ulodendron*-Zustand herrühren könnte. Später fand ich aber einen Theil des Gegenabdruckes, und die Fortsetzung desselben (Taf. X, Fig. 23), und es zeigte sich dann, dass die grossen Narben oder Höcker spiralig gestellt und überdies nach aussen in die Länge gezogen sind. Hier haben wir nicht nur einen Abdruck, sondern auch einen plattgedrückten Steinkern, von dessen rechter Seite ein kleiner Höcker oder Zweig (bei x) ausgeht, während ein anderer (bei x') durch eine stark verkohlte Partie angegeben wird. Auch das Zweiglein bei x war ursprünglich verkohlt, ich habe aber die Kohle entfernt, so dass der Abdruck jetzt zu sehen ist.

Eine nähere Bestimmung des vorliegenden Exemplares ist selbstverständlich nicht möglich. Das Hauptinteresse liegt darin, dass hierdurch gezeigt wird, dass neben den Lepidodendreen mit endständigen Zapfen auch andere hier vorkommen, welche an Halonien-

artigen Zweigen angehaftet waren. Das Exemplar kommt am Gipshuk zusammen mit *Lepidodendron Veltheimianum* und *Stigmaria* vor.

Lepidostrobi.

Taf. X, Fig. 16—20; XII, Fig. 8—10.

Von Lepidostroben kommen auf Spitzbergen vier Formen vor.

1. Heer hat bekanntlich, wie oben schon erwähnt, einige Fruchtzapfen von *Lepidodendron* aus dem Roberts-Thal beschrieben,[1] welche er mit seinem *Lepidodendron Sternbergi* vereinigte, und welche wohl am wahrscheinlichsten zu *Lepidodendron Veltheimianum acuminatum* gehören dürften. Die allgemeine Form dieser Zapfen geht aus Heers Arbeit hervor, doch sind die Sporangien in der That nicht so deutlich, wie es diese Figuren, welche schematisirt sind, zeigen, sondern sie scheinen meistens aufgesprungen zu sein. Unsere Taf. X, Fig. 17, 18 stellen neue Figuren von Heers Taf. III, Fig. 8 und 13 dar. Es erhellt daraus, dass die Lamina der Fruchtblätter eine etwa trianguläre Form besessen hat. Ein Zapfen von ähnlichem Bau und von übereinstimmender Grösse habe ich in einem losen Geschiebe im Inneren der Klaas-Billen-Bay gefunden.

2. Am Pyramidenberg traf ich dann 1882 den auf Taf. X, Fig. 16 abgebildeten Zapfenrest an, welcher sich durch seine Grösse im Verhältniss zu den oben erwähnten auszeichnet. Derselbe ist übrigens zusammengedrückt und schlecht erhalten, so dass nichts mehr darüber zu sagen ist, als dass er wohl, in Folge der Grössenverhältnisse, zu einer anderen Art gehören muss.

3. Eine dritte Art ist von Heer als *Lepidodendron* (*Lepidostrobus*) sp. aufgenommen worden (l. c. S. 13, Taf. III, Fig. 22). Von dieser, welche im Roberts-Thal gefunden ist, sind nur einzelne Fruchtblätter bekannt, welche im Verhältniss zu denjenigen der vorigen Arten sehr lang sind. Sie werden von einem scharfen Mittelnerven durchzogen. Bei den von Heer beschriebenen Exemplaren ist die Lamina wahrscheinlich nicht vollständig, sondern an der Spitze abgebrochen. Unsere Fig. 20 auf Taf. X zeigt ein Fruchtblatt von sogar 45 Mm. Länge.

Wir scheinen somit drei verschiedene *Lepidodendron*-Zapfen auf Spitzbergen zu haben, d. h. ebenso viele wie die auf den Zweigen gegründeten Arten derselben Gattung. Der eine *Lepidostrobus* gehört wahrscheinlich zu *L. Veltheimianum acuminatum*, ob aber die anderen zu den übrigen, oben beschriebenen oder zu noch anderen *Lepidodendron*-Arten gehören, lässt sich gegenwärtig nicht sagen.

4. Ganz abweichend ist der vierte Zapfentypus, *Lepidostrobus Zeilleri* n. sp., welcher am Pyramidenberg gefunden wurde (Taf. XII, Fig. 8—10). Derselbe scheint aus kleinen, rundlichen, in Schrägzeilen gestellten Sporangien aufgebaut zu sein (Fig. 10), ohne dass man etwas von den Sporangialblättern beobachten kann. Dass es sich in der That um Zapfenreste handelt, wird durch ein anderes Exemplar (Fig. 8) dargelegt, bei welchen man eine Menge von Sporen zwischen den Sporangien sieht; Fig. 9 stellt eine Partie dieses

[1] Heer, Beiträge etc., l. c. Taf. III, Fig. 8—13.

Exemplares in Vergrösserung dar, man sieht ein noch erhaltenes Sporangium ringsum von Sporen umgeben. Den näheren Bau derselben habe ich nicht ermitteln können.

Es fragt sich nun, zu welcher Pflanze diese Zapfen gehören können. Es scheint mir am wahrscheinlichsten, dass sie zu *Bothrodendron tenerrimum* zu bringen sind, in welchem Falle sie eigentlich *Bothro(dendro)strobus* zu nennen wären. Allerdings kann man diese Zusammengehörigkeit nicht beweisen, für dieselbe spricht nur der Umstand, dass beide an derselben Lokalität vorkommen. Ein Beweis für die Zusammengehörigkeit ist dies allerdings gar nicht, es zeigt nur, dass die Möglichkeit einer solchen nicht ausgeschlossen ist, und die Entscheidung der Frage muss daher der Zukunft überlassen bleiben.

Von den Zapfen von *Bothrodendron* kennt man bisher sehr wenig. Lindley und Hutton sagen von *Bothrodendron punctatum*, dass sie aus den grossen Narben dieser Pflanze Fragmente herausgenommen haben, welche darlegen, dass die betreffenden Narben die Anhaftungsstellen von Zapfen waren, welche, soweit die Verfasser aus den noch restirenden Resten schliessen konnten, aus rundlichen, glatten, $^3/_{10}$ Zoll dicken, bei einer centralen Spindel anhaftenden und vollständig zu einander passenden Schuppen bestanden. »Sie (die Zapfenreste) haben im Ganzen eine so vollständige Ähnlichkeit mit dem Basaltheil von *Pinus Lambertiana*, dass wir nicht zweifeln können, dass die Pflanze zu den Coniferen gehört hat.»[1] Abgesehen von der Grösse, scheint diese Beschreibung nicht wenig mit dem Bau der soeben erwähnten Zapfenreste übereinzustimmen.

Ein anderer Zapfen von *Bothrodendron*, und zwar von *B. minutifolium*, ist von Kidston beschrieben worden.[2] Derselbe ist, obschon nicht vollständig, etwa 90 Mm. lang, 9—10 Mm. breit, endständig auf einem langen Zweig angehaftet, welcher nach Kidston »die Blätter der Art» tragen soll; der Bau stimmt mit dem der *Lepidostroben* überein.

Wenn dieser Zapfen wirklich *Bothrodendron* angehört, dann würden auch bei dieser Gattung, wie bei *Lepidodendron*, zwei verschiedene Typen vorkommen, von welchen der eine endständige Zapfen hatte, während diese beim anderen Typus ungestielt, in Reihen auf den Seiten der Zweige gestellt waren, an welchen sie die grossen excentrischen Narben zurückgelassen haben. In der That sind solche Narben bisher nur bei *B. punctatum* beobachtet worden, was mit dem Vorkommen zweier Typen gut harmonirt.

Stigmaria ficoides Sternberg sp.

Taf. VIII, Fig. 9.

Stigmaria ficoides Heer, Steinkohlenflora etc. l. c. S. 5, Taf. I, Fig. 4; Taf. II und III.
Stigmaria Lindleyana Heer, Beiträge etc. l. c. S. 14, Taf. IV, Fig. 1, 2.
Lepidophyllum caricinum Heer, Beiträge etc. l. c. S. 14, Taf. III, Fig. 26.

Stigmarien sind auf Spitzbergen in den pflanzenführenden Schichten der Untercarbonlager nicht selten. Ich habe solche aus sämmtlichen früher erwähnten Lokalitäten bekommen

[1] Lindley and Hutton, Fossil flora etc. Vol. II, p. 2.

[2] R. Kidston, Additional notes on some britisb carboniferous lycopods. Ann. Mag. Nat. Hist. July 1889, p. 60.

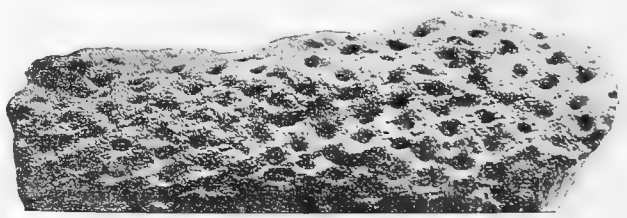
und dazu noch ein schönes Exemplar als gekratztes Geschiebe auf der Seitenmoräne des Frithiof-Gletschers im Osten vom Ingeborgs-Fjell gefunden. Die ersten von WILANDER und mir 1870 aus Spitzbergen mitgebrachten Exemplare sind von HEER vortrefflich beschrieben und abgebildet worden, und da die Stigmarien im Allgemeinen jetzt, durch Beschreibungen und Abbildungen von mehreren Autoren, genau bekannt sind, halte ich es für überflüssig, Abbildungen auch von den 1882 gesammelten Exemplaren hier zu geben. Unter denselben kommen verschiedene Varietäten vor, welche aber meistens nur als verschiedene Erhaltungszustände zu deuten sind.

Sogar der von HOOKER beschriebene, von WILLIAMSON gedeutete Erhaltungszustand fehlt nicht, indem ich am Pyramidenberg ein Exemplar im Sandstein gesammelt habe, welches genau mit HOOKERS und WILLIAMSONS[1] Abbildungen übereinstimmt. Leider konnten die grössten und schönsten Stigmarien, die ich auf Spitzbergen gesehen habe, nicht mitgebracht werden, da sie in gigantischen Sandsteinblöcken vorkamen, welche zu gross waren, um zerschlagen werden zu können.

HEER hat in seinen Beiträgen etc. eine *Stigmaria Lindleyana* n. sp. beschrieben, welche sich dadurch unterscheiden würde, dass die »Appendices» gegen ihre Anhaftungsstelle verschmälert waren. Dies beruht aber nur darauf, dass die betreffenden Organe zerrissen sind, so dass sie nicht vollständig vorliegen. *Stigmaria Lindleyana* ist demzufolge zu streichen, was auch von *Lepidophyllum caricinum* gilt, welches nicht anders als plattgedrückte *Stigmaria*-Appendices ist. Der muthmassliche Mittelnerv entspricht dem Gefässbündel des Appendix.

GEINITZ hat bekanntlich eine Varietät *minor* beschrieben,[2] deren Narben etwas kleiner als bei der gewöhnlichen Form sind. GEINITZ sagt selbst, dass ihre Breite bis 3 Mm. beträgt, während dieselbe in den Abbildungen meistens etwas mehr misst.

Noch kleinere Narben hat eine Form, welche ich am Pyramidenberg gefunden habe, und welche sowohl im Schiefer (Taf. VIII, Fig. 9) wie im Sandstein (vergl. die Textfigur) vorkommt.



Stigmarienform (Var. *minima*) mit kleinen Narben aus dem Sandstein des Pyramidenberges.

Bei dieser Form messen die Narben 2, höchstens 2,5 Mm. im Durchmesser. Infolge der Kleinheit der Narben macht diese Form einen etwas Cyclostigma-artigen Eindruck, doch ist die Stigmarienstruktur an mehreren Stellen ausserordentlich deutlich zu beobachten. Die Form könnte zweckmässig als *minima* bezeichnet werden, womit nur gesagt werden

[1] WILLIAMSON, A monograph on the morphology and histology of *Stigmaria ficoides*, pl. XIV, fig. 75. Palæontogr. Society for 1886. London 1887.

[2] GEINITZ, Die Versteinerungen der Steinkohlenformation in Sachsen, S. 49, Taf. IV, Fig. 6; X, Fig. 1 Leipzig 1855.

soll, dass die Narben sehr klein sind. Das in der GOLDENBERG'schen Sammlung befindliche Originalexemplar zu seiner *Stigmaria Anabathra* (GOLDENBERGS Taf. III, Fig. 3) hat ebenso kleine Narben.

Der Umstand, dass auf Spitzbergen Stigmarien häufig sind, während *Sigillaria* gänzlich fehlt, dagegen aber *Lepidodendron* vorkommt, ist, wie schon HEER und WILLIAMSON hervorgehoben haben, noch ein Beweis dafür, dass *Stigmaria* die Rhizome auch von *Lepidodendron* darstellt. Zu welcher Art oder zu welchen Arten die hiesigen Stigmarien gehören, lohnt nicht zu erörtern, da *Stigmaria ficoides* nicht als eine besondere Species, vielmehr als ein Collectiv-Typus aufzufassen ist. Wir können gern annehmen, dass sie hier die Rhizome sämmtlicher oben beschriebenen Arten darstellt, während Var. *minima* möglicher Weise zu *Bothrodendron* gehören kann, mit welchem sie in der That zusammen vorkommt, obschon dies an sich nichts beweist.

Vorkommen. Wie schon erwähnt, ist *Stigmaria ficoides* beinahe in allen pflanzenführenden Lokalitäten der Carbonlager Spitzbergens gefunden worden, d. h. im Belsund im Roberts-Thal, am Mitterhuk, am Ingeborgs-Fjell, auf der Moräne des Frithiof-Gletschers; im Eisfjorde am Gipshuk, am Pyramidenberg und am Nordenskiöld-Gletscher an der östlichen Seite der Klaas-Billen-Bay.

Bothrodendron tenerrimum AUERBACH und TRAUTSCHOLD sp.

Taf. X, Fig. 24—26; XI, Fig. 2—7.

Lepidodendron tenerrimum AUERBACH und TRAUTSCHOLD,[1] Kohlen von Centr.-Russl. S. 40, Taf. III, Fig. 1—3.

Unter dem Namen *Lepidodendron tenerrimum* beschrieben AUERBACH und TRAUTSCHOLD 1860 jene Reste, welche den hauptsächlichen Bestandtheil der bekannten russischen Papierkohle oder Blätterkohle bei Milenino und Malowka bilden.[1] Dieselben werden als »Fragmente von Rindenhaut, welche durch Ausfallen der Blattkissen siebartig durchlöchert sind», gedeutet. »Die Löcher mit gut erhaltenem Rande haben eine elliptische an beiden Enden zugespitzte Form, und an der einen Spitze findet sich zuweilen eine kleine vorspringende Verlängerung des Zellgewebes».

Die Blätterkohle von Malowka wurde später von GÖPPERT untersucht,[2] welcher betreffs der Kohle von Tawarkowa konstatiren konnte, dass sie »in der That ganz und gar aus Rinden von Lepidodendreen besteht.» ...»in der Regel sind nur die äusseren rhombischen Öffnungen und die rundlichen inneren, durch welche die Gefässbündel aus dem Stamme hervortraten, noch vorhanden.» Was GÖPPERT mit diesem Ausdruck meint, wage ich nicht zu entscheiden, in den von mir untersuchten Exemplaren aus Tula sind sämmtliche Öffnungen in den Cuticulablättern von einer und derselben Gestalt, und zwar wie

[1] AUERBACH und TRAUTSCHOLD, Ueber die Kohlen von Central-Russland. Nouv. mém. de la soc. impér. de Moscou. T. 13 (19). 1860.

[2] GÖPPERT, Ueber die Kohlen von Malowka in Central-Russland. Sitzungsber. d. k. bayr. Akad. d. Wiss. zu München. 1861. S. 199.

sie schon AUERBACH und TRAUTSCHOLD richtig beschrieben hatten. Vielleicht hat GÖPPERT Reste eines wirklichen *Lepidodendron* vor sich gehabt.[1]

Durch die Untersuchungen von ZEILLER wurde dann hervorgehoben, dass die betreffenden Fragmente als Cuticulastücke zu deuten sind,[2] wie die von ihm beschriebenen Querschnitte deutlich zeigen, und ferner wird dargelegt, dass die Reste nicht zu *Lepidodendron* gehören können, wogegen sie die grösste Übereinstimmung mit *Bothrodendron* zeigen. Bei dieser Gattung, oder wenigstens bei *B. punctatum*, fehlen die Blattpolster, und die Blattnarben sind sehr klein und zeigen drei Spurpunkte, während dicht über der Narbe die sogenannte Ligulargrube vorhanden ist. ZEILLER meint nun, dass die Öffnungen, welche in den Cuticulablättern aus Russland zu sehen sind, die gemeinsame Öffnung der Blattnarbe und der Ligulargrube darstellen, und dass die betreffenden Reste zu *Bothrodendron punctatum* gehören. Dass diese Vermuthung nicht richtig sein kann, geht schon aus den Exemplaren aus Russland hervor, welche die phytopaläontologische Abtheilung des Reichsmuseums in Stockholm besitzt. Einige derselben sind von TRAUTSCHOLD seiner Zeit mitgetheilt worden, andere habe ich 1891 in Petersburg durch die Freundlichkeit der Herren Director A. KARPINSKY und Professor J. LAHUSEN bekommen, während mir noch andere von Herrn KIDSTON freundlichst mitgetheilt wurde. An keinem derselben habe ich in den Öffnungen die Zusammenziehung sehen können, welche nach ZEILLER die Berührungsstelle der beiden Narben andeuten würde. Auch ZEILLERS eigene Figuren zeigen diese Zusammenziehung (»un léger étranglement») nicht, jedenfalls in keiner Weise überzeugend. Wenn noch Zweifel hierüber bestehen konnten, so wurden dieselben durch die spitzbergischen Exemplare jedenfalls beseitigt, durch welche in überzeugender Weise dargelegt wird, dass die Blattnarben selbst in die Länge gezogen, eirund oder oval, oben etwas zugespitzt sind. Damit ist auch hinreichend dargelegt worden, dass die Pflanze nicht mit ZEILLERS *Bothrodendron punctatum* identisch sein kann,[3] bei welchem die Blattnarben rundlich oder sogar pentagonal sind (»cicatrices foliaires . . . de forme pentagonale à angles et à côtés arrondis, quelquefois même presque circulaires» ZEILLER). Ich glaube demzufolge annehmen zu müssen, dass *Bothrodendron tenerrimum* eine gut getrennte Art darstellt. Es sei übrigens bemerkt, dass das Originalexemplar von LINDLEYS und HUTTONS *Bothrodendron punctatum* bekanntlich verloren gegangen ist, so dass es nicht als ganz sichergestellt betrachtet werden kann, dass ZEILLERS Pflanze damit identisch ist, obschon mehrere Gründe dafür angeführt werden können. Was mir eigenthümlich erscheint, ist der Umstand, dass die Blattnarben auf LINDLEYS und HUTTONS Taf. 80 ganz so gezeichnet sind, wie die Blattnarben von *Bothrodendron tenerrimum* aus Russland. In die weissen, kleinen Flecken, welche den Blattnarben entsprechen, scheint nämlich von unten

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[1] In seinen »Notes sur des cuticules fossiles» etc. (siehe unten) hat ZEILLER GÖPPERTS Ausdruck nicht vollständig wiedergegeben, wenn er denselben auf folgende Weise formulirt: »l'on ne retrouve que les ouvertures internes arrondies, correspondant au passage du faisceau vasculaire.» Es sollte wohl heissen: l'on ne retrouve que *les ouvertures externes rhombiques et les internes arrondies* etc.

[2] ZEILLER, Notes sur des cuticules fossiles du terrain carbonifère de la Russie centrale. Bull. soc. botanique de France, t. 27, 1880, p. 348. — Observations sur quelques cuticules fossiles. Ann. d. sciences nat. 6me sér. Botanique, t. 13, p. 217.

[3] ZEILLER, Observations sur les *Ulodendron* et *Bothrodendron*. Bull. soc. géol. de France. 3e sér., t. 14, p. 168, 1885. — Flore fossile du bassin houiller de Valenciennes, 1888, p. 487.

eine schwarze Partie einzudringen, ganz wie die »kleine vorspringende Verlängerung des Zellgewebes» in den Löchern der russischen Cuticulablätter. Obschon der Text hierüber nichts aussagt, kann diese Zeichnung doch wohl kaum zufällig sein, da sie sowohl im oberen wie im unteren Theil von LINDLEYS und HUTTONS Abbildung wiederkehrt. Ist dem aber so, dann dürfte die Pflanze, welche in Taf. 80 von LINDLEY und HUTTON abgebildet ist, von ZEILLERS *Bothrodendron punctatum* verschieden sein, während sie mit der russischen Art übereinstimmen dürfte. Bei dieser kann nämlich die Länge der Löcher bis 2 Mm. messen, was gut zu dem englischen, in $^1/_3$ der natürlichen Grösse abgebildeten Exemplar passt. Die Frage ist allerdings gegenwärtig nicht mehr zu entscheiden, sicher ist nur, dass AUERBACHS und TRAUTSCHOLDS *Lepidodendron tenerrimum* nicht mit ZEILLERS *Bothrodendron punctatum* identisch sein kann.

Es fragt sich nun, ob jene Pflanze dessenungeachtet zur Gattung *Bothrodendron* zu bringen ist. Auch diese Frage ist gegenwärtig kaum zu entscheiden. Bei den Exemplaren von Spitzbergen habe ich zuweilen einen Spurpunkt beobachten können (Taf. X, Fig. 26), und zwar in der Mitte der Blattnarbe, während ihrer drei bei *Bothrodendron* vorkommen sollen.[1] Diesen centralen Spurpunkt habe ich sowohl in Abdrücken wie auf der kohligen Rinde selbst deutlich gesehen, während in anderen Fällen nichts derartiges zu beobachten war (Taf. XI, Fig. 4, 5). Ebenso wie die beiden seitlichen Male fehlen, so habe ich weder auf den russischen noch auf den spitzbergischen Exemplaren die Ligulargrube entdecken können. Ich war in Folge dieser Verschiedenheiten zuerst geneigt, die Art zu einer besonderen provisorischen Gattung *Porodendron* zu bringen, da aber mehrere Anhaltspunkte mit *Bothrodendron* vorhanden sind, so dürfte es doch wohl besser sein, die Art bis auf weiteres in dieser Gattung zu lassen. Es wäre ja möglich, dass die drei Male in der Blattnarbe bei anderen Exemplaren entdeckt werden. Dazu kommt, dass das englische Originalexemplar vielleicht gerade diesen Typus darstellen kann. Bis aber dies Exemplar wiedergefunden wird, dürfte es wohl am besten sein, ZEILLERS Pflanze als Typus der Gattung *Bothrodendron* zu betrachten.

Dass die Exemplare aus Spitzbergen mit der Art aus Central-Russland vollständig übereinstimmen, lässt sich gar nicht bezweifeln. Die Form, Stellung und variirende Grösse der Blattnarben, die chagrinartige Oberflächen-Skulptur sind bei beiden vollständig dieselben. Die Blattnarben beim Exemplare Taf. XI, Fig. 6 (vergrössert Fig. 7) sind ungemein klein, aber ähnliche Formen kommen auch in Russland vor. Eigenthümlich erscheinen die Exemplare Taf. XI, Fig. 3 und 6 dadurch, dass die Narben z. Th. auf schmale Rippen gestellt zu sein scheinen, so dass diese Exemplare demzufolge ein etwas sigillarienähnliches Aussehen behaupten. Da aber diese Rippen bei anderen Exemplaren fehlen (Fig. 2), so dürften sie, obschon sie allerdings zuweilen recht scharf ausgeprägt sind, nur zufällig sein und vielleicht mit der Aufberstung der Rinde längs den Blattnarbenreihen in Verbindung stehen.

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[1] Zuweilen habe ich allerdings drei Punkte neben einander beobachtet, habe mich aber nicht überzeugen können, dass sie anders als zufällige Erhöhungen sind, da sie nicht scharf hervortreten. Es ist ja leider so, dass man, wenn man nach solchen Dingen sucht, viel zu leicht glaubt, dieselbe zu sehen. Man sollte aber ihre Anwesenheit nur dann behaupten, wenn sie so deutlich sind, dass keine Zweifel vorliegen. Wenn dies geschieht, dann kommen gewiss keine 3 Male auf den spitzbergischen Exemplaren vor.

Was die Stellung der Exemplare auf der Tafel betrifft, so habe ich mit TRAUTSCHOLD und ZEILLER das spitzige Ende der Narbe als das obere betrachtet, was wohl auch das wahrscheinlichste ist, wenngleich die entgegengesetzte Stellung nicht ganz unmöglich wäre, in welchem Falle die kleine vorspringende Verlängerung des Gewebes in den Löchern der russischen Exemplare von der Oberfläche des Blattes herrühren würde.

Zu *Bothrodendron tenerrimum* gehören ohne Zweifel auch die auf Taf. X, Fig. 24 abgebildeten entrindeten Abdrücke von kleinen Zweigen. Auf einem derselben sieht man die in Fig. 25 derselben Tafel vergrössert dargestellten Narben. KIDSTON hat ähnliche Spuren als »subepidermical cicatricules» von *Bothrodendron minutifolium* beschrieben.[1]

Vorkommen. Sämmtliche auf Spitzbergen gefundenen Exemplare von *Bothrodendron tenerrimum* stammen vom Pyramidenberg, wo ich dieselben 1882 selbst gesammelt habe.

GYMNOSPERMÆ.

Rhynchogonium costatum HEER mit Var. **globosum** HEER.

Taf. IV, Fig. 7, 8.

Rhynchogonium crassirostre HEER, Beiträge etc., S. 20, Taf. V, Fig. 3 a, 4 a.
» *costatum* HEER, l. c. S. 20, Taf. V, Fig. 6, 7, 8, 8 a, 9 rechts.
» *macilentum* HEER, l. c., S. 21, Taf. V, Fig. 5 a, 5 b.
» *globosum* HEER, l. c., S. 22, Taf. V, Fig. 1, 2.

Zu der von HEER gelieferten Beschreibung seines *Rhynchogonium* aus Spitzbergen ist erstens hinzuzufügen, dass die dazu gebrachten Blätter Reste von Farnspindeln sind, und zweitens, dass es mehr als zweifelhaft erscheint, ob »die Früchte (Samen) in der Achsel von langen, schmalen, von Längsnerven durchzogenen Deckblättern sitzen». Dass Fig. 3 und 4 a, b bei HEER eine solche Annahme nicht beweisen, ist ganz sicher, während Fig. 9 zu unvollständig ist, um als Belegstück angeführt zu werden. Immerhin hat das muthmassliche Deckblatt eher das Aussehen eines Stigmarienappendix, und es können demzufolge keine Schlussfolgerungen aus dem betreffenden Exemplare gezogen werden.

HEER hatte bekanntlich vier Arten von diesen Samen aufgestellt, jedoch mit der folgenden Bemerkung: »Ich war anfangs geneigt, sämmtliche unter *Rhynchogonium* aufgeführten Früchte zu einer Art zu vereinigen und die Verschiedenheit in Grösse und Form von ihrer verschiedenen Stellung in der Ähre abzuleiten. Dieselbe ist aber so bedeutend, dass es doch zweckmässiger erscheint, sie auseinander zu halten. Es kann erst ein reicheres Material über diese Frage entscheiden.»

Obschon die Frage, ob wir es mit einer Art oder mehreren zu thun haben, eigentlich ziemlich gleichgültig ist, so scheint es mir doch am wahrscheinlichsten, dass nur eine Art vorliegt. Ich kann wenigstens, nachdem die muthmasslichen Blätter nicht mehr in Betracht

[1] R. KIDSTON, Additional notes on some british carboniferous lycopods. Ann. Mag. Nat. Hist. July 1889, p. 64, pl. 4, fig. 5, 5 b.

gezogen werden können, keine durchgreifenden Merkmale zwischen *crassirostre*, *costatum* und *macilentum* finden, sondern meine, dass dieselben nur verschiedene Erhaltungszustände derselben Art darstellen. Auch *Rh. globosum* Heer, welches durch seine kugelige Gestalt etwas mehr von den übrigen Arten abweicht, dürfte nur ein jüngeres Exemplar repräsentiren. Um jedoch nicht mehr zu vereinigen als wirklich zu vereinigen ist, kann man diese Form als eine besondere Varietät *globosum* aufnehmen, während die übrigen Formen am zweckmässigsten unter dem gemeinsamen Namen *costatum* zusammengefasst werden können.

Was den Erhaltungszustand dieser Reste betrifft, so habe ich kein ringsum vollständiges Exemplar beobachten können, es wollte vielmehr scheinen, als wäre die Testa durch Längsspalten entweder in zwei Hälften, oder in mehrere Stücke gespalten, bevor sie im Schlamme eingebettet wurde. An mehreren Exemplaren kann man eine deutliche Zellenstruktur auf der konvexen Oberfläche der Exemplare beobachten, und da diese Exemplare Steinkerne, d. h. Ausfüllungen der inneren Höhle der Samen sind, so muss diese Struktur vom Abdrucke der inneren Epidermiswand der Endotesta herrühren. Fig. 7 und 8 (stark vergrössert) auf unserer Taf. IV zeigen dagegen die Zellenstruktur auf der inneren Seite der noch erhaltenen und verkohlten Endotesta selbst.

Was die Stellung dieser Reste zu anderen Gymnospermensamen betrifft, so kann ich keine bestimmte Meinung aussprechen. Solms warf die Frage auf (Paläophytologie, S. 123), ob nicht *Rhynchogonium* die Steinkerne von *Trigonocarpum olivæforme* Lindl. darstellen könnten, eine Frage, welche Heer selbst (Beiträge, S. 21) schon früher verneinend beantwortet hat. Kidston hat meine Aufmerksamkeit auf einige Samen gelenkt, welche von J. Young 1868 kurz erwähnt,[1] dann 1869 abgebildet[2] und endlich 1876 *Trigonocarpum Gloagianum* genannt wurden.[3] Die Samen sollen dadurch charakterisirt sein, dass 8 scharfe Rippen ringsum die Spitze gestellt sind und sich von dieser etwa über $^1/_3$ des Samens erstrecken, während der übrige Theil des Samens glatt ist »mit einem deutlichen Calyx ringsum die Basis». Wenn man von diesem »Calyx» absieht, welcher auf den Exemplaren aus Spitzbergen bis jetzt noch nicht hat beobachtet werden können, so ist allerdings nicht zu verkennen, dass im Übrigen eine recht grosse Ähnlichkeit mit diesen vorhanden ist, so dass es sich wahrscheinlich um generisch verwandte Dinge handelt. Doch kann ich nicht entscheiden, ob auch die spitzbergischen Samen mit 8 Rippen versehen waren, was nach dem Original zu Heers Taf. V, Fig. 7 nicht ganz unmöglich erscheint.

Da mehrere Exemplare, welche halbe Samen darstellen, ausser den Kanten drei Rippen zeigen, so ist es in der That wahrscheinlich, dass 8 Rippen vorhanden waren. Dass, wie Heer meint, die eine Seite drei, die andere nur eine Rippe gehabt habe, ist kaum anzunehmen.

Vorkommen. Die Rhynchogonien sind bisher nur im Roberts-Thal gefunden worden.

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[1] Proceed. Nat. Hist. Soc. of Glasgow, vol. 1, part 1, p. 203.

[2] l. c. vol. 2, pl. IV, fig. 9, 10.

[3] Armstrong, Young and Robertson, Catalogue of the western scottish fossils. Glasgow 1876, p. 36.

Carpolithes sp.

Taf. IV, Fig. 9.

Am Ingeborgs-Fjell traf ich 1882 einen anderen grossen Samen an, welcher ebenfalls gerippt zu sein scheint, obschon die Rippen in Folge der starken Zusammenpressung des Exemplares nicht scharf ausgeprägt sind. Dass dieser Samen zu einem von den vorigen getrennten Typus gehört, ist wahrscheinlich. Mehr ist übrigens nicht zu sagen, und ein Versuch, denselben mit schon früher beschriebenen Arten zu vergleichen oder zu identificiren, lohnt sich selbstverständlich nicht.

Carpolithes nitidulus Heer.

Taf. X, Fig. 27, 28.

Carpolithes nitidulus Heer, Beiträge etc., l. c. S. 25, Taf. V, Fig. 23—25.

Da Heers Figuren von dieser Art etwas schematisirt ausgeführt sind, theile ich hier zwei neue vergrösserte Abbildungen mit. Übrigens ist nichts hinzuzufügen.

Vorkommen. Roberts-Thal.

Carpolithes sp.

Taf. X, Fig. 30.

Ein kleiner Samen, welcher einen ganz anderen Typus als die vorigen darstellt, ist am Pyramidenberge gefunden worden. Vielleicht handelt es sich in der That nur um ein Sporangium.

Carpolithes sp.

Taf. X, Fig. 29.

Auch dieses Exemplar rührt vom Pyramidenberge her, und sieht wie ein in eine lange Stachelspitze auslaufender Same (oder Frucht) aus. Möglicherweise handelt es sich aber nur um ein von oben gesehenes Fruchtblatt mit Sporangium von *Lepidodendron*.

Samaropsis spitzbergensis Heer.

Taf. IV, Fig. 10, 11.

Samaropsis spitzbergensis Heer, Beiträge etc., l. c. S. 24, Taf. V, Fig. 18—22.

Die hier mitgetheilten Figuren dürften eine etwas bessere Vorstellung von dem Bau der betreffenden Samen als die Heer'schen Abbildungen geben. Sonst verweise ich auf Heers Beschreibung derselben, zu welcher ich nichts wesentliches hinzuzufügen habe.

Vorkommen. Im Roberts-Thal, nicht selten.

»Rhizocarpeenfrucht»??

Rizocarpeenfrucht? HEER, Steinkohlenflora etc. S. 6, Taf. I, Fig. 6 a, 7.

Zu HEERS Beschreibung dieses noch immer sehr räthselhaften Gegenstandes habe ich nur hinzuzufügen, dass derselbe mir eher das Fragment eines Stamm- oder Spindeltheiles als einen Fruchtrest darzustellen scheint.

Vorkommen. Gipshuk.

Rückblick.

Das geologische Alter der pflanzenführenden Carbonlager Spitzbergens wird in einem folgenden Abschnitte besprochen werden, und wir können uns demzufolge hier damit begnügen, eine kurze Übersicht der Flora von botanischem und klimatologischem Standpunkt aus zu liefern, wenn auch in dieser Hinsicht nicht viel zu sagen ist. Die reiche Steinkohlenflora Europas ist jetzt so gut bekannt und wird noch immer durch die Arbeiten mehrerer tüchtiger Forscher bereichert, so dass man schon im voraus nicht viel neues in botanischer Hinsicht von der Steinkohlenflora Spitzbergens erwarten konnte. Die Farne, deren Fructificationen bekannt sind, wie *Calymmatotheca bifida* und *Sphenopteris flexibilis*, gehören zu den Marattiaceen, welche ja auch in der Steinkohlenflora Europas den weitaus grössten Antheil der damaligen Farnvegetation bildeten. Auch die übrigen Sphenopteriden und Adiantiten schliessen sich, wie auch *Cardiopteris*, an schon aus Europa bekannte Formen an. Dagegen bieten die Farnspindeln durch ihre Grösse ein besonderes Interesse dar, indem sie in dieser Hinsicht die entsprechenden Formen in den gleichzeitigen Ablagerungen Europas sogar übertreffen.

Von den Lepidodendren ist wenig zu sagen, sie kommen sowohl in kleinen wie in grösseren Formen vor, und ihre Zapfen scheinen bei einigen Arten endständig gewesen zu sein, während sie bei anderen auf Halonia-artigen Zweigen angehaftet waren. Die Stigmarien stehen in keiner Hinsicht gegen die europäischen Exemplare zurück. Von besonderem Interesse ist *Bothrodendron tenerrimum*, welches eine bisher verkannte Sippe der Gattung darstellt, und von welchem vielleicht auch die Zapfen, die ebenfalls einen neuen Typus darstellen, vorliegen. Das Vorkommen von gymnospermen Samen ist von grossem Interesse, weil sie zeigen, dass schon zur untercarbonen Zeit die betreffende Pflanzenabtheilung im hohen Norden vorkam; doch war sie allerdings schon aus den entsprechenden Ablagerungen Europas bekannt.

Was die Artenzahl betrifft, so ist die Flora allerdings eine relativ arme, was wahrscheinlich aber nur davon herrührt, dass für die Aufbewahrung der Pflanzenreste zweckmässige Ablagerungen nur sehr untergeordnet vorkommen, und von der Schwierigkeit, welche auch sonst mit der Einsammlung von Pflanzenfossilien hier im Allgemeinen verbunden sind. Wenn man in Europa keine Kohlengruben hätte, welche die Kohlenlager

des Culms ausbeuteten, so würden wir gewiss auch relativ wenig von der Culmflora Europas kennen. Auch ist ganz gewiss zu erwarten, dass fortgesetzte Ausbeutungen der betreffenden Lager noch viele für Spitzbergen neue Arten zum Vorschein bringen werden.

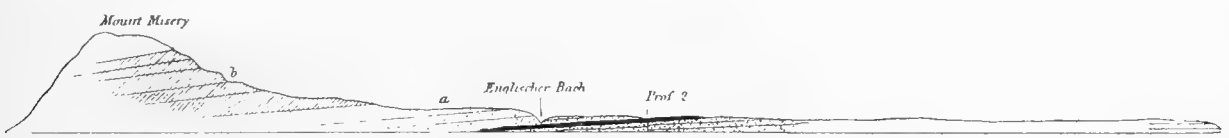
Für die Beurtheilung des Klimas im Verhältniss zu dem in Europa gleichzeitig herrschenden, sind die Pflanzenreste überaus lehrreich. Die Arten, welche schon aus Europa bekannt waren, sind auf Spitzbergen ebenso gross wie hier, was sowohl von den Farnen wie von den Lepidodendren und Stigmarien gilt. Bemerkenswerth sind insbesondere die grossen Farnspindeln und die Stigmarien. Es giebt demzufolge in den vorliegenden Materialien kein einziges Anzeichen dafür, dass die damaligen Klimaverhältnisse auf Spitzbergen ungünstiger gewesen wären als in Europa. Worauf diese Übereinstimmung beruht, ist eine Frage, deren Erklärung die Wissenschaft noch nicht hat geben können, und mit welcher wir uns übrigens hier nicht zu beschäftigen haben.

II. Die paläozoische Flora der Bären-Insel.

Das Vorkommen der Pflanzenfossilien.

Über das Vorkommen der Pflanzenfossilien auf der Bären-Insel habe ich zu dem, was schon NORDENSKIÖLD und HEER mitgetheilt haben,[1] nichts hinzuzufügen. Ich begnüge mich demzufolge hier damit, das schematische Profil zu reproduciren, welches NORDENSKIÖLD in HEERS erwähnter Arbeit veröffentlicht hat.

Da die Pflanzenreste in und neben den Kohlenlagern gefunden sind, so ist schon aus diesem Profile ersichtlich, dass ausser diesem pflanzenführenden Horizonte auch andere vorkommen können, und es wäre daher sehr erwünscht, wenn eine stratigraphisch-paläontologische Untersuchung des Sandsteins hier durchgeführt werden könnte. Denn man würde durch eine solche vielleicht entscheiden können, ob auch der spitzbergische Pflanzenhorizont hier vorhanden ist und zwar zwischen dem Kohlenlager und dem Bergkalk (Permocarbon). Vielleicht kommen auch ältere Horizonte vor.



Profil durch einen Theil der Bären-Insel (nach NORDENSKIÖLD).

a. Sandstein mit Kohlen-Flötzen. *b*. *Productus*- und *Spirifer*-führender Kalkstein (Permocarbon).

Über das Vorkommen der Pflanzen im Gestein ist übrigens zu erwähnen, dass sie theils in der Kohle selbst, theils in einem schwarzen kohligen Schiefer, theils in einem grauschwarzen Thonschiefer, theils in Thoneisenstein und endlich in einem groben Sandstein auftreten.[2]

Die ersten Angaben über Pflanzenfossilien von dieser Insel verdanken wir übrigens VON BUCH, welcher sagt:[3] »auch in den Flötzen der Bären-Insel fand Hr. KEILHAU eine schöne, vielleicht neue Art von *Pecopteris*, welche die Sammlung in Christiania ver-

[1] HEER, Fossile Flora der Bären-Insel. K. Svenska Vet. Akad. Handl. Bd 9, N:o 5. Stockholm 1871. Auch in Flora foss. arctica, vol. 3.

[2] HEER, l. c. S. 3—4.

[3] L. v. BUCH, Die Bären-Insel nach B. M. Keilhau geognostisch beschrieben. Berlin 1847. S. 9.

wahrt». Ich habe umsonst in Christiania nach diesem Stück gefragt, alle Pflanzenreste von der Bären-Insel, welche man dort finden konnte, waren unbestimmbare entrindete Spindel- oder Stammstücke. Da *Pecopteris* in so alten Ablagerungen bisher nirgends gefunden worden ist, kann ich nicht umhin die Meinung auszudrücken, dass die Angabe v. Buchs auf irgend einem Missverständniss oder auf Verwechselung beruhen muss.

Dann beschrieb Heer in seiner schon mehrmals erwähnten Arbeit die von Nordenskiöld und Malmgren 1868 gesammelten Pflanzen, welche noch immer die Hauptsammlung der von der Bären-Insel bekannten Pflanzen ausmacht. Eine durch Herrn L. Cremer 1891 von der Insel mitgebrachte *Knorria*, von welchem Typus schon eine ganze Formenreihe von Heer beschrieben war, wurde von Dr. H. Potonié beschrieben,[1] welcher die Gelegenheit benutze, seine Beobachtungen über die Zusammengehörigkeit von *Knorria* und *Bothrodendron* aus dem westphälischen Carbon mitzutheilen. 1892 wurde von Herrn A. Hamberg einige wenige obschon z. Th. recht interessante Pflanzenfossilien von der Bären-Insel mitgebracht, welche jetzt der Phytopaläontologischen Abtheilung des Reichsmuseums in Stockholm gehören und unten besprochen werden sollen.

Die Beschreibung der Arten, welche jetzt folgt, ist daher hauptsächlich eine Revision der Heer'schen Arbeit, gegründet auf eine erneute Untersuchung der Originale.

Beschreibung der Arten.

FILICES.

Calymmatotheca sp.

Taf. XIV, Fig. 2, 3 (vergrössert).

? *Sphenopteris Schimperi* Heer, Fossile Flora der Bären-Insel, S. 38, Taf. XIII, Fig. 3—5.

Auf einem von Herrn A. Hamberg 1892 von der Bären-Insel mitgebrachten Stück schwarzen Schiefers liegen die abgebildeten Reste, welche bei Vergrösserung wie dicht zusammengedrängte spitzige Sporangien, deren Oberfläche mit einem Netz von länglich gestreckten Zellen bedeckt ist (Fig. 3), aussehen. Die Art und Stellung dieser Sporangien scheint für eine Zusammengehörigkeit mit *Calymmatotheca* zu sprechen, was ja auch mit dem geologischen Vorkommen gut harmonirt.

Möglicherweise gehören hierher auch diejenigen Reste, welche Heer als *Sphenopteris Schimperi* aufgenommen hat, ein Name, der jedenfalls nicht beibehalten werden kann, da die diesbezüglichen Reste ganz unbestimmbar sind. Die Abbildungen, welche Heer geliefert hat, sind idealisirt, nach den Originalen könnte man eher annehmen, dass es sich um fertile Exemplare eines *Calymmatotheca*-ähnlichen Farns handelt.

[1] Potonié, Die Zugehörigkeit der fossilen provisorischen Gattung *Knorria*. Naturw. Wochenschr. Bd. 7. 1892. S. 61.

Sphenopteridium? sp.

Taf. III, Fig. 10, 11.

Cardiopteris frondosa HEER, l. c. S. 36, Taf. XIV, Fig. 3, 4.
» *polymorpha* HEER, l. c. S. 37, Taf. XIV, Fig. 1, 2; IV, Fig. 1.
Palæopteris Roemeriana HEER, l. c. S. 37, Taf. XIV, Fig. 5.

Unter diesem Namen glaube ich am zweckmässigsten die Reste aufnehmen zu können, welche HEER als *Cardiopteris frondosa* und *polymorpha* beschrieben hat, welche aber in der That nicht sicher bestimmbar sind. HEER hat die Nervatur nicht richtig aufgefasst, da er dieselbe als wie bei *Cardiopteris frondosa* darstellt, d. h. mit gleichstarken, mehrfach dichotomen, dicht gedrängten, in schwachen Bogen nach dem Rande verlaufenden Nerven. Auf diese Weise ist die Nervatur auch auf dem grössten Blattfragment seiner Taf. XIV, Fig. 3 wiedergegeben, während unsere Fig. 11 auf Taf. III das richtige Aussehen des betreffenden Stückes darstellt. Es erhellt daraus sogleich, dass es sich nicht um einen einheitlichen, breiten Blattlappen handelt, sondern dass das Exemplar vielmehr aus wenigstens vier Blattsegmenten besteht, und dass sich die Nerven in jedem Lappen von einem Mittelnerven oder einer Mittelfurche aus nach beiden Seiten hin biegen. Der Zeichner der HEER'schen Figur scheint in der That etwas ähnliches auf den beiden Lappen oben rechts auf HEERS erwähnter Fig. 3 beobachtet zu haben. Es sei aber hierbei bemerkt, dass die betreffenden Blätter sämmtlich so zart und undeutlich sind, dass sie nur unter günstiger Beleuchtung beobachtet werden können, und dass es demzufolge schwierig zu sagen ist, ob wir die wirkliche Nervatur oder nur eine durch den Druck hervorgerufene Striirung vor uns haben. Zuweilen sind die Lappen am Rande zerrissen, wie unsere Fig. 10 es zeigt.

Da die vorliegenden Materialien keinen hinreichenden Aufschluss über den Bau der betreffenden Blätter liefern, kann eine endgiltige Bestimmung der Pflanze selbstverständlich noch nicht durchgeführt werden. Soviel kann jedoch behauptet werden, dass sie keine *Cardiopteris* darstellen dürfte, was übrigens schon STUR (Culmflora, I, S. 103) ausgesprochen hat. Ob sie zu *Sphenopteridium* gehört, sei dahingestellt; einige Lappen ähneln, wie schon HEER bemerkt, allerdings *Sph. dissectum* GÖPPERT sp., wenn aber die Nervatur unserer Fig. 11, Taf. III richtig ist, kann auch diese Gattung nicht in Betracht kommen. Auch scheinen Verschiedenheiten mit *Triphyllopteris* und *Palæopteris* zu bestehen, und es wäre demzufolge möglich, dass unsere Pflanze in der That zu einem früher nicht bekannten Farntypus gehört.

Von anderen Farnresten seien auch Fragmente gabeliger Spindeltheile, z. Th. mit Höckern, jenen aus dem Roberts-Thal auf Spitzbergen nicht unähnlich, erwähnt. Ein eigenthümliches, von Herrn HAMBERG gesammeltes Objekt ist auf unserer Taf. XIV, Fig. 1 wiedergegeben. Ob dies eine Farnspindel, einen Wurzelrest oder sogar ein Stück von *Pseudobornia ursina* mit Zweigen darstellt, wage ich nicht zu sagen, da das Exemplar nicht gut erhalten ist.

CALAMARIEÆ.

Von Calamitenresten hat HEER bekanntlich das Vorkommen von *Calamites radiatus* auf der Bären-Insel angegeben. »Es ist dies die häufigste Pflanze der Bären-Insel», sagt er, »deren Rhizome massenhaft in dem grauschwarzen Schiefer liegen, die Stammstücke theils in der Kohle selbst, theils in dem Sandstein, in welchem NORDENSKIÖLD sehr lange Stücke gesehen hat». Was nun diese letzte Angabe betrifft, so ist hierauf selbstverständlich nicht all zu grosses Gewicht zu legen, so lange nicht solche Exemplare mitgebracht sind, was leider nicht geschehen ist.

Es wäre sonst sehr interessant gewesen, die Grösse zu erfahren, welche die Calamiten unter 74° 30′ n. Br. erreicht haben. Dass Calamitenreste in der That im Sandstein vorkommen, scheint aus HEERS Taf. I, Fig. 1 hervorzugehen, welche doch wohl einen solchen Rest darstellen soll, wozu noch unsere Fig. 4 auf Taf. XIV hinzugefügt werden kann, welche wahrscheinlich auch als ein solcher zu deuten ist, obschon es nicht bewiesen werden kann. Was aber die übrigen von HEER abgebildeten Stammstücke auf seiner Taf. I—III betrifft, so sind dieselben keine Calamitenreste, sondern Knorrien, und man sollte daher auf die betreffenden Zeichnungen künftighin keine Rücksicht nehmen.

Die *Knorria* Fig. 1 auf unserer Taf. XV ist dasselbe Exemplar wie HEERS *Calamites* auf seiner Taf. I, Fig. 3, und unsere Taf. XV, Fig. 2 ist der *Calamites radiatus* auf seiner Taf. I, Fig. 7 u. s. w. Die muthmasslichen Knoten auf HEERS vermeintlichen Stammstücken sind nur zufällige Risse.

HEER hat allerdings selbst erkannt, dass ein Zusammenhang seiner muthmasslichen Calamiten mit knorrienähnlichen Formen vorhanden zu sein scheint, meint aber, dass »der Übergang der scheinbaren Warzen in zusammenhängende Längsrippen zeigt, dass auch diese Stücke zu unseren Calamiten gehören». Diese Längsrippen haben aber gar nichts mit ächten Calamitenrippen zu thun, sondern verdanken in einigen Fällen ihren Ursprung dem Umstande, dass die Blätter in geraden Reihen über einander gestellt waren, so dass sich die Polster der Knorrienform in einander fortsetzen (unsere Taf. XV, Fig. 2), während die Rippen in anderen Fällen lediglich dadurch entstanden sein dürften, dass die Rinde längs den Blattspurdurchgängen zerbrochen ist (Taf. XV, Fig. 1). Wie dem auch sein mag, so entbehren sämmtliche Formen, wenn auch HEERS Abbildungen anders zeigen, jeder Knotenbildung und sind ächte Knorrien, welche nichts mit den Calamiten zu thun haben.

Auf solche Weise bleiben von den HEER'schen Calamarien theils die oben erwähnten etwas zweifelhaften Calamitenreste im Sandstein, theils jene Reste übrig, welche er als Rhizome von *Calamites radiatus* aufgefasst hat, und welche unten als *Pseudobornia* beschrieben sind. Was die Knorrien betrifft, so sind dieselben unten ausführlich besprochen.

Calamites? sp.

Taf. XIV, Fig. 4.

Calamites radiatus HEER (ex parte), l. c. S. 32, Taf. I, Fig. 1 a.

Zu *Calamites* dürfte wohl, wie schon erwähnt, das Stück zu bringen sein, welches HEER auf seiner Taf. I, Fig. 1 a abgebildet hat. Der Rest liegt in einem groben Sandstein, und es bleibt unsicher, ob der Querriss einen Knoten oder nur einen zufälligen Bruch darstellt. Die Streifen, welche nach HEERS Abbildung auf den Rippen unter den Knoten vorhanden sein sollen, sind in der Wirklichkeit nicht zu sehen.

Als ferner wahrscheinlich zu *Calamites* gehörend dürfte unsere Fig. 4 auf Taf. XIV anzusehen sein, jedoch ist keine Gliederung vorhanden, und es können in der That auch andere Pflanzenreste, wie z. B. das Holz der Coniferen, ähnliche Abdrücke hervorbringen. Die Rippen sind an der einen Seite schmäler als an der anderen. Es bleibt somit noch zweifelhaft, ob wirkliche Calamitenreste bis jetzt auf der Bären-Insel gefunden sind, obschon es jedoch möglich ist. Wenn HEERS Fig. 6 auf Taf. I getreu wäre, müssten allerdings alle Zweifel gehoben werden. Das Stück, welches muthmasslich als das Original zu der betreffenden Figur bei HEER zu betrachten ist, ist sehr schlecht erhalten und scheint am ehesten eine *Knorria* darzustellen, eine wirkliche Gliederung ist nicht vorhanden.

Auch die Knoten, welche an dem behaupteten »jüngeren Spross» Taf. X, Fig. 8 bei HEER gezeichnet sind, existiren thatsächlich nicht. Das Exemplar stellt nur ein Stück welliges Holz dar.

Pseudobornia ursina n. gen. et sp.

Taf. XII, Fig. 1—7; XIII; XIV, Fig. 5.

Calamites radiatus HEER (ex parte), l. c. S. 32, Taf. II, Fig. 2—5; III, Fig. 4; IV, Fig. 1—6; V; VI; VII, Fig. 1 a.

Da ich mich nicht habe überzeugen können, weder dass die betreffende Pflanze mit *Calamites radiatus* identisch ist, noch dass sie zur Gattung *Calamites* (incl. *Asterocalamites*) gehört, so ziehe ich es vor, dieselbe unter einem provisorischen Namen aufzuführen, statt eine Identität oder Verwandtschaft zu behaupten, welche in der That vielleicht gar nicht existirt. Durch ein solches Verfahren verursacht man wenigstens keinen Schaden, und überdies wird verhütet, dass unrichtige Schlussfolgerungen aus dem Vorkommen der Pflanze auf der Bären-Insel gezogen werden. Übrigens könnte man sogar die Zusammengehörigkeit mit den Calamarien in Frage stellen.[1]

Die Stämme der betreffenden Pflanze erreichen (in zusammengedrücktem Zustand) einen Durchmesser von wenigstens 11—12 Cm. (Taf. XIII), während die kleinsten (Zweige oder Stämme) nur einige Millimeter stark sind.

[1] Schon STUR scheint der Meinung gewesen zu sein, dass HEERS *Calamites radiatus* nicht diese Art darstellt (Culmflora, I, S. 103), obschon er sich sehr zurückhaltend ausdrückt.

Die Gliederung ist von HEER meistens nicht richtig wiedergegeben, indem er eine gerade quer verlaufende Knotenlinie darstellt, während sie in der That meistens etwas bogenförmig oder schief verläuft und überhaupt nicht sehr ausgeprägt ist (Taf. XII, Fig. 1—6).

Obschon etwas schematisirt sind immerhin HEERS Fig. 4 und 5 auf seiner Taf. IV in dieser Hinsicht die besten, während Fig. 1 derselben Tafel entschieden unrichtig ist. Was hier als Knotenlinie dargestellt wird, ist ein zufälliger Eindruck im Gestein selbst, und die rundlichen Knötchen, welche sowohl hier wie auf dem Zweige desselben Stückes dargestellt sind, existiren thatsächlich nicht. Aus unserer Fig. 5 auf Taf. XIV, welche das betreffende Original HEERS in getreuer Weise abbildet, erhellt ferner, dass der Zweig nur eine Gliederung zeigt, während HEER zwei Knoten dargestellt hat. Wie die Knotenlinie auf dem Hauptstamm dieses Exemplares verläuft, lässt sich nicht sicher bestimmen.

Eine deutliche Rippung, wie auf *Calamites*, ist auf keinem Exemplare zu beobachten, und unsere Fig. 2 auf Taf. XII welche die deutlichste Annäherung dazu darstellt (auf der Tafel sogar etwas zu deutlich), zeigt dieselbe nicht mehr, als mehrere Stammreste, welche nichts mit Calamarien zu thun haben. Nun ist es allerdings wahr, dass sämmtliche Exemplare sehr zusammengepresst sind, aber es ist jedenfalls eigenthümlich, dass unter den Hunderten von untersuchten Exemplaren nicht ein einziges Stück mit deutlichen Calamitenrippen zu beobachten ist. Dass die Oberfläche der Rinde, wie bei mehreren Calamiten, ungerippt war, scheint jedenfalls sicher; man könnte aber vermuthen, dass der innere Bau anders als bei diesen gestaltet gewesen, was allerdings infolge der starken Zusammenpressung nicht mehr sicher zu entscheiden ist.

Obschon also nicht gerippt war die Oberfläche doch nicht glatt, sondern bietet eine eigenthümliche Skulptur dar, welche ich von keinem Autor als bei *Asterocalamites scrobiculatus* (*Calamites radiatus*) vorkommend angeführt gefunden habe, ein Umstand, welcher auch gegen die Identität mit dieser Art sprechen dürfte. Diese Skulptur, welche meistens nur in der Nähe der Knotenlinie zu beobachten ist (Taf. XII, Fig. 1, 2), besteht aus kleinen, punktförmigen Eindrücken und Streifen, wie die vergrösserte Fig. 3 derselben Tafel sehr getreu wiedergiebt. Da wir es mit Abdrücken zu thun haben, so müssen die Stämme selbstverständlich mit entsprechenden Höckerchen bedeckt gewesen sein. Auf dem grossen Stück Taf. XIII scheint diese Skulptur ursprünglich über die ganze Oberfläche verbreitet gewesen zu sein, obschon sie jetzt hie und da verwischt ist.

Dass diese Skulptur die Anwesenheit von Haaren oder Spreuschuppen angiebt, ist wohl sicher. HEER hat bekanntlich einige Haarbildungen auf seiner Taf. IV, Fig. 5 und 6 abgebildet. Doch ist es möglich, dass diese Eindrücke nur zufällig sind, während andere Exemplare in der That Eindrücke von Haaren anzuzeigen scheinen, und zwar am meisten in der Nähe der Knoten. Im ganzen sind sie aber zu undeutlich, um etwas sicheres über den Bau derselben anzugeben.

Ein *Calamites* mit Spreuschuppenbildung ist von STUR als *Calamites paleaceus* aus den Schatzlarer-Schichten Belgiens beschrieben worden.[1] Die Höckerchen auf der Oberfläche dieser Art sind nach STUR nahezu von derselben Beschaffenheit und auch Gestalt,

[1] STUR, Die Carbonflora der Schatzlarer-Schichten. Abth. 2. Die Calamarien, S. 116, Taf. XI b, Fig. 1—3. Abh. d. k. k. geol. Reichsanst. Bd. XI, Abth. 2. Wien 1887.

wie die Höcker, welche Stamm und Blattstiele der *Alsophila* zieren und dazu bestimmt sind, die Spreuschuppen, die diese Farntheile dicht bedecken, zu tragen.

In der paläophytologischen Abtheilung des Reichsmuseums in Stockholm findet sich auch ein aus GOLDENBERGS Sammlung, welche seiner Zeit für unser Museum eingekauft wurde, stammendes Exemplar eines *Calamites*, dessen Internodien ebenfalls mit kleinen Höckerchen dicht bedeckt sind. Die Skulptur der Oberfläche unserer *Pseudobornia* steht daher nicht ganz vereinzelt da.

Auch in Bezug auf die Astbildung scheint eine Abweichung vom gewöhnlichen *Calamites*-Zustand vorzuliegen. Man sieht nie die gewöhnlichen Astnarbengruben, sondern die Narben erscheinen als Erhöhungen, infolgedessen dieselben im Profil als Anschwellungen hervortreten (Taf. XII, Fig. 2, 6), als ob es sich um verkümmerte Äste handelte. Wenn diese Narben, oder richtiger Erhöhungen, »en face» gesehen werden, so treten sie als rundliche oder ovale Eindrücke im Gestein (nicht im Stamme) hervor (Taf. XII, Fig. 1, 5). Soweit ich habe ermitteln können, kommen nur 2 Äste (zuweilen nur 1?) an jedem Knoten vor. Da sie nicht immer vorhanden sind und auch an dem folgenden Knoten fehlen können, so scheint ihr Vorkommen ganz unregelmässig zu sein, wie in WEISS' Untergattung *Stylocalamites*.

Die Frage von der Stellung der Äste im Verhältniss zur Knotenlinie ist bekanntlich von verschiedenen Autoren verschiedenartig beantwortet worden. Auch unsere Fig. 5, Taf. XIV lässt ihre Stellung nicht sicher ermitteln, da die Knotenlinie selbst hier undeutlich ist. Ich kann demzufolge nicht behaupten, dass sämmtliche Exemplare auf Taf. XII die richtige Stellung erhalten haben. Während die Äste jedenfalls im Allgemeinen ihre Lage an den Knoten behaupten, scheint der Ast, welcher aus dem grossen Exemplar Taf. XIII (bei *x*) heraustritt, auf das Internodium herunter (resp. hinauf) gerückt zu sein.

HEER betrachtete sämmtliche hier beschriebene Formen als Rhizome von *Asterocalamites scrobiculatus* (= *Calamites radiatus*). Ob sie Rhizome oder Stämme sind, oder ob sie sowohl diese wie jene umfassen, wage ich nicht zu entscheiden. Dass wenigstens einige Rhizome vorliegen, scheint aber wahrscheinlich, da es in der That den Anschein hat, als ob Wurzelzasern, wie HEER meinte, zuweilen an den Knoten vorkommen. Diese Wurzelzasern waren es, welche HEER dazu veranlassten, die Anwesenheit von Blättern bei *Asterocalamites scrobiculatus* zu bestreiten, indem er meinte, dass die von den Autoren beschriebenen Blätter in der That nur Wurzelzasern wären, eine Vermuthung, welche aber durch spätere Aufschlüsse nicht bestätigt worden ist.

Ein Rest, welcher wohl mit unserer Pflanze verglichen werden kann, ist GÖPPERTS *Anarthrocanna tuberculosa*.[1] Diese ist aber, wie ich mich an den Originalexemplaren in Breslau habe überzeugen können, eine so vage Bildung, dass mit dieser Vergleichung nicht viel gewonnen wird. KIDSTON nimmt diese *Anarthrocanna*, wenn auch mit einem ?, als Synonym mit *Asterocalamites scrobiculatus* auf.[2]

Auch *Anarthrocanna stigmarioides* GP. (l. c. S. 129, Taf. XLI, Fig. 5) könnte in Betracht gezogen werden, falls dieselbe nicht eine ebenso zweifelhafte Bildung wie die

[1] GÖPPERT, Fossile Flora des Übergangsgebirges. S. 128, Taf. VII, Fig. 1—3. Nova acta etc. Bd. (14) 22. Suppl. 1852.

[2] KIDSTON, Catalogue of the palæozoic plants etc., p. 37, 38.

vorige Art wäre. Dasselbe gilt von der von EICHWALD beschriebenen[1] *Anarthrocanna* sp. aus »einem sehr harten Kohlenkalk der Insel Vancouver».

Wir müssen daher bessere Materialien abwarten, bevor die Stellung unsrer Pflanze endgültig endschieden werden kann.

Vorkommen. Die Pflanze ist sehr häufig in dem grauschwarzen Schiefer unter dem Kohlenlager.

LYCOPODIACEÆ.

Lepidodendron cfr. **Pedroanum** CARRUTHERS sp.

Taf. XI, Fig. 1.

Flemingites Pedroanus CARRUTHERS, Geol. Magazine 1869, p. 151, pl. V, fig. 1—11.
Lepidodendron commutatum HEER (excl. synonym.), Fossile Flora der Bären-Insel, S. 39, Taf. VII, Fig. 9, 10.
Lepidodendron Pedroanum SZAJNOCHA, Über einige carbone Pflanzenreste aus der Argentinischen Republik[2]. S. 5 (203), Taf. II, Fig. 2, 3.

Diese Art ist durch verkehrt eiförmige Blattpolster ausgezeichnet, an deren oberem Ende eine kleine halbmondförmige Blattnarbe zu sehen ist. HEERS Abbildungen sind insofern unrichtig, als sie die Blattpolster oben zugespitzt und verlängert darstellen, während sie im Gegentheil hier deutlich abgerundet sind. Ich habe daher das Hauptstück (HEERS Fig. 10) wieder abbilden lassen, damit das Aussehen desselben naturgetreu erscheint. Die Blattpolster auf der linken Seite der HEER'schen Abbildung sind ziemlich richtig dargestellt.

HEER zieht die Pflanze zu *Lepidodendron* (*Ulodendron*) *commutatum*, welches jedoch nur ein Ulodendronzustand von *Lepidodendron Veltheimianum* ist. Dass diese Identificirung nicht richtig sein kann, erhellt aus der Form der Blattpolster, wie diese hier dargestellt sind. Dagegen scheint die Pflanze recht gut mit *Lepidodendron Pedroanum*, wie diese von SZAJNOCHA aus der Argentinischen Republik beschrieben worden ist, übereinzustimmen. Die Blattpolster zeigen ebenfalls eine grosse Ähnlichkeit mit CARRUTHERS' vergrösserter Abbildung seines *Flemingites Pedroanus*, nur dass bei diesem keine Blattnarben zu beobachten sind, was nach CARRUTHERS darauf beruhen soll, dass die Blattbasen die Stammoberfläche bekleideten. Ist dem nun so, dann ist wohl CARRUTHERS' Pflanze sowohl von der unsrigen wie von SZAJNOCHAS verschieden, da bei diesen doch Blattnarben, wenngleich nicht scharf ausgeprägt, wahrzunehmen sind. Jedenfalls dürfte unsere Art mit der von SZAJNOCHA beschriebenen Pflanze identisch sein oder ihr äusserst nahe stehen. Der einzige Unterschied ist der, dass bei der Pflanze von der Bären-Insel die Blattpolster nicht ganz so dicht beisammen stehen. Sie nähert sich daher ein wenig an *Bothrodendron Wijkianum*. Dass sie zu *Lepidodendron* gehört, kann allerdings nicht bewiesen werden, da die Blattnarben zu undeutlich sind, um die Spuren erkennen zu lassen. Es ist ferner

[1] EICHWALD, Geognostisch-palæontologische Bemerkungen über die Halbinsel Mangischlak und die Aleutischen Inseln. St. Petersburg 1871. S. 115, Taf. IV, (nicht VI, wie auf der Tafel und im Texte steht), Fig. 8.

[1] Sitzungbsber. Acad. der Wiss. Wien, Math.-naturw. Classe Bd. 100, S. 199. 1891

nicht zu leugnen, dass die Form der Blattnarben auch sehr an gewisse kleinere Formen von *L. Heeri* aus Spitzbergen erinnert.

Vorkommen. In schwarzem Kohlenschiefer oder schieferiger Kohle, selten.

Das oben beschriebene *Lepidodendron* ist die einzige Art von dieser Gattung, welche bisher auf der Bären-Insel gefunden wurde, obschon die Zusammengehörigkeit mit *Lepidodendron* bei den vorliegenden Materialien nicht hat bewiesen werden können. HEER hat aber, ausser dieser Art, noch drei andere Arten aufgenommen, und zwar *L. Veltheimianum*, *L. Wijkianum* und *L. Carneggianum*. Die beiden letztgenannten werden unten unter *Bothrodendron* besprochen werden, die erste umfasst verschiedene Dinge, welche unrichtig gedeutet und dargestellt sind. Das Original zu HEERS Taf. VIII, Fig. 1 ist in der Wirklichkeit eine undeutliche Knorrienform von *Bothrodendron*, welche wenig Ähnlichkeit mit der Zeichnung hat. Das Original zu Fig. 2 derselben Tafel zeigt undeutliche, runzelige, unbestimmbare Rindenstücke ohne regelmässige Blattpolster und dürfte ebenfalls zu *Bothrodendron* gehören. Fig. 3 ist unrichtig gezeichnet, indem die Blattpolster oberhalb der Narben auf der Zeichnung verlängert sind, während eine solche Fortsetzung in der Wirklichkeit nicht vorkommt.

Dies Exemplar gehört wie Fig. 4 thatsächlich zu *Bothrodendron Wijkianum*. Die Originale zu Fig. 5 und 6 sind unbestimmbare Abdrücke, welche den Zeichnungen wenig entsprechen, und Fig. 7 ist eine unbestimmbare Knorrienform. Endlich dürften auch die längsrunzeligen Zweige, welche HEER auf Taf. IX, Fig. 3, 4 zu *Lepidodendron Veltheimianum* gebracht hat, in der That zu *Bothrodendron* gehören. Es liegt daher kein Grund für die Annahme vor, dass *Lepidodendron Veltheimianum* bis jetzt auf der Bären-Insel gefunden worden wäre.

Ebenso vage und lieber unberücksichtigt bleibende Reste sind die, welche HEER als *Lepidophyllum Roemeri* aufgenommen hat, während die dichotom gegabelten Reste, welche er als Wurzeln von *Lepidodendron* aufnahm, vielleicht die von *Pseudobornia* vorstellen dürften. Dass sie jedenfalls nicht zu *Lepidodendron* gehören können, ist selbstverständlich, seitdem wir jetzt wissen, dass *Stigmaria* die Rhizome desselben darstellen.

Bothrodendron.

Die Gattung *Cyclostigma* wurde bekanntlich 1859 von HAUGHTON für einige Pflanzenreste aufgestellt, welche im gelben Schiefer des Kiltorkan Hill und in einigen anderen Lokalitäten der Grafschaft Kilkenny in Irland[1] vorkommen, und zwar in einer Ablagerung, welche unter dem Bergkalk liegt, und zum »old red sandstone» gerechnet wird.

HAUGHTON meinte, dass die Blätter in alternirende Kreise gestellt seien und beschrieb die Blattnarben als »vollständig cirkelrund, in mehreren Fällen mit einem kleinen und deutlichen Mal in der Mitte, wahrscheinlich von einem centralen Spurbündel von holzartigem Gewebe herrührend». Die Pflanze solle am nächsten mit *Stigmaria* zu vergleichen sein. Er beschrieb drei Arten: *C. kiltorkense, minutum* und *Griffithsi.*

[1] S. HAUGHTON, On *Cyclostigma* a new genus of fossils plants from the old red sandstone of Kiltorkan etc. Journal Roy. Soc. Dublin, vol. 2, 1859, p. 407, pl. 14—17.

Dann wurde *Cyclostigma kiltorkense* und *minutum* von der Bären-Insel durch HEER beschrieben. Den Bau der Blattnarben hat er aber nicht richtig erkannt, wie aus dem folgenden Citate (l. c. S. 43) hervorgeht. »Alle Stücke sind ausgezeichnet durch kleine in schiefe Reihen gestellte Wärzchen oder deren Abdrücke. Es haben diese Wärzchen nur eine Breite von etwa 2 Mm. Sie sind kreisrund, etwas nach oben gerichtet, und auswärts verschmälert, doch scheinen sie nicht länger als breit gewesen zu sein. Sie sind oben mit einer runden Vertiefung versehen (Taf. XI, Fig. 4 b vergrössert), die im Abdruck (Fig. 1, 2) als kleines Wärzchen erscheint, das am oberen Ende des Eindruckes liegt. Die Vertiefung ist bei den am besten erhaltenen Wärzchen (Fig. 4 und 4 b) von einem scharfen, ringförmigen Rand umgeben, an welchem zuweilen (Fig. 5 c) 2 bis 3 sehr kleine Erhabenheiten hervortreten.»

Was HEER hier Wärzchen benannt hat, sind in seiner Fig. 4, 4 b die Blattpolster mit der Blattnarbe, während Fig. 5 c diese allein darstellt, und zwar in der rechten Figur mit den 3 Spurpunkten. Es ist daher nicht richtig, wenn HEER sagt: »knorrienartige Warzen fehlen unter der Rinde vollständig, wodurch *Cyclostigma* von *Knorria* leicht zu unterscheiden ist, obwohl die äussere Rinde der Knorrien eine ähnliche Bildung zeigt». Es gehören vielmehr die meisten Knorrien der Bären-Insel zu *Bothrodendron* (*Cyclostigma*).

Dieselben Arten wurden gleichfalls von HEER aus Irland beschrieben und zwar in einem Anhange zu seinem Aufsatze: »On the carboniferous Flora of Bear Island».[1] Die Blattnarben von *Cyclostigma kiltorkense* werden als »kleine runde Wärzchen, welche einen cirkelrunden Eindruck an der Spitze haben», beschrieben, während die Wärzchen von *C. minutum* durch ein deutliches centrales Närbchen ausgezeichnet sein sollen.

Auch *Cyclostigma densifolium* DAWSON, aus dem mitteldevonischen Gaspésandstein, wird als mit einem centralen Male in der Blattnarbe beschrieben[2] und DAWSON giebt denselben Bau für die von ihm gesehenen Exemplare von *Cyclostigma* aus Kiltorkan an.[3] Auch SCHMALHAUSEN[4] spricht von Wärzchen mit einem runden Närbchen in der Mitte, was, nach den Abbildungen zu urtheilen, wohl als Blattpolster und Blattnarben zu deuten ist. O. FEISTMANTEL, welcher zwei Cyclostigmen aus den paläozoischen Ablagerungen Australiens beschrieben hat,[5] spricht von Narben, welche im oberen Theile der Peripherie »ein länglich-rundliches Höckerchen» enthalten. WEISS[6] spricht von Narben »mit meist wenig markirtem centralen Punkt», und SOLMS[7] behandelt *Cyclostigma* als einen »Stigmarien-ähnlichen Rest».

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[1] Quarterly journal geol. soc. London, vol. 28, 1872, p. 169, pl. 4.

[2] DAWSON, The fossil plants of the devonian and upper silurian formations of Canada. Geol. Survey of Canada. Montreal 1871. P. 43, pl. 8, fig. 92—96.

[3] DAWSON, l. c. p. 76.

[4] SCHMALHAUSEN, Die Pflanzenreste aus der Ursa-Stufe im Flussgeschiebe des Ogur in Ost-Sibirien. Mélanges phys. et chim. tirées du Bull. de l'Acad. imp. des sciences de St.-Pétersbourg, vol. 9 (1876), S. 625.

[5] O. FEISTMANTEL, Palæozoische und mesozoische Flora des östlichen Australiens. Palæontographica. Suppl. 3, Lief. 3, Heft 2, S. 70 und 75.

[6] WEISS, Zur Flora der ältesten Schichten des Harzes. Jahrb. d. kgl. preuss. geol. Landesanstalt für 1884. Berlin 1885. S. 175.

[7] SOLMS, Einleitung in die Paläophytologie. S. 301. 1887.

Erst KIDSTON[1] giebt eine richtige Beschreibung der Blattnarbe bei *Cyclostigma*. »Die Blattnarben», sagt er, »sind oval oder nahezu kreisrund und zeigen, in gut erhaltenen Exemplaren, ein wenig über ihrer Mitte drei kleine Spur-Eindrücke. Die Rinde zwischen den Narben ist mit feinen länglichen Linien geziert. Die älteren Stämme werden unregelmässig gerippt und können, wenn schlecht erhalten, für Calamiten missgedeutet werden». Er bemerkt ferner, dass er, obwohl er gut erhaltene Exemplare sowohl von *Cyclostigma* wie von *Rhytidodendron* untersucht hat, doch kein wirkliches Kennzeichen anführen könne, wodurch die beiden Gattungen von einander zu trennen wären.

Da aber *Rhytidodendron* nunmehr mit *Bothrodendron* vereinigt ist, so würde hieraus folgen, dass *Cyclostigma* ebenfalls zu dieser Gattung zu bringen ist, was auch KIDSTON bei einer anderen Gelegenheit ausgesprochen hat.[2] Man könnte dieselbe allerdings als eine besondere Untergattung aufnehmen, doch scheinen Übergänge zur Rhytidodendronform vorzukommen. Wollte man aber, wie bei *Sigillaria*, verschiedene Unterabtheilungen aufstellen, dann würde allerdings auch *Cyclostigma* als eine derartige betrachtet werden müssen, die durch rundliche Blattnarben ohne deutliche Ligulargrube und durch ausgeprägte Längsstriirung der Oberfläche der Rinde charakterisirt ist.

Bevor ich zur Besprechung der Cyclostigmen-ähnlichen Formen von der Bären-Insel übergehe, will ich hier eine kurze Beschreibung einiger Exemplare von *Cyclostigma* aus Kiltorkan mittheilen, welche ich dank der Liebenswürdigkeit Sir ARCHIBALD GEIKIE's, Director General of the Geological Surveys of Great Britain, habe untersuchen können.

Mehrere lange Rindenstücke liegen auf einer grünlichen Schieferplatte zusammen. Einige derselben sind breit (Taf. XVI, Fig. 1, 3), andere dagegen schmal (Fig. 2). Während die Blattnarben auf den meisten Stücken als deutliche Erhöhungen, welche eine Knorrienform unter der Rinde vermuthen lassen (Taf. XVI, Fig. 1, 2, 4, 5), hervortreten, sind dagegen andere Stücke (Taf. XVI, Fig. 3, 7) ganz flach, was aber vielleicht nur durch den Druck verursacht ist, da einzelne Narben auf solchen Stücken mehr erhöht sind. Die Stellung der Narben auf verschiedenen Stücken wechselt; während sie bei einigen in anscheinend fast quergestellte alternirende Reihen geordnet sind (Taf. XVI, Fig. 1), scheinen sie in anderen Exemplaren eine deutliche quincunciale Stellung zu behaupten (Taf. XVI, Fig. 3). Ihre Stellung ist daher nicht immer sicher zu ermitteln, da die Stücke zumeist wohl nicht in ihrer vollständigen Breite vorliegen.

Was die Blattnarben betrifft, so sind dieselben beinahe kreisrund. Durch eine Untersuchung derselben wird es leicht erklärlich, dass so verschiedene Ansichten über ihren Bau haben ausgesprochen werden können. In den meisten Fällen setzt sich nämlich, wohl in Folge späterer Risse oder anderer Ursachen, die Skulptur der Oberfläche auf die Narben fort (Taf. XVI, Fig. 4, 5), so dass man keine sicheren Aufschlüsse über die Spurpunkte erhalten kann. Um diese zu erkennen, muss man vielmehr die Abdrücke studiren, und auf einem solchen habe ich drei rundliche Male neben einander in der, wie ich annehme, unteren Hälfte der Narbe (Taf. XVI, Fig. 6, vergrössert) beobachten können. Es ist über-

[1] KIDSTON, Catalogue of the palæozoic plants etc. 1886, p. 236.

[2] KIDSTON, Additional notes on some british carboniferous lycopods. Ann. Mag. Nat. Hist. Ser. 6, vol. 4, 1889, p. 60. »So lange die Gattungscharaktere dieser Lycopadiaceen auf den Bau der Blattnarbe gegründet werden, muss *Cyclostigma* in die ältere Gattung *Bothrodendron* aufgehen.»

haupt bei diesen flachen Exemplaren nicht immer möglich zu sagen, welche Seite die obere ist. Taf. XVI, Fig. 7 (vergrössert Fig. 8) zeigt den Abdruck einer Rindenpartie, welche sich durch eine etwas abweichende Skulptur und durch minimale Blattnarben auszeichnet. Ob derselbe einer anderen Art angehört, kann ich nicht sagen. KIDSTON führt HAUGHTONS sämmtliche Arten auf eine einzige Art zurück. Auf der mir vorliegenden Platte kommt kein Exemplar mit der transversalen Striirung vor, welche nach HEERS Angabe für *Cyclostigma minutum* charakteristisch sein würde.

Ich kann bei dieser Gelegenheit nicht umhin, die Ähnlichkeit hervorzuheben, welche in vieler Hinsicht zwischen *Bothrodendron kiltorkense* und *Sigillaria rimosa* GOLDENBERG[1] zu bestehen scheint, und welche vielleicht eine Verwandtschaft zwischen beiden Pflanzen andeutet. Da die Originalexemplare GOLDENBERGS sich nunmehr in Stockholm befinden, hielt ich es für angemessen, eine neue Zeichnung (Taf. XVI, Fig. 9) des Originales zu seiner Taf. VI, Fig. 1 hier mitzutheilen. Wie aus einer Vergleichung mit GOLDENBERGS Abbildung hervorgeht, sind die Spurpunkte, welche auf dieser gezeichnet sind, in der Wirklichkeit nicht zu sehen, was übrigens schon SCHENK bemerkt hat.[2] Aber nicht genug damit, dass die Skulptur der Oberfläche sehr an die von *Bothrodendron kiltorkense* erinnert, die entrindete Stammoberfläche, oder richtiger der Abdruck der inneren Rindenseite, zeigt eine ganz deutliche Knorrienstruktur, was ausdrücklich von GOLDENBERG hervorgehoben wird, obschon es auf seiner Abbildung nicht hinreichend deutlich gezeichnet und wohl daher später nicht berücksichtigt ist. Wie wir in dem folgenden sehen werden, sind die Knorrien der Bären-Insel durchweg — oder wenigstens grösstentheils — Abdrücke der inneren Rindenflächen von *Bothrodendron*. Auch auf keinem anderen Exemplare von *Sigillaria rimosa* habe ich die Spurpunkte beobachten können, dagegen sieht man zuweilen einige feine Querstreifen in der Nähe der Blattnarben (Taf. XVI, Fig. 10, vergrössert). ZEILLER vereinigt GOLDENBERGS *Sigillaria rimosa* mit *Sigillaria camptotaenia* WOOD aus dem Kohlenbecken bei Valenciennes, was aber nach ZEILLERS eigenen Figuren doch als zweifelhaft betrachtet werden muss,[3] da die Streifen der Oberfläche bei den GOLDENBERG'schen Exemplaren nicht so scharf von einer Narbe aus gegen die vier umstehenden gerichtet sind.

Bevor ich endlich zur Beschreibung der *Bothrodendron*-Arten der Bären-Insel übergehe, muss ferner bemerkt werden, dass die Materialien nicht so umfassend sind, wie es erwünscht gewesen wäre, um die verschiedenen Formen richtig begrenzen zu können. Der Forscher, welcher über ein Material aus so entfernten Gegenden arbeitet, ist selbstverständlich nicht in derselben günstigen Lage wie seine Collegen, die sich mit europäischen Steinkohlenpflanzen beschäftigen, und die in zweifelhaften Fällen öfters die erwünschten Aufschlüsse durch erneutes Einsammeln aus den Kohlengruben oder in anderen Sammlungen bekommen können. Wenn schon im letzteren Falle viel zweifelhaftes übrig bleibt, um wieviel mehr muss dies erst dann eintreten, wenn das unzulängliche Material nur durch kostspielige und mühsame Expeditionen vermehrt werden kann. Unter diesen Umständen bleibt mir bezüglich der Bothrodendren wie schon früher in Bezug auf die Lepidodendren aus Spitzbergen noch mancherlei Fragliches übrig.

[1] GOLDENBERG, Flora Saræpontana fossilis. Zweites Heft, 1857. S. 22, Taf. VI, Fig. 1—4.

[2] SCHENK, Die fossilen Pflanzenreste, S. 82, Fussnote und Fig. 41. Breslau 1888.

[3] ZEILLER, Flore fossile du bassin houiller de Valenciennes, p. 588, pl. 88, fig. 4—6. Paris 1888.

Bothrodendron kiltorkense Haughton sp.

Taf. XIV, Fig. 7—9, 17(?); XV, Fig. 3—13.

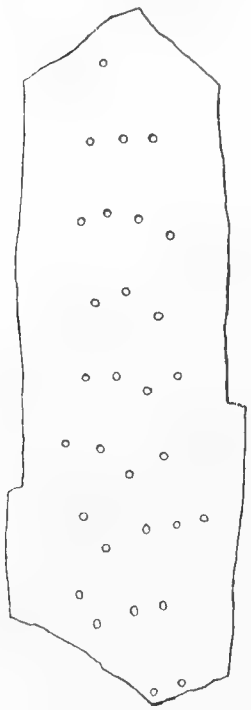
Cyclostigma kiltorkense Heer, Fossile Flora der Bären-Insel, S. 43, Taf. XI, Fig. 1—5 c.
Calamites radiatus Heer (ex parte), l. c. Taf. III, Fig. 2 a; IX, Fig. 2 b.
Knorria imbricata Heer (ex parte), l. c. Taf. X, Fig. 4.
Lepidodendron Veltheimianum Heer (ex parte), l. c. Taf. IX, Fig. 2 a?, 3, 4.
Halonia tuberculosa Heer, l. c. S. 45, Taf. XII, Fig. 7.
Stigmaria ficoides minuta Heer (ex parte), l. c. S. 46, Taf. IX, Fig. 2 c.

Wie bei Kiltorkan kommt auch hier diese Art in verschiedenen Formen vor, welche z. Th. verschiedene Erhaltungszustände, z. Th. aber auch verschiedene Altersverhältnisse darstellen dürften.

Wir haben erstens ganz flache Formen, welche keine Entwickelung der Blattpolster zeigen. Eine solche Form stellt unsere Taf. XIV, Fig. 8, vergrössert Fig. 9, mit den vergrösserten Blattnarben Taf. XV, Fig. 12, 13 dar. Dies Exemplar weicht jedoch von den übrigen auch insofern ab, als die Längsstreifen kaum merkbar sind, während eine, allerdings sehr feine, Querstriirung angedeutet ist (Taf. XIV, Fig. 9), so dass man einigermassen an *Bothrodendron minutifolium* erinnert wird, ohne dass jedoch die eigenthümliche Skulptur desselben erreicht wird. Auch die Blattnarben erinnern etwas an dasselbe, indem sie nicht so kreisrund wie bei der typischen Form sind, sondern zuweilen eine Annäherung an die querovale Form zeigen. Zu derselben flachen Form gehören ferner Heers *Stigmaria ficoides minuta* auf seiner Taf. IX, Fig. 2 c, und sein *Calamites radiatus* derselben Tafel Fig. 2 b. Diese Exemplare zeigen aber keine Querstriirung, während die drei Spurpunkte auf einigen Narbenfeldern deutlich zu beobachten sind. Heers Abbildungen sind daher z. Th. als unrichtig zu betrachten.

Gewöhnlich sind aber die Blattnarben auf kleine Blattpolster gestellt, welche etwas nach oben gerichtet sind. Infolge dessen müssen die Blattnarben selbst einen schiefen Eindruck im Gestein verursachen, und sie erscheinen daher etwas quergezogen (Taf. XV, Fig. 10, 11). Da die Skulptur der Oberfläche sich nicht über die Blattpolster fortsetzt, so können diese ziemlich scharf hervortreten, so dass sie in Abdrücken sogar als scharf begrenzte Felder erscheinen. Sonst kann man aber deutlich beobachten, dass sie nach unten keine Begrenzung gegen die umgebende Rinde zeigen (Taf. XV, Fig. 10, 11). Eine Form mit sehr hohen Blattpolstern, auf deren Spitze die rundliche, sogar etwas länglich ovale Narbenfläche deutlich zu sehen ist, wurde von Heer als *Halonia tuberculosa* beschrieben. Heers Abbildung ist aber durchaus unrichtig, weil sie die Blattpolster als durch eine scharfe Linie begrenzt darstellt, während eine solche, wie aus unseren Abbildungen Taf. XV, Fig. 8 und 9 der beiden Gegenplatten des Heer'schen Originales erhellt, in der That nicht existirt. Diese Form bildet den Übergang zu *Bothrodendron Wijkianum*, ohne dass sie jedoch von *B. kiltorkense* getrennt werden kann. — An keinem Exemplare mit Blattpolstern habe ich die Spurpunkte beobachten können.

Abweichend ist unsere Fig. 4 auf Taf. XV. Die Blattnarben sind hier sehr klein, und neben denselben kommen auch kleinere rundliche Eindrücke vor, die aber so undeutlich sind, dass sie wahrscheinlich ganz zufällige Bildungen darstellen. Auch die Stellung der Blattnarben ist ziemlich unregelmässig, wie aus nebenstehender Textfigur, welche mit Weglassung der übrigen Eindrücke nur die Blattnarben angiebt, erhellen dürfte. Dieses Exemplar ist dasselbe wie Heers Taf. XI, Fig. 5 (der untere Theil ist verloren gegangen). An einigen Narben desselben können die Spurpunkte deutlich beobachtet werden, was schon Heer, obschon nicht ganz richtig, angedeutet hat. Sie stehen zuweilen am oberen Ende der Narbenfläche (Taf. XV, Fig. 6 und 7), während andere Narben dieselben etwas heruntergerückt zeigen (Fig. 5). Jene Stellung rührt wohl von irgend einer Verschiebung her.



Auch insofern ist das betreffende Exemplar von Interesse, weil die Gegenplatte desselben (Taf. XV, Fig. 3) eine *Knorria* darstellt. Heer, welcher übersehen hatte, dass diese beiden Stücke Gegenplatten sind, hatte diese als *Calamites radiatus* beschrieben und eine nicht gelungene Zeichnung hiervon (l. c. Taf. III, Fig. 2 a) mitgetheilt.

Wie aus unserer Abbildung hervorgeht, ist die Knorriennatur des betreffenden Exemplares sehr deutlich, obschon einige durch Druck verursachte Unregelmässigkeiten vorkommen.

Wenn noch Zweifel darüber bestehen könnten, dass *Bothrodendron kiltorkense* auch durch *Knorria* repräsentirt wird, so werden diese durch das Exemplar Taf. XIV, Fig. 7 vollständig beseitigt. Unsere Figur ist eine getreue Zeichnung desselben Exemplares, welches Heer auf seiner Taf. X, Fig. 4 als *Knorria imbricata* abgebildet hatte, welche Abbildung aber insofern nicht richtig ist, als sie einige Narben zeigt, welche in der Wirklichkeit nicht existiren. Wie aus unserer Figur ersichtlich ist, korrespondiren die Narben genau mit den Knorrienwülsten, bei *x* sitzt eine Narbe noch an der Spitze eines Wulstes.

Die Bedeutung des betreffenden Exemplares ist schon von Solms hervorgehoben worden,[1] und wir wissen jetzt, dass wenigstens ein Theil der Knorrien von *Bothrodendron* stammt, was auch durch Potonié neuerdings[2] bestätigt ist. Es soll übrigens nicht unerwähnt bleiben, dass Carruthers schon längst hervorgehoben hatte,[3] dass Heers *Knorria acicularis* von Tallowbridge von *Cyclostigma minutum* stammen dürfte.

Die Rindenstücke, welche in Heers Taf. XI, Fig. 2 abgebildet sind, zeigen z. Th. eine sehr charakteristische Runzelung; andere Zweige mit ähnlicher Struktur, aber ohne Blattnarben, hat Heer zu *Lepidodendron Veltheimianum* gebracht (l. c. Taf. IX, Fig. 3 u. 4, von welchen diese recht gut das Aussehen dieser sehr häufigen Form wiedergiebt), während sie in der That zu *Bothrodendron kiltorkense* gehören dürften, vielleicht als dessen Rhi-

[1] l. c. S. 207—208.

[2] Potonié, Die Zugehörigkeit der fossilen provisorischen Gattung *Knorria*. Naturw. Wochenschr. Bd. 7, 1892, S. 61.

[3] Quarterly journal geol. soc. London, vol. 28, 1872, p. 173.

zome (?). Andere grössere Rindenpartien mit ähnlicher, obschon gröberer Struktur und mit ovalen Durchtrittsstellen für die Gefässbündel (Taf. XIV, Fig. 17) sind von HEER als *Lepidodendron Veltheimianum* bestimmt, obschon sie wohl eher hierher gehören. Dass HEERS Taf. IX, Fig. 2 a und Taf. VIII, Fig. 2 c als innere Rindenflächen von *Bothrodendron kiltorkense* anzusehen sind, dürfte jedenfalls sehr wahrscheinlich sein.

Vorkommen. *Bothrodendron kiltorkense* kommt auf der Bären-Insel hauptsächlich in der Kohle und im Kohlenschiefer, aber auch im eisenhaltigen Sandsteinschiefer vor.

Bothrodendron Wijkianum HEER sp.[1]

Taf. XV, Fig. 14, 15.

Lepidodendron Wijkianum HEER, Fossile Flora der Bären-Insel, l. c. S. 40. Taf. VII, Fig. 1 c, 2; IX, Fig. 1.
Lepidodendron Veltheimianum HEER (ex parte), l. c. Taf. VIII, Fig. 3, 4.

Diese Art zeichnet sich durch ihre grossen Blattpolster, an deren oberem Ende die kleine Blattnarbe ihren Platz hat, aus. Diese ist eigentlich kreisrund, obschon sie jetzt infolge des schiefen Abdruckes meistens etwas quergezogen erscheint (Fig. 15). An keiner Blattnarbe habe ich die Spurpunkte mit voller Sicherheit beobachten können. Die Oberfläche zwischen den Polstern ist, wie schon HEER beschrieben hat, mit deutlichen Längsstreifen versehen. Diese Streifen setzen sich nicht auf die Blattpolster fort, vielmehr sind diese glatt, treten infolge dessen ziemlich stark gegen die Stammoberfläche hervor. Dagegen sind sie in ihrem unteren Theile nicht durch eine Linie, wie es nach HEERS Figuren scheinen könnte, gegen die Stammoberfläche begrenzt, sondern gehen hier unmerklich in die Umgebung über (Fig. 15), wie HEER für seine Taf. IX, Fig. 1 (Gegenabdruck zu seiner Taf. VII, Fig. 2) richtig bemerkt.

Zur selben Art gehören HEERS *Lepidodendron Veltheimianum* Taf. VIII, Fig. 3 (im Sandstein) und Fig. 4 (im Schiefer), an welchen beiden die Blätter dieselbe Stellung wie bei *Bothrodendron kiltorkense* aus Kiltorkan besitzen. Die erstgenannte Figur ist unrichtig, weil sie die Blattpolster bis über die Narben sich fortsetzen lässt. Eine solche Fortsetzung existirt aber nicht in der Wirklichkeit.

So sehr auch die Exemplare mit breiten Blattpolstern, wie unsere Taf. XV, Fig. 14 und HEERS Taf. VII, Fig. 1 c (dasselbe Exemplar) und Taf. VIII, Fig. 3 von *Bothrodendron kiltorkense* abweichen, so ist es doch nicht zu leugnen, dass das Exemplar Taf. VII, Fig. 2 bei HEER, sowie unsere Taf. XV, Fig. 8, 9 Zwischenformen darstellen, obschon eine vollständige Übergangsreihe allerdings noch nicht vorliegt. Jedenfalls kann man z. B. bei HEERS Taf. VIII, Fig. 4 zweifelhaft werden, ob sie zu *kiltorkense* oder zu *Wijkianum* zu bringen ist.

KIDSTON hat seiner Zeit ein *Bothrodendron Wijkianum* aus der Calciferous Sandstone Series in Schottland beschrieben,[2] und betrachtet dasselbe als wahrscheinlich mit HEERS Art identisch, eine Auffassung, der ich aber nicht beipflichten kann. Denn die Blattpolster scheinen bei der schottischen Pflanze sehr wenig, oder gar nicht, entwickelt

[1] Da die Art Herrn O. WIJK gewidmet ist, sollte der Name auf diese Weise, nicht aber *Wiikianum* geschrieben werden.

[2] KIDSTON, Additional notes etc. l. c.

zu sein, die Blattnarben sind bedeutend breiter als hoch, regelmässig queroval, während sie bei *Bothrodendron Wijkianum* aus der Bären-Insel nahezu kreisrund sind (nur infolge des schiefen Abdruckes erscheinen sie auch hier zuweilen queroval). Dazu ist bei der schottischen Pflanze eine deutliche Ligulargrube vorhanden, was ich an keinem Exemplar der Bären-Insel beobachtet habe. Ich muss demzufolge KIDSTONS Art, bei welcher übrigens drei Spurpunkte im unteren Theil der Narbe vorkommen, von der unsrigen als verschieden ansehen, und schlage für jene den Namen *Bothrodendron Kidstoni* vor.

Vorkommen. *Bothrodendron Wijkianum* ist auf der Bären-Insel sowohl im pflanzenführenden Schiefer wie im Sandstein (ein Exemplar) gefunden worden.

Bothrodendron Weissi n. sp.

Taf. XIV, Fig. 15—16.

Unter den von Herrn A. HAMBERG 1892 auf der Bären-Insel gesammelten Pflanzenfossilien kommt auch ein Stück eines *Bothrodendron* vor, welches ich hier vorläufig als eigene Art aufnehme, obschon es möglich ist, dass es nur einen Zweig von einer von den anderen Arten darstellt.

Beim ersten Anblick des Stückes könnte man glauben, einen *Calamites* vor sich zu haben, zumal es gerippt erscheint. Diese Rippung dürfte aber von den subepidermalen Knorrienwülsten herrühren, an deren Spitze je eine kreisrunde Blattnarbe gestellt ist. So wenigstens glaube ich das Stück deuten zu müssen, da in jeder Spirallinie nur jede zweite Rippe eine Narbe trägt. Allerdings beginnt der neue Wulst unmittelbar über der Narbe, dasselbe sieht man aber auch bei mehreren Knorrien (z. B. Taf. XV, Fig. 2). Die Blattnarben sind klein und anscheinend kreisrund.

Von schon bekannten Arten scheint die vorliegende am meisten mit *Bothrodendron* (*Cyclostigma*) *hercynicum* WEISS sp.[1] aus dem Unterdevon des Harzes verglichen werden zu können. Doch sind beide noch zu wenig bekannt, als dass man etwas bestimmtes darüber aussagen könnte.

Vorkommen. Bis jetzt ist nur ein einziges Exemplar und zwar im pflanzenführenden grauschwarzen Schiefer gefunden worden.

Bothrodendron Carneggianum HEER sp.

Taf. XIV, Fig. 10—14.

Lepidodendron Carneggianum HEER, Fossile Flora der Bären-Insel S. 40, Taf. VII, Fig. 3—7; VIII, Fig. 8 a; IX, Fig. 2 d, 2 e.

Cyclostigma minutum HEER, l. c. S. 44, Taf. VII, Fig. 11, 12; VIII, Fig. 5 b; IX, Fig. 5 a.

Als *Lepidodendron Carneggianum* wurden von HEER kleine Zweigreste beschrieben, welche mit rhombischen Blattnarben mit je drei Spurpunkten bedeckt sein sollten, während

[1] WEISS, Zur Flora der ältesten Schichten des Harzes. Jahrb. d. kgl. preuss. geol. Landesanstalt für 1884. S. 148.

andere, sonst ähnliche aber mit rundlichen oder querovalen Narben und einem centralen Spurpunkt versehene Zweiglein als *Cyclostigma minutum* unterschieden wurden. Die Angabe, dass die Blattnarben oder Polster bei jener Art rhombisch sind, ist aber nicht ganz richtig. Dieselben besitzen vielmehr die Form eines Cirkelsektors mit dem Bogen nach oben oder zuweilen die Form eines Cirkelsegmentes mit dem Bogen nach unten. Dass aber die verschiedene Form der Blattnarben nicht als Speciesunterschied gelten kann, geht aus dem schönen Stück hervor, welches Herr A. Hamberg 1892 von der Bären-Insel mitgebracht hat, und welches auf unserer Taf. XIV, Fig. 10 dargestellt ist. An diesem Exemplar sind die untersten Narben kreisrund (Fig. 11), dann folgen einige Narben mit unten bogenförmigem, oben querem Rande (Fig. 12) und endlich, ohne deutlichen Übergang, solche, deren Form die eines Cirkelsektors mit dem Bogen nach oben (Fig. 13) ist, und welche den grössten Theil des ganzen Stückes einnehmen. Hier kommt daher an demselben Exemplar sowohl die Form der Narben vor, welche für *Cyclostigma minutum*, wie die, welche für *Lepidodendron Carneggianum* bezeichnend sein soll. Was nun die Spurpunkte betrifft, so hatte es in den meisten Fällen den Anschein, als wäre nur ein centraler vorhanden, wie auf Heers Taf. VII, Fig. 12 b. Es ist aber zu bemerken, dass angesichts der geringen Grösse der Narben die drei Punkte, auch wenn solche vorhanden wären, kaum getrennt erscheinen können, sondern dass sie in den meisten Fällen zusammenfliessen dürften. Heer giebt für das Exemplar auf seiner Taf. VII, Fig. 4, vergrössert Fig. 5, drei Spurpunkte an; hiernach zu urtheilen dürften aber die beiden Seitenpunkte in diesem Falle nur zufällig sein. Selbst habe ich auf demselben Exemplare keine solche Punkte beobachten können, es ist jedoch jetzt z. Th. zerbrochen. Auf unserem Exemplare Taf. XIV, Fig. 10 sieht man in den rundlichen Narben zuweilen zwei Punkte (Fig. 11), und nur einmal habe ich, an einem anderen Exemplare, drei deutliche Spurpunkte beobachten können (Taf. XIV, Fig. 14), und zwar, wie ich vermuthe, an demselben Exemplare wie Heers Taf. VII, Fig. 3.

Nach alledem muss ich annehmen, dass wahrscheinlich auch bei dieser Art drei Spurpunkte vorhanden sind, obschon sie infolge der Kleinheit der Narben meistens nicht deutlich beobachtet werden können.

Da nun Heers *Lepidodendron Carneggianum* dieselbe Pflanze wie sein *Cyclostigma minutum* ist, so fragt es sich, welcher Name für dieselbe benutzt werden soll. Dieser Name ist der ältere, und wenn ich überzeugt wäre, dass Heers *Cyclostigma minutum* dieselbe Pflanze wie Haughtons wäre, so müsste selbstverständlich unsere Pflanze mit diesem Namen bezeichnet werden. *Cyclostigma minutum* aus Irland ist aber noch sehr wenig bekannt und wird überdies von Kidston als Synonym mit *C. kiltorkense* aufgenommen, infolge dessen ich die Benennung *Bothrodendron Carneggianum* Heer sp. für die Pflanze aus der Bären-Insel für die zweckmässigste halte. Sollte es sich später zeigen, dass dieselbe mit *Bothrodendron minutum* aus Irland identisch ist, so kann der Name ja leicht geändert werden.

Was die Zusammengehörigkeit der Art mit *Bothrodendron kiltorkense* betrifft, so kommen in der Sammlung von der Bären-Insel keine Übergänge zwischen beiden vor, und ebensowenig habe ich auf *Bothrodendron Carneggianum* die für *B. kiltorkense* charakteristische Längsstreifung beobachten können. Auch wenn man vermuthen könnte, dass

beide zusammen gehörten, wäre es meiner Meinung nach unrichtig, dieselben zu vereinigen, denn von einer faktischen Zusammengehörigkeit wissen wir bis jetzt nichts mit Sicherheit.

Vorkommen. Sowohl in der Kohle wie im grauschwarzen Schiefer.

Knorria.

Taf. XV, Fig. 1—3; XIV, Fig. 7.

Knorria imbricata Heer, Fossile Flora der Bären-Insel, S. 41, Taf. IX, Fig. 6; X, Fig. 1—5.
Knorria acicularis Heer, l. c. S. 42, Taf. X, Fig. 6—7; VIII, Fig. 2 d.
Calamites radiatus Heer (ex parte), l. c. S. 32, Taf. I, Fig. 2, 3, 4 (?), 5, 7, 8; II, Fig. 1; III, Fig. 1—3.

Die Knorrien sind in der Kohle der Bären-Insel die häufigsten Pflanzenreste. Sie kommen dort in verschiedenen Formen vor, betreffs deren ich auf Heers Beschreibung und auf seine Abbildungen, welche hier relativ gut sind,[1] hinweise.

Heer nimmt zwei Hauptformen, *Knorria imbricata* Sternb. und *K. acicularis* Göppert auf, sagt aber in Bezug auf diese, dass sie »vielleicht nur Varietät der *Knorria imbricata* ist».

Die meisten Knorrien sind aber von Heer als Stammreste von *Calamites radiatus* aufgenommen worden. Von dieser Form theile ich hier (Taf. XV, Fig. 1 und 2) zwei Abbildungen mit, von welchen jene dasselbe Exemplar wie Heers Taf. I, Fig. 3, diese dasselbe wie seine Taf. I, Fig. 7 darstellt. Wie hieraus ersichtlich wird, sind die Knorrienpolster hier in scheinbar orthostichale Reihen geordnet, und da das untere Ende eines Polsters oft unmittelbar über der Spitze des in derselben Reihe vorhergehenden seinen Anfang nimmt, so sieht es allerdings bei flüchtiger Betrachtung aus, als hätte man eine gerippte Stammoberfläche vor sich, zumal die Rinde längs den Polstern (oder richtiger längs den Knorrienhöhlungen) leicht zerreisst. Ganz eigenthümlich ist die Form Fig. 2, von welcher man glauben könnte, dass sie von einer Pflanze mit *Rhytidolepis*-artiger Stammoberfläche herrührt, was aber selbstverständlich nicht der Fall ist. Am meisten trügerisch ist das Exemplar bei Heer Taf. III, Fig. 1, doch kann man, besonders durch die Gegenplatte, bei näherer Untersuchung auch hier die Knorriennatur konstatiren. Nicht nur durch die stellenweise Anschwellung der Rippen, sondern besonders durch den Verlauf der feinen Längsstreifen, erhalten wir sehr gute Aufschlüsse hierüber. Im Allgemeinen wird schon die Knorriennatur der Calamiten-ähnlichen Stücke sogleich erkennbar, wenn man das Licht in die Längsrichtung der scheinbaren Rippen auffallen lässt. Die Polster treten dann meistens sehr deutlich hervor.

Zuweilen liegt diejenige Rindenfläche vor, deren Abdruck eine Knorria ist. Solche Rindenflächen zeigen in der Kohle den Polstern entsprechende längliche Vertiefungen, welche nach oben ziemlich scharf begrenzt sind.

Das Hauptinteresse der Knorrien der Bären-Insel beruht namentlich darauf, dass sie meistens zu *Bothrodendron* zu gehören scheinen. Das in dieser Hinsicht beweisende Exemplar Taf. XIV, Fig. 7 wurde schon oben erwähnt. Wichtig ist auch das Exemplar Taf. XV, Fig. 3, dessen Gegenabdruck nicht nur die *Bothrodendron*-Narben, sondern auch

[1] Die in Heers Taf. X, Fig. 5 befindlichen runden Narben sind jedoch nur zufällige Eindrücke.

ihre Spurpunkte erkennen lässt. Ein anderes, etwa 10 Cm. breites Exemplar mit dicht gedrängten Polstern, welches HEER als *Calamites radiatus laticostatus* bezeichnet hat, ist stellenweise mit Kohlenrinde versehen, auf welcher noch Narben sitzen, ganz ähnlich den auf unsrer Taf. XIV, Fig. 7 abgebildeten. Endlich zeigt das von HEER in ähnlicher Weise bezeichnete, in dessen Taf. II, Fig. 1 sehr unrichtig dargestellte Exemplar hie und da *Bothrodendron*-Narben, von der oben (S. 65) besprochenen flachen Form.

Nach alledem darf man mit voller Sicherheit behaupten, dass die meisten oder gar sämmtliche Knorrien aus der Bären-Insel von *Bothrodendron* stammen. Das Vorkommen von *Lepidodendron* ist hier noch zweifelhaft, denn ich bin nicht überzeugt, dass die oben als *Lepidodendron* cfr. *Pedroanum* bezeichnete Pflanze ein echtes *Lepidodendron* ist.

Es ist in dieser Hinsicht nicht ohne Interesse, dass so viele Knorrien auch im Flussgerölle des Ogur in Ostsibirien zusammen mit *Bothrodendron* (*Cyclostigma*) vorkommen,[1] und dass mehrere derselben an die Formen aus der Bären-Insel erinnern. Wie schon oben erwähnt, hat POTONIÉ auch eine *Knorria* als mit *Bothrodendron minutifolium* zusammengehörend beschrieben. Wenn hiernach erwiesen ist, dass ein Theil der Knorrien zu *Bothrodendron* gehört, so ist es leicht einzusehen, warum man so lange Zeit über ihre Herkunft im Zweifel gewesen ist, denn es muss als eine Ausnahme betrachtet werden, dass die kleinen *Bothrodendron*-Narben auf der Korrienrinde noch erhalten sind.

Wie oben gezeigt, hat auch *Sigillaria rimosa* GOLDENB. eine echte Knorrienform (Taf. XVI, Fig. 9); diese Art scheint aber mit *Bothrodendron* verwandt zu sein.

Da auf der Bären-Insel verschiedene *Bothrodendron*-Arten vorkommen, kann man selbstverständlich auch mehrere Knorrienformen erwarten, was ja thatsächlich auch der Fall ist. Dieselben unter verschiedenen Namen aufzuführen scheint mir aber kaum zweckmässig, um so weniger, da Übergänge zwischen den verschiedenen Formen nicht fehlen. Ich begnüge mich einfach damit, auf HEERS sowie auf die hier mitgetheilten Abbildungen und Beschreibungen hinzuweisen.

Vorkommen. Ist der häufigste Pflanzenrest des Kohlenlagers. Von Herrn A. HAMBERG wurden auch einige Stücke aus dem Sandstein mitgebracht.

Stigmaria ficoides STERNB. sp.

Stigmaria ficoides HEER, Fossile Flora der Bären-Insel, l. c. S. 45, Taf. VIII, Fig. 5 c; XII, Fig. 1—4, 6.

Zu HEERS Beschreibung dieser Reste habe ich nur hinzuzufügen, dass, wie schon erwähnt, seine Taf. IX, Fig. 5 a nicht zu *Stigmaria* sondern zu *Bothrodendron* gehört, und dass seine Taf. XII, Fig. 5 besser unberücksichtigt bleiben dürfte. HEER sagt selbst, dass die Narben »in der Zeichnung zu deutlich hervortreten», dieselben sind thatsächlich so undeutlich, dass man nicht mit Sicherheit sagen kann, ob der Rest zu *Stigmaria* gehört. Die meisten Stigmarien der Bären-Insel zeichnen sich durch relativ grosse Narben aus, doch liegen verhältnissmässig wenige Exemplare vor.

[1] SCHMALHAUSEN, Die Pflanzenreste aus der Ursastufe im Flussgeschiebe des Ogur etc., l. c.

Zu welcher Pflanze dieselben gehören, kann selbstverständlich nicht entschieden werden. Da aber nach SCHIMPER *Stigmaria* auch in Verbindung mit *Knorria longifolia* gefunden ist, und da die Knorrien der Bären-Insel zu *Bothrodendron* gehören, so wäre es allerdings möglich, dass auch die betreffenden Stigmarien die Rhizome dieser Gattung darstellten. Da aber vielleicht auch *Lepidodendron* hier vorkommt, so sind keine bestimmte Schlussfolgerungen nach dieser Richtung zulässig.

Vorkommen. Im Kohlenlager und im bituminösen Schiefer.

Sporangia.

HEER hat in seiner Abhandlung einige Sporangien aus der Bären-Insel beschrieben und abgebildet (l. c. S. 47, Taf. VIII, Fig. 8—17). Sie sind stellenweise in der Kohle recht häufig und gehören nach HEER zu drei verschiedenen Formen. Da ich sie bisher nicht hinreichend habe untersuchen können, beschränke ich mich darauf, auf HEERS erwähnte Abhandlung hinzuweisen.

Zweifelhafte Reste.

Unter den von HEER als *Calamites radiatus* bezeichneten Stammstücken kommt auch das auf unserer Taf. XIV, Fig. 6 abgebildete Exemplar vor. Dasselbe zeigt den Abdruck eines Stammrestes, an dessen einem Ende die Fragmente von zwei grossen becherförmigen Eindrücke zu sehen sind. Diese Eindrücke sind den *Ulodendron*- und *Bothrodendron*-Bechern recht ähnlich, und da ja *Bothrodendron* auf der Bären-Insel recht häufig ist, könnte man besonders an eine Zusammengehörigkeit mit diesem denken. Gegen eine solche Annahme spricht allerdings der Umstand, dass die Becher bei den bisher bekannten bechertragenden Bothrodendren eine geradlinige Reihe auf der Stammoberfläche bilden, während die Becher am vorliegenden Exemplar, falls dasselbe in richtiger Stellung gezeichnet ist, spiralig gestellt zu sein scheinen. Für *Bothrodendron* könnte vielleicht auch die Beschaffenheit der Oberfläche sprechen, welche sich unter der Loupe ziemlich feingestreift und etwas granulirt zeigt. Gegen *Ulodendron* und *Lepidodendron* spricht die Abwesenheit aller Spuren von Blattnarben und wir müssen daher bessere Materialien abwarten, bevor eine Bestimmung des betreffenden Gegenstandes ausgeführt werden kann.

Die als *Cardiocarpum punctulum* und *ursinum* von HEER beschriebenen Gegenstände müssen noch als zweifelhaft betrachtet werden. Jenes ist vielleicht nur eine konkretionäre Bildung und ist jedenfalls nicht deutlich genug, um mit GÖPPERTS und BERGERS Pflanzenrest identificirt werden zu können. *Cardiocarpum ursinum* ist vielleicht nur das Fragment einer solchen gabelig getheilten Farnspindel (?), wie sie unsere Fig. 1 auf Taf. XIV darstellt.

[1] Traité de pal. vég. II, p. 118.

Rückblick.

Die fossile Flora der Bären-Insel ist noch bedeutend ärmer an Arten, als die Steinkohlenflora Spitzbergens. Die wenigen Arten, welche jetzt bekannt sind, bieten jedoch ein nicht geringes Interesse dar, obschon fortgesetzte, und zwar wenn möglich von einem Fachmanne vorgenommene, Einsammlungen nöthig sind, um in allen Fragen Klarheit zu erlangen. Die Farnreste sind noch sehr ungenügend bekannt, und von den Calamiten kennen wir auch sehr wenig, während die problematische *Pseudobornia* noch umfassend studirt werden muss, um richtig gedeutet werden zu können. Auch von den Bothrodendren haben wir noch keine hinreichende Kenntniss, da weder Verzweigung noch Fruchtbildung,[1] weder Blätter noch Wurzelbildung derselben bisher bekannt sind. Diese Pflanzen bieten sonst das weitaus grösste Interesse dar, denn von ihnen sind vielleicht sowohl die Sigillarien wie die Lepidodendren ausgegangen. Es ist nämlich kaum zu verkennen, dass mehrere Sigillarien sich an die Bothrodendronsippen *Rhytidodendron* und *Cyclostigma* anschliessen, während *Bothrodendron Wijkianum* durch seine Blattpolster eine Annäherung an *Lepidodendron* darstellt. Man braucht sich nur diese Polster etwas mehr abgegrenzt zu denken, um ein *Lepidodendron*-Polster zu bekommen.

Doch — dies alles kann trügerisch sein; wir brauchen vor allen Dingen ein umfassenderes Untersuchungsmaterial, statt uns mit Spekulationen zu beschäftigen, wie lockend diese auch sein mögen.

Auch in anderer Beziehung sind die Bothrodendren der Bären-Insel von Interesse, da durch dieselben bewiesen ist, dass eine Menge der Knorrien zu *Bothrodendron* gehören.

In klimatologischer Hinsicht ergiebt sich aus der Flora der Bären-Insel dasselbe wie aus der Steinkohlenflora Spitzbergens: betreffs der entsprechenden Pflanzenreste in Europa hat keine Verschiedenheit konstatirt werden können.

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[1]) Es soll jedoch nicht unerwähnt bleiben, dass ein Exemplar eines länglichen und relativ schmalen Fruchtzapfens in der That vorliegt, welcher vielleicht zu *Bothrodendron* gehören könnte. Der Rest ist jedoch zu schlecht erhalten, um eine genaue Vorstellung seines Baues geben zu können, infolge dessen ich ihn nicht habe abbilden lassen.

III. Das geologische Alter der Steinkohlenflora Spitzbergens und der „Ursaflora" der Bären-Insel.

Die nebenstehende Tabelle, welche ein Verzeichniss der Arten aus der Steinkohlenflora Spitzbergens enthält, ist aufgestellt, um sowohl die Verbreitung der Pflanzenfossilien innerhalb Spitzbergens wie auch das Vorkommen derselben oder ihrer nächsten Verwandten in anderen Ablagerungen zu zeigen.

Was nun zuerst die Verbreitung der Pflanzen auf Spitzbergen betrifft, so ist schon im Vorhergehenden bemerkt worden, dass hier wahrscheinlich verschiedene Horizonte vorkommen, obschon es durch stratigraphische Untersuchungen bisher nicht direkt hat konstatirt werden können. Betrachten wir aber für einen Augenblick die Tabelle, so ergiebt sich sofort, dass die beiden reichsten Fundstätten, das Roberts-Thal und der Pyramidenberg, am meisten von einander abweichen. Ausser *Calymmatotheca bifida*, deren Vorkommen am Pyramidenberge übrigens nicht ganz zweifellos ist, und *Stigmaria ficoides*, sind keine Reste diesen Fundstätten gemeinsam. Vielleicht wird die Zahl der gemeinsamen Arten bei künftigen Untersuchungen vermehrt werden, doch dürfte es jedenfalls wahrscheinlich sein, dass der Pyramidenberg eine relativ tiefe, das Roberts-Thal dagegen eine relativ hohe Abtheilung der pflanzenführenden Ablagerungen darstellt. Das Roberts-Thal tritt in ähnlicher Weise auch gegen die übrigen Lokalitäten hervor, indem seine Flora mehrere Arten enthält, welche nur hier gefunden sind, wie *Sphenopteris flexibilis*, *Adiantites bellidulus* und *longifolius*, *Rhynchogonium costatum*, *Samaropsis spitzbergensis*. Ich will diese Vergleichung jetzt nicht fortsetzen, da von den meisten Lokalitäten nur wenige Arten vorliegen.

Wenn wir ferner in der Tabelle nachsehen, in welcher Abtheilung des Carbonsystems in Europa dieselben oder verwandte Pflanzenreste vorkommen, so geht sogleich hervor, dass die grösste Ähnlichkeit mit der Flora des Culms und des Bergkalks auf dem Continente und mit der Flora des »Calciferous Sandstone's» in Schottland existirt. Diese Übereinstimmung ist in der That so gross, dass man geneigt sein könnte, die Steinkohlenflora Spitzbergens für eine Culmflora zu erklären.[1] An die devonische Flora be-

[1] Stur hat seiner Zeit die Meinung ausgesprochen, dass mit vollster Sicherheit »die pflanzenführenden Schichten des Roberts-Thals dem Culm angehören und meinen Waldenburger- oder Ostrauer-Schichten entsprechen und mit dem Culmbassin von Hainichen-Ebersdorf gleichzeitig sind». Verh. der k. k. geol. Reichsanstalt in Wien. 1877. S. 81.

Verzeichniss der Steinkohlenpflanzen Spitzbergens nebst Angaben über das anderweitige Vorkommen derselben oder verwandter Arten.

Die Steinkohlenpflanzen Spitzbergens.	Lokalitäten[1] auf Spitzbergen.							Das Vorkommen derselben oder verwandter Arten in Europa etc.
	R	M	N	I	S	G	P	
Calymmatotheca bifida L. & H. sp.	+	+	—	+	+	+	+	*Calymmatotheca bifida*, Calciferous Sandstone, Culm, Bergkalk.
Sphenopteris Kidstoni Nath.	—	—	—	—	—	—	+	*Calymmatotheca affinis*, Calciferous Sandstone; *Sphenopteris Ettingshauseni*, Culm.
Sturi Nath.	—	—	—	—	+	—	—	*Rhodea Hochstetteri*, Culm.
» *flexibilis* Heer	+	—	—	—	—	—	—	*Sph. distans*, Culm.
Adiantites bellidulus Heer	+	—	—	—	—	—	—	*A. tenuifolius*, Culm.
longifolius Heer sp.	+	—	—	—	—	—	—	*A. antiquus*, Culm.
Cardiopteris sp.	—	—	—	+	—	—	—	*Cardiopteris nana, polymorpha, Hochstetteri;* Calciferous Sandstone, Culm, Bergkalk.
Sphenopteridium? sp.	+	—	—	—	—	—	—	*Archæopteris Tschermaki, Sphenopteris dissectum*, Culm, Bergkalk.
Lepidodendron Veltheimianum Sternb. mit Var. *acuminatum* Schimper	+	+	+	—	—	+	—	*L. Veltheimianum* und *acuminatum*, Calciferous Sandstone, Culm, Bergkalk.
Heeri Nath.	+	—	+	+	—	—	—	
spetsbergense Nath.	+	—	+	+	—	—	—	*L. corrugatum*, Lower Carboniferous in Canada.
sp.	—	—	+	—	—	—	-	
Knorria (verschiedene Formen)	—	—	+	+	—	+	+	Devon—Obercarbon.
Halonia	—	—	—	—	—	+	—	
Lepidostrobus var. 1	+	—	—	—	—	—	—	
» » 2	—	—	—	—	—	—	+	
» 3	+	—	—	—	—	—	—	
Zeilleri Nath.	—	—	—	—	—	—	+	
Stigmaria ficoides Sternb.	+	—	+	+	—	+	+	Devon—Perm.
Var. *minima*	—	—	—	—	—	—	+	
Bothrodendron tenerrimum Auerb. & Trautsch. sp.	—	—	—	—	—	—	+	*B. tenerrimum*, Untercarbon, Russland.
Rhynchogonium costatum Heer mit Var. *globosum* Heer	+	—	—	—	—	—	—	*Trigonocarpum Gloagianum*, Bergkalk, Schottland.
Samaropsis spitzbergensis Heer	+	—	—	—	—	—	—	
Carpolithes nitidulus Heer	+	—	—	—	—	—	-	
» sp.	—	—	—	+	—	—	—	
» sp.	—	—	—	—	—	—	+	
» sp.	—	—	—	—	—	—	+	

[1] R = Roberts-Thal; M = Südseite des Mitterhuks im Belsund; N = Nordseite desselben; I = Ingeborgs-Fjell; S = Safehaven; G = Gipshuk; P = Pyramidenberg.

stehen in der That keine besondere Annäherungen, und wenn man mit der Benennung »Ursa-Stufe» die Übergangslager zwischen Devon und Carbon bezeichnen will, so passt diese Benennung für die Steinkohlenflora Spitzbergens, welche einen ausgeprägten carbonischen Charakter trägt, durchaus nicht. Wir werden unten sehen, dass die Flora der Bären-Insel zu einem anderen Horizonte als die Steinkohlenflora Spitzbergens gehören muss; hier wollen wir zunächst die stratigraphischen Verhältnisse der pflanzenführenden Lager Spitzbergens etwas näher betrachten.

Diese werden, wie schon erwähnt, von den marinen Permocarbonlagern bedeckt. Man kann aber deshalb nicht behaupten, dass die pflanzenführenden Lager hier unter dem echten Bergkalke liegen, da ja die Permocarbonlager einem jüngeren Horizonte angehören. Es wäre daher möglich, dass die betreffenden Lager in der That zum Culm zu rechnen sind. Andrerseits muss bemerkt werden, dass die marinen Versteinerungen, welche auf Spitzbergen gesammelt sind, und welche sowohl permische wie carbonische Arten enthalten, meistens aus dem »Spiriferkalk» Nordenskiölds und aus noch höheren Lagern stammen. Es wäre deshalb nicht unmöglich, dass die mächtige Lagerreihe des Cyathophyllumkalkes, welche unter dem Spiriferkalk liegt, doch zum echten Bergkalk gehören könnte. Wir haben uns in der That 1882 bemüht, die Versteinerungen der verschiedenen Horizonte auseinander zu halten, und sie sind schon längst von Professor G. Lindström bestimmt worden. Bis jetzt war es mir aber nicht möglich, dieselben in stratigraphischer Hinsicht zu vergleichen, und es bleibt also noch immer unentschieden, ob der Cyothophyllumkalk zum Permocarbon oder zum echten Bergkalk zu rechnen ist. Ich hoffe dies in meiner Arbeit über die Geologie Spitzbergens mittheilen zu können; bevor aber diese Frage entschieden ist, dürfte es am zweckmässigsten sein, die Steinkohlenflora Spitzbergens nur als eine untercarbonische zu bezeichnen.

Wenden wir uns jetzt zur Flora der Bären-Insel. In stratigraphischer Hinsicht wissen wir von derselben nur, dass auch sie unter den marinen (Permo-?) Carbonlagern ihren Platz hat, und dass sie folglich älter als dieselben sein muss. Es müssten daher auch hier die Pflanzenreste die Frage von dem Alter der Ablagerung entscheiden. Wenn man aber von den nichtssagenden Knorrien und *Stigmaria* und von dem nicht sicher bestimmbaren *Lepidodendron* cfr. *Pedroanum*, welches für den Culm spricht, absieht, so bleibt nur die Cyclostigma-Sippe des Bothrodendron übrig, welche Anhaltungspunkte für die Altersbestimmung liefern könnte. Diese Sippe spricht aber für ein devonisches Alter der Flora, falls wirklich die Ablagerung bei Kiltorkan, wie die meisten Geologen meinen, zum Oberdevon und nicht zum Carbon zu rechnen ist. Diese Frage ist eine ziemlich gleichgültige, und wir können gern die Benennung Ursa-Stufe für die pflanzenführenden Übergangslager zwischen Devon und Carbon beibehalten, welche durch das häufige Auftreten der Cyclostigmen-artigen Bothrodendren und der zu denselben gehörenden Knorrien charakterisirt sind. Ob auch *Lepidodendron Veltheimianum* und *Calamites radiatus*, wie Heer meint, in dieser Stufe vorkommen, sei dahingestellt.

Vergleichen wir nun die Ursaflora der Bären-Insel mit der Steinkohlenflora Spitzbergens, so finden wir, dass nur *Stigmaria ficoides* beiden gemeinsam ist. Alle übrigen Arten sind verschieden, und kein einziges Exemplar der auf der Bären-Insel so häufigen Bothrodendren ist bisher auf Spitzbergen gefunden, wo dagegen ein *Bothrodendron* von

Verzeichniss der fossilen Pflanzen der Bären-Insel nebst Angaben über das anderweitige Vorkommen derselben oder verwandter Arten.

Fossile Pflanzen der Bären-Insel.	Das anderweitige Vorkommen derselben oder verwandter Arten.
Calymmatotheca sp. indet.	
Calamites? sp.	
Pseudobornia ursina NATH.	
Lepidodendron cfr. *Pedroanum* CARR. sp.	*L. Pedroanum*, Culm, Süd-Amerika.
Bothrodendron kiltorkense HAUGHT. sp.	*B. kiltorkense*, Oberdevon, Irland.
» *Wijkianum* HEER sp.	
» *Weissi* NATH.	*B. hercynicum*, Unterdevon, Harz.
» *Carneggianum* HEER sp.	*B. minutum*, Oberdevon, Irland.
Knorria (verschiedene Formen)	Devon — Obercarbon.
Stigmaria ficoides STERNB.	Devon — Perm.

ganz abweichendem Typus vorkommt. HEER sagt selbst: »als eine die Ursa-Stufe charakteristische Gattung haben wir *Cyclostigma* zu nennen», welche ja auf Spitzbergen bis jetzt nicht gefunden ist.

Dass HEER die von WILANDER und mir 1870 auf Spitzbergen entdeckten Pflanzen zur Ursa-Stufe bringen konnte, hatte seine Ursache darin, dass er *Calamites radiatus* und *Lepidodendron Veltheimianum* als für diese Stufe charakteristische Pflanzen betrachtete, während sie in der That nicht auf der Bären-Insel gefunden sind. Dazu kommt noch, dass er ein *Cyclostigma Nathorsti* aus Spitzbergen beschrieb, welches aber, wie wir jetzt wissen, nicht als *Cyclostigma* aufgefasst werden kann. Dagegen wurden die pflanzenführenden Lager im Roberts-Thal von ihm zum produktiven Steinkohlengebirge gerechnet, während auch diese thatsächlich zum Untercarbon gehören, indem wir, wie erwähnt, nur eine pflanzenführende Hauptabtheilung auf Spitzbergen haben. Diese muss zum Untercarbon gerechnet werden, und muss jünger sein als die Ursastufe der Bären-Insel, welche wohl eher den Übergang vom Devon darstellt. Es wäre wohl möglich, dass die Ursaflora auch auf Spitzbergen entdeckt wird, und dass die untercarbonische Flora Spitzbergens ebenfalls auf der Bären-Insel, über der dortigen Ursaflora, zu finden ist. Mit der devonischen Flora Spitzbergens hat die Ursaflora nichts gemein, sie dürfte demzufolge nicht unerheblich jünger, als jene sein.

IV. Einige Pflanzenreste aus Novaja Zemlja.

Das Vorkommen der Pflanzenfossilien.

Über das Vorkommen der von NORDENSKIÖLD im Sommer 1875 auf Novaja Zemlja bei N. Gåskap (Gänsekap) entdeckten Pflanzenfossilien theilt er in seinem Reiseberichte[1] Folgendes mit.

»Nur eine sehr geringe Zahl von ziemlich schlecht erhaltenen Pflanzenversteinerungen wurde in den steil aufgerichteten, öfters sogar sattelförmig umgebogenen Schieferlagern in der nächsten Umgebung des Hauses (Russenhauses) gefunden. Unter den Schieferlagern kommen Lager von Kalk vor, welche mit Schiefer wechseln, und welche marine Versteinerungen, wie *Productus*, *Spirifer* etc. enthalten, damit darlegend, dass diese Lager zu der merkwürdigen Zwischenformation zwischen Perm und Carbon gehören».

Aus dieser Darstellung geht also hervor, dass der pflanzenführende Schiefer seine Lage über den Permocarbonlagern hat, und nach den bisher bekannten Thatsachen kann demzufolge betreffs seines geologischen Alters nur geschlossen werden, dass er jünger als die betreffenden Permacarbonschichten ist, während es unentschieden bleibt, ob er einen jüngeren Horizont derselben Formation darstellt oder zu noch jüngeren Ablagerungen gehört. Diese Frage müsste daher nach den Versteinerungen entschieden werden, wobei leider zu bemerken ist, dass diese sehr dürftig und einförmig sind und nur einige bandförmige Blätter umfassen. HEER hat dieselben, wie ich glaube mit vollem Recht, zu *Cordaites* gebracht,[2] obschon nicht vergessen werden darf, dass wir jetzt auch Pflanzen aus mesozoischen Ablagerungen kennen, welche, wie *Phœnicopsis*, *Rhiptozamites* etc., recht ähnliche Blattformen zeigen. Die Richtigkeit der HEER'schen Auffassung scheint mir aber auch dadurch bestätigt zu werden, dass SCHMALHAUSEN zwei *Cordaites*-Arten aus den Artinskischen (Permocarbon) Ablagerungen Russlands beschrieben hat,[3] welche etwas analoge Formen der beiden Arten aus Novaja Zemlja darstellen.

Wie schon HEER bemerkt hat, muss es auffallend sein, »dass alle sonst für das Carbon so charakteristischen Pflanzen fehlen[4] und nur einige sehr ähnliche Arten unter

[1] NORDENSKIÖLD, Redogörelse för en expedition till mynningen af Jenissej och Sibirien år 1875. Bihang till Vet. Akad. Handl. Bd. 4, N:o 1, s. 25.

[2] HEER, Über fossile Pflanzen von Novaja Semlja. K. Sv. Vet. Akad. Handl. Bd. 15. N:o 3. Stockholm 1878. — Flora foss. arctica, Bd. V, N:o 5.

[3] SCHMALHAUSEN, Die Pflanzenreste der artinskischen und permischen Ablagerungen im Osten des europäischen Russlands. Mém. du comité géologique. Vol. 2, N:o 4. S:t-Pétersbourg 1887.

[4] Auf der Rückseite eines Stückes habe ich allerdings den Rest einer *Sphenopteris* (?) beobachtet, welcher jedoch so undeutlich ist, dass gar nichts damit anzufangen ist.

allen den vielen Stücken, die mir zugingen, sich finden». Vielleicht ist die Ablagerung marinen Ursprungs, so dass die Pflanzenreste aus entfernten Gegenden nach der jetzigen Fundstätte hingeschwemmt sind.

Einige Bemerkungen über die Arten.

In seiner oben erwähnten Arbeit hatte HEER vier auf muthmassliche Blätter gegründete *Cordaites*-Arten aufgestellt, von welchen aber *C. insularis* und *C. lingulatus* zu streichen sind. Jener stellt nämlich keine Blätter, sondern den Abdruck von Holzresten dar, und dieser ist ebenfalls kein Blatt, sondern wahrscheinlich das Fragment einer Spindel, wie auch HEER ursprünglich auf die Etikette geschrieben hat (»Basis einer Spindel»).

Es bleiben somit nur zwei *Cordaites*-Arten übrig. Die eine von diesen, *Cordaites Nordenskiöldi* HEER, hat schmale Blätter und gehört also zur Formenreihe des *Poa-Cordaites*. Ich glaube aber, dass mehrere der HEER'schen Figuren, welche die Blätter allmählich gegen die Spitze verschmälert darstellen, in der That umgekehrt gestellt sind, und dass unsere Fig. 11, Taf. XII die richtige Stellung wiedergiebt, was selbstverständlich nicht verhindert, dass auch andere Blätter eine Verschmälerung gegen die Spitze zeigen können. Dies kann aber bei der schlechten Erhaltung der Nervatur schwierig entschieden werden. Einige der hierher gehörigen Blätter ähneln etwas *Poa-Cordaites tenuifolius* SCHMALHAUSEN (l. c. Taf. VI, Fig. 4).

Die Form mit breiteren Blättern, von welcher HEERS Fig. 1 das beste Exemplar darstellt, während Fig. 3 nur der Abdruck eines Holz- oder Rindenstückes ist, wird von ihm mit *Cordaites palmæformis* GÖPPERT sp., obschon allerdings mit einem ?, verglichen. Sie kann auch mit SCHMALHAUSENS *Cordaites lancifolius* (l. c. S. 37, Taf. V, Fig. 4, 5; VI, Fig. 1—3; VII, Fig. 1) verglichen werden, obschon die Nerven an dem Exemplare aus Novaja Zemlja etwas dichter gestellt zu sein scheinen. Bei der Unzulänglichkeit des Materials kann eine sichere Artbestimmung nicht ausgeführt werden.

HEER hatte auch zwei vermeintliche Samen zu seinem *Cordaites Nordenskiöldi* gebracht. Von diesen ist aber das eine Exemplar (Fig. 4 bei HEER) so erhalten, dass man seine Bestimmung weder bestätigen noch bestreiten kann, während das andere (Fig. 5 bei HEER) nur ein Stück eines abgeriebenen Holzrestes darstellt. Die in der Figur befindlichen Streifen existiren in Wirklichkeit nicht, und auch das Närbchen am Grunde ist eine ganz zufällige Bildung. Was HEERS *Rhabdocarpus* sp. (Fig. 15) betrifft, so habe ich das Exemplar in der Sammlung nicht wiederfinden können, vermuthe aber nach der Abbildung, dass es sich auch hier nur um ein Holzstück handelt.

Es bleiben somit nur zwei Arten aus der Ablagerung bei N. Gåskap übrig, welche einigermassen sicher bestimmt werden können, und zwar *Cordaites Nordenskiöldi* HEER und *Cordaites* cfr. *palmæformis* GP. sp.

Register der Arten.

Die Arten, deren Namen *kursiv* gedruckt sind, sind in der vorliegenden Abhandlung beschrieben; die übrigen sind synonym oder nur kurz erwähnt.

TAFEL I.

Pflanzenreste aus dem Devon Spitzbergens.

Fig. 1. Unbestimmbarer *Psilophyton*-ähnlicher Stiel- oder Stammrest von der Westseite der Klaas-Billen-Bay.
» 2, 3. Ähnliche Reste aus derselben Lokalität mit mehr gegenständigen Secundärsegmenten (Zweigen?).
» 4—7. Farnspindelähnliche Reste aus derselben Lokalität.
8—11. Kleinere Trümmer aus dem Mimers-Thal.
» 12. *Cyclopteris* sp. Bruchstück eines Fiederchens, von der Westseite der Klaas-Billen-Bay.

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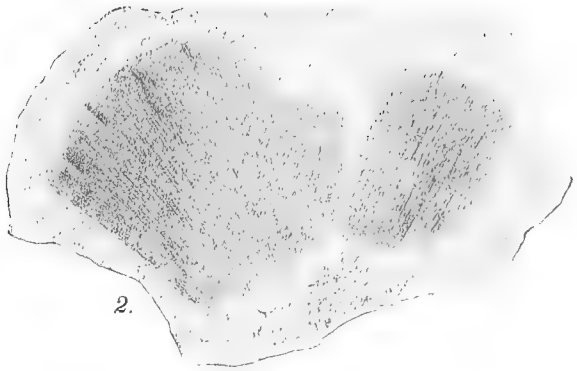
TAFEL II.

Pflanzenreste aus dem Devon Spitzbergens.

Fig. 1. *Psygmophyllum Williamsoni* NATH., das vollständigste Blatt. Mimers-Thal.
» 2. » » Fragment eines anderen Blattes mit länglichen Eindrücken am oberen Rande.
» 3. Problematische Eindrücke in einem losen Geschiebe. Mimers-Thal.
» 4. Unbestimmbarer Abdruck eines beblätterten Astes oder Fruchtzapfens in einem losen Geschiebe. Mimers-Thal.
5. Abdruck eines höckerigen Stielrestes in einem losen Geschiebe. Mimers-Thal.
» 6. *Bothrodendron*(?) sp. Abdruck einer inneren Rindenfläche (»entrindetes Stammfragment») in einem Thoneisensteinknollen aus der Fischschlucht im Mimers-Thal.
» 6 *a*. Partie des Vorigen, vergrössert.
7. *Lepidodendron* sp., Abdruck einer inneren Rindenfläche, in Thoneisenstein aus der Fischschlucht im Mimers-Thal.
8. *Bergeria*-Form in Sandsteinschiefer aus einer Seitenschlucht im Mimers-Thal.

1.



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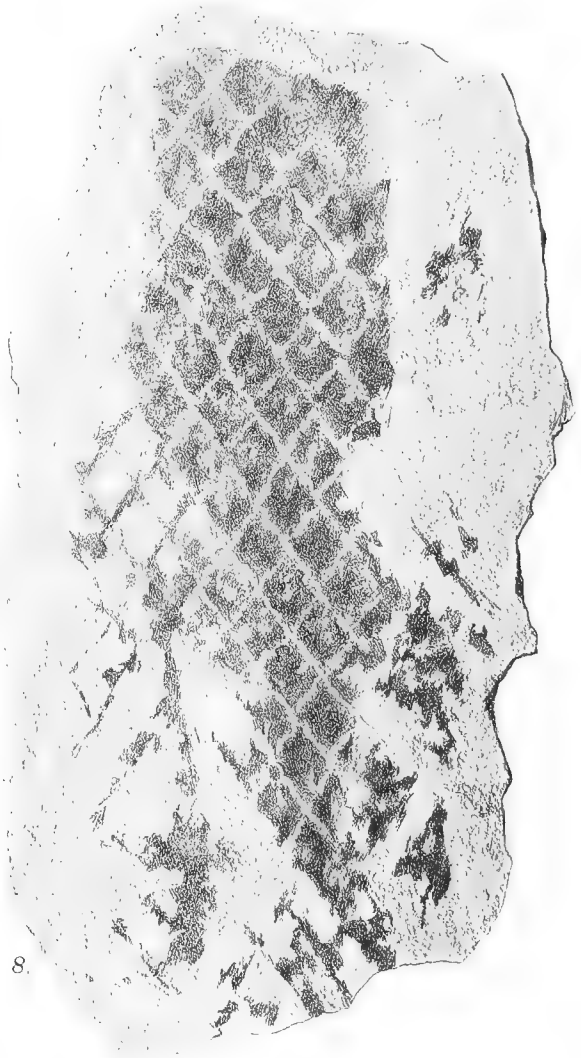

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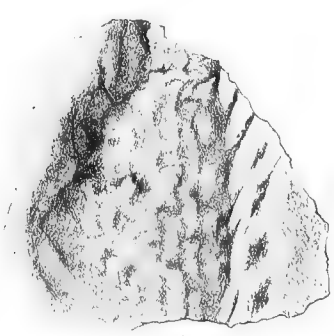

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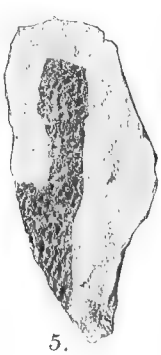

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Fig. 1—9 12—19. Pflanzenreste aus dem Untercarbon Spitzbergens.
Fig. 10, 11. Ursapflanzen von der Bären-Insel.

Fig. 1. *Calymmatotheca bifida* L. & H. sp. Grosses Exemplar. Safe-Haven. Rechts ein Fragment, das wahrscheinlich zu *Sphenopteris Sturi* gehört.

» 2, 3. » » Andere Exemplare aus derselben Lokalität. Bei Fig. 1 und 2 sind die Lappen etwas zusammengedrückt, während sie bei Fig. 3 mehr getrennt sind.

» 4. *Sphenopteris Sturi* NATH. aus dem Safe-Haven, in natürlicher Grösse.

» 5, 6. *Sphenopteris flexibilis* HEER, sterile Blättchen in etwa doppelter Grösse. Roberts-Thal.

» 7. » » Fertiles Blättchen, die Stellung der Sporangien zeigend, in etwa dreifacher Vergrösserung.

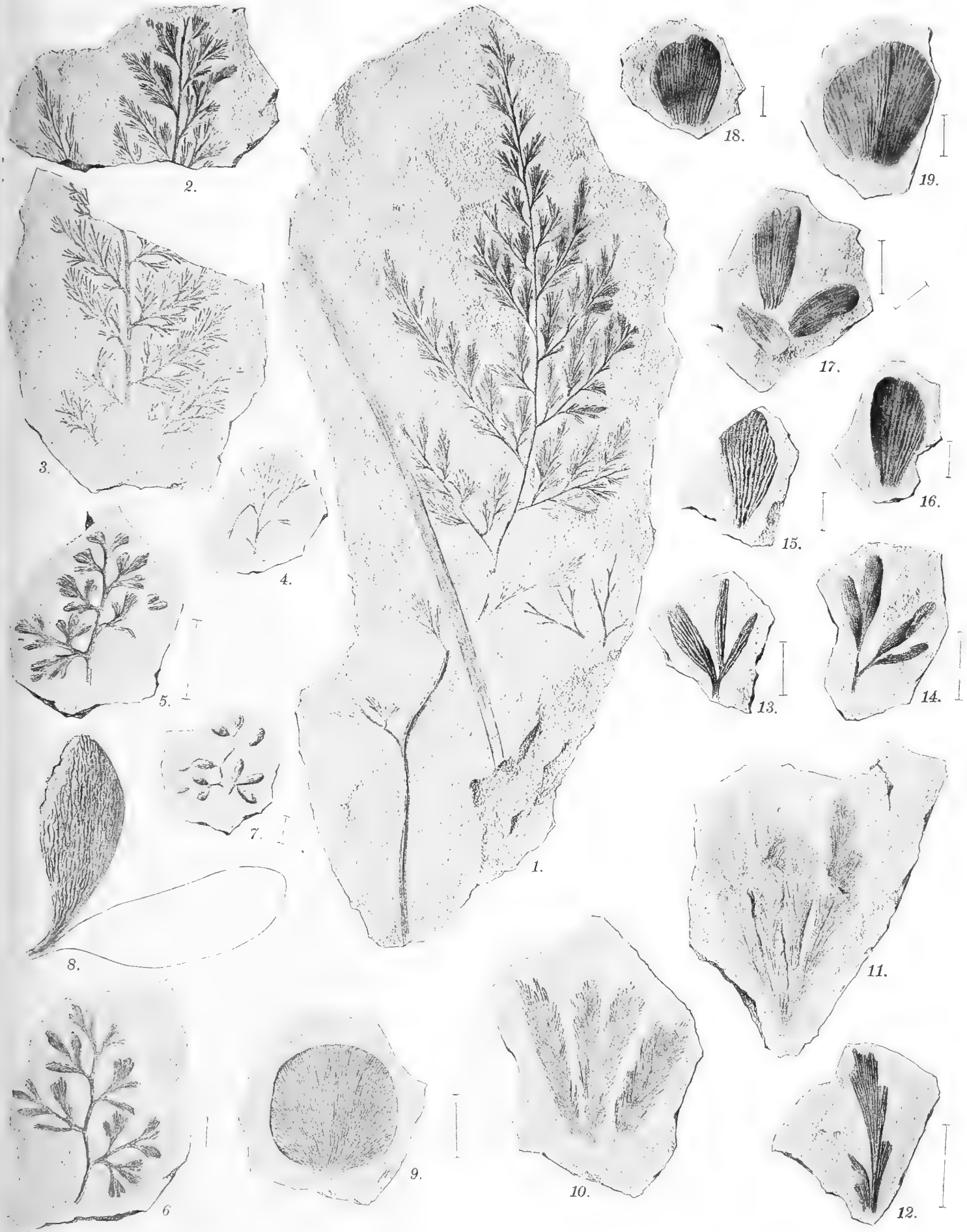
8. » » Zwei Sporangien sehr stark vergrössert; die Zeichnung des rechten ist nicht ausgeführt.

» 9. *Cardiopteris* sp., etwas vergrössert, aus einem losen Geschiebe am Ingeborgs-Fjell.

» 10, 11. *Sphenopteridium? sp.* von der Bären-Insel, in natürlicher Grösse.

12. *Sphenopteridium? sp.*, etwas vergrössert. Roberts-Thal.

13—19. *Adiantites bellidulus* HEER, aus dem Roberts-Thal, verschiedene Formen der Blättchen in verschiedener Vergrösserung; 13, 14. Getheilte Fiedern mit schmalen Lappen; 15—17. Übergangsformen zur breiteren Form; 18, 19. Breitere Form (Fig. 16 ist das Original zu HEERS Taf. II, Fig. 17, und Fig. 19 zu seiner Taf. II, Fig. 19).



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TAFEL IV.

Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. Abdruck einer Farnspindel im Sandstein des Pyramidenberges.
» 2. Gabelige Farnspindel aus derselben Lokalität.
» 3. Problematischer Rest, vergrössert.
» 4. *Sphenopteris Kidstoni* NATH. vom Pyramidenberge, links Fragment einer Farnspindel.
» 5. » » Blättchen. Die Lappen sind beim Zeichnen etwas zu breit und zu scharf begrenzt worden.
» 6. Samen oder Sporangium.
» 7. *Rhynchogonium costatum* HEER mit z. Th. verkohlter Testa und deutlicher Zellenstruktur, vergrössert.
» 8. » » Partie des Vorigen, sehr stark vergrössert.
» 9. *Carpolithes* sp., vom Ingeborgs-Fjell.
» 10, 11. *Samaropsis spitzbergensis* HEER. Roberts-Thal.

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TAFEL V.

Pflanzenreste aus dem Untercarbon Spitzbergens.

(Sämmtliche Figuren in halber natürlicher Grösse.)

Fig. 1. Grosse Farnspindel, vom Pyramidenberge.
" 2. Gabelige Farnspindel aus derselben Lokalität.
" 3. Plattgedrückte, blattähnliche Farnspindel aus derselben Lokalität.

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TAFEL VI.

Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. Abdruck einer inneren Rindenfläche eines grossen Lepidodendronstammes. Gipshuk.
2. Abdruck einer inneren Rindenfläche eines Lepidophyten. Ingeborgs-Fjell.
3. *Lepidodendron Heeri* Nath., Zweiglein. Ingeborgs-Fjell.
4. » » Partie des vorigen Exemplares, vergrössert.
5, 6. » » Zweige. Ingeborgs-Fjell.
7. » » Partie von Fig. 6, vergrössert.
8, 9. » » Zweige, aus derselben Lokalität.
10. » » Blattpolster mit der Blattnarbe und den Spurpunkten; Partie von Fig. 9 vergrössert.


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TAFEL VII.

Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. *Lepidodendron spetsbergense* NATH. Stück eines grossen Stammes von der Nordseite des Mitterhuks im Belsund.

2. » » Ein Blattpolster des Vorigen, vergrössert.

3. Abdruck einer runzeligen Rindenpartie derselben Art(?). Nordseite des Mitterhuks.

4—6. *Lepidodendron spetsbergense* NATH., Zweige. 4 und 5, von der Nordseite des Mitterhuks; 6, vom Ingeborgs-Fjell.

7. » » Partie von Fig. 6, vergrössert.

8. *Lepidodendron Heeri* NATH., Varietät, von der Nordseite des Mitterhuks.

9. » » Zweigstück, vom Ingeborgs-Fjell, rechts mit Abdruck der Cuticula.

10. » » Partie des vorigen Exemplares, vergrössert.

11. » » Kleines Fragment, vom Ingeborgs-Fjell.

12. » » Partie des vorigen Exemplares, vergrössert.

13. » » Gabeliger Zweig, rechts mit dem etwas knorrienähnlichen Steinkern (Vergl. Taf. X, Fig. 7, der Steinkern vergrössert).

14. *Lepidodendron* sp., unbestimmbar, ob *Heeri* oder *Veltheimianum*. Ingeborgs-Fjell.

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TAFEL VIII.

Pflanzenreste aus dem Untercarbon Spitzbergens.

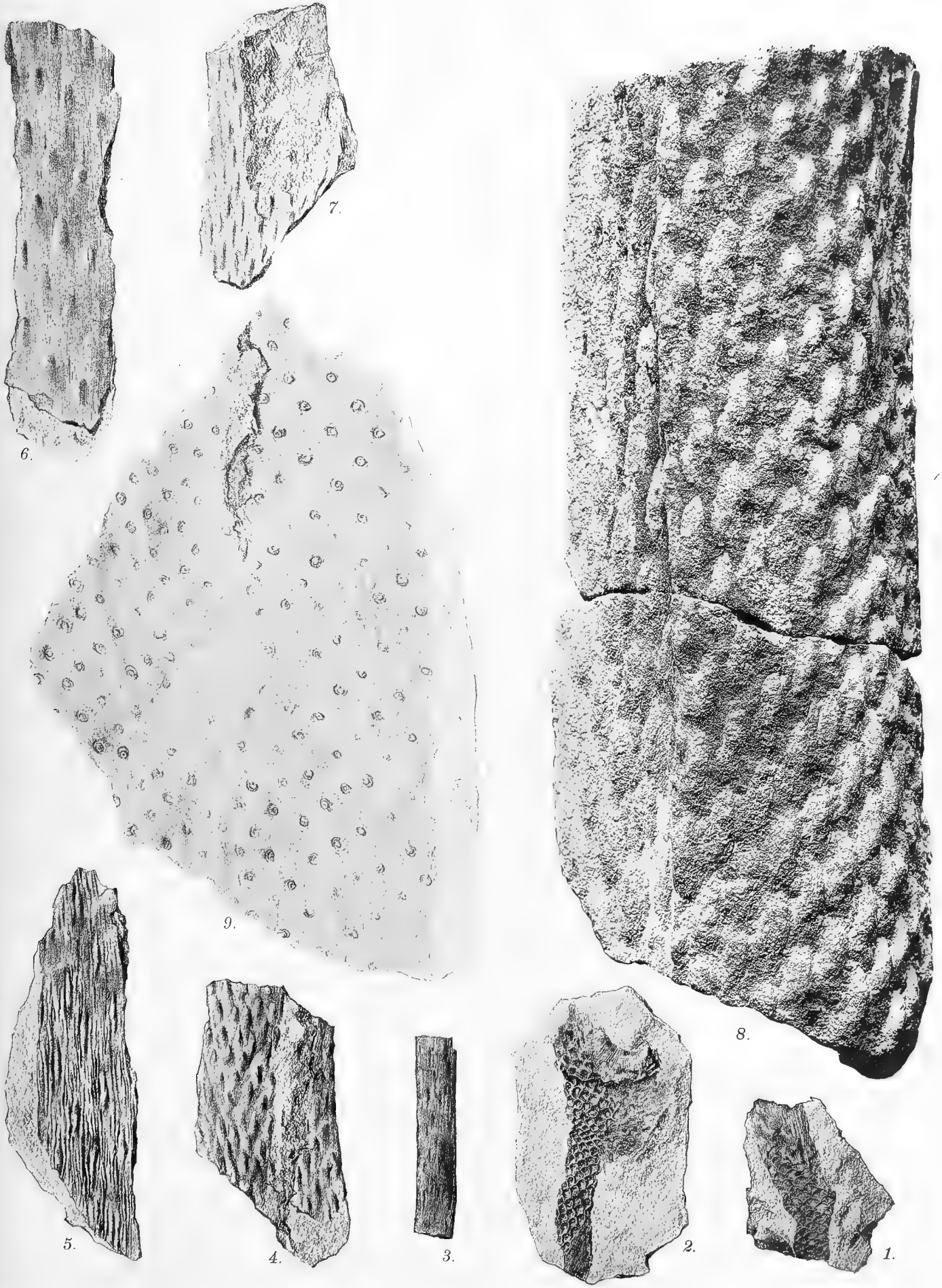
Fig. 1, 2. *Lepidodendron Heeri* NATH., mit variirender Form der Blattpolster (Taf. X, Fig. 6 stellt eine vergrösserte Partie von Fig. 2 dar). Ingeborgs-Fjell.

3, 4, 6, 7. Verschiedene *Knorrien*-Formen aus derselben Lokalität. Fig. 4 und 7 stellen dasselbe Exemplar dar, von vorn und von hinten gesehen.

5. Abdruck einer inneren Rindenfläche eines Lepidophyten; aus derselben Lokalität.

8. *Knorria*. Aus dem Sandstein des Pyramidenberges. Die Figur ist eine direkte Photographie des Originales auf die Tafel.

9. *Stigmaria ficoides* STERNB. sp. Varietät (*minima*) mit sehr kleinen Narben. Pyramidenberg.



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TAFEL IX.

Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. Steinkern einer innerer Rindenfläche eines Lepidophyten. Nordseite des Mitterhuks.

» 2. Partie des Vorigen, vergrössert.

» 3. Der Abdruck rechts rührt von *Lepidodendron spetsbergense* NATH. her, und wahrscheinlich stellt auch der Abdruck links unten eine Knorrienform derselben Pflanze dar. Das kleine Rindenstück mit erhaltenen Blattpolstern, links oben, gehört wahrscheinlich zu *Lepidodendron Veltheimianum* STERNB. Nordseite des Mitterhuks.

» 4. Gabeliger Zweig eines *Lepidodendron* oder einer Farnspindel (?). Pyramidenberg.

» 5. Aspidiarienform eines Lepidophyten. Pyramidenberg. (Taf. X, Fig. 21 zeigt eine vergrösserte Partie desselben Exemplares.)

» 6. *Halonia*. Gipshuk.

6. 5. 1.

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TAFEL X.

Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. *Adiantites longifolius* Heer sp., vergrössert. Roberts-Thal. (Das Originalexemplar zu Heer's *Sphenophyllum longifolium.*)

2. Abdruck eines Stückes von einer Farnspindel, mit Dictyoxylonähnlicher Struktur. Sandstein des Pyramidenberges.

3. Eigenthümlich verzweigte Farnspindel. Schiefer des Pyramidenberges.

4. 4 *a* (vergrössert). Zweiglein von *Lepidodendron Heeri* mit Blättern. Roberts-Thal.

5. *Lepidodendron Heeri* Nath., Varietät. Einige Blattpolster vergrössert. Nordseite des Mitterhuks.

6. » » Partie von Taf. VIII, Fig. 2, vergrössert.

7. Partie von Taf. VII, Fig. 13, vergrössert, um den Knorrienähnlichen Steinkern zu zeigen.

8. 9. Exemplare mit periodischer Veränderung in der Form der Blattpolster. Ingeborgs-Fjell.

10. » » Gabeliger Zweig aus derselben Lokalität, in doppelter Grösse, die Veränderung der Blattpolster darstellend.

11. » » (?) Exemplar mit länglichen Polstern und Steinkern aus derselben Lokalität.

12, 13 (vergrössert). *Lepidodendron* sp. Nordseite des Mitterhuks.

14. *Lepidodendron spetsbergense* Nath. Roberts-Thal.

15. » » Ein Blattpolster des Vorigen, vergrössert.

16. *Lepidostrobus* sp. N:o 2. Pyramidenberg.

17—19. *Lepidostrobus* sp. N:o 1. Roberts-Thal. 17. Längsschnitt, 18. Querschnitt des Zapfens. 19. Ein Theil der Zapfenspindel vergrössert.

20. *Lepidostrobus* sp. N:o 3. Fruchtblatt mit Sporangium. Roberts-Thal.

21. Partie von Taf. IX, Fig. 5, vergrössert.

22. Partie einer *Knorria*. Gipshuk.

23. *Halonia*. Bei *x*, *x'* die Fruchtzweige. Gipshuk.

24. *Bothrodendron tenerrimum* Auerb. & Trautsch. sp. Kleine Zweige. Pyramidenberg.

25. » » Partie des untersten Zweiges der vorigen Figur, vergrössert.

26. » » Blattnarbe eines grossen Exemplares, vergrössert. Pyramidenberg.

27, 28. *Carpolithes nitidulus* Heer, vergrössert. Roberts-Thal.

29. *Carpolithes* sp. Pyramidenberg.

30. » sp. Pyramidenberg.

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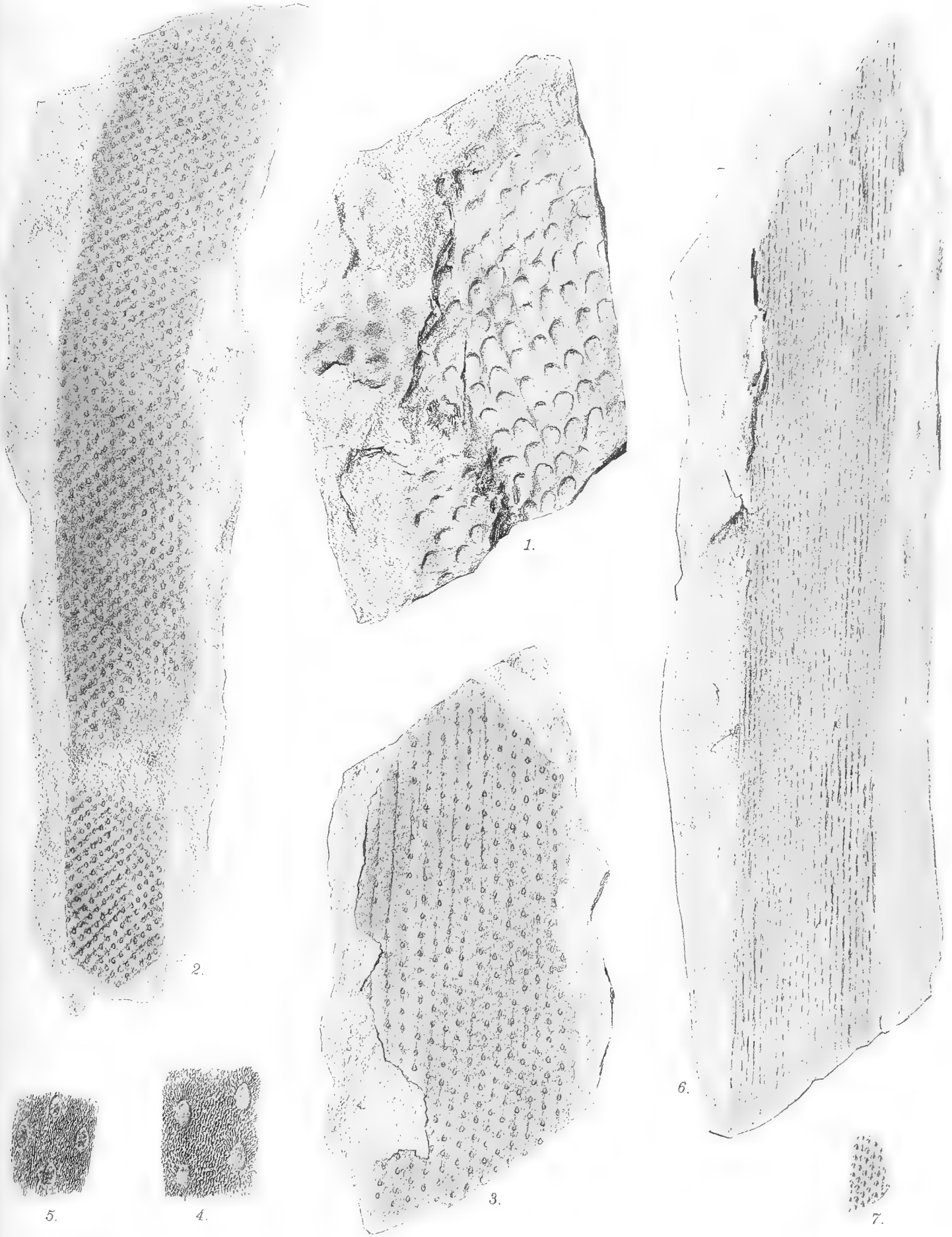
TAFEL XI.

Fig. 1. Ursapflanze von der Bären-Insel. Fig. 2—7. Pflanzenreste aus dem Untercarbon Spitzbergens.

Fig. 1. *Lepidodendron* cfr *Pedroanum* CARRUTHERS sp., von der Bären-Insel.
» 2, 3. *Bothrodendron tenerrimum* AUERB. & TRAUTSCH. sp. Pyramidenberg.
» 4, 5. » » Partien der beiden Vorigen, vergrössert.
» 6. » » Gerippter Stamm mit sehr kleinen Blattnarben. Pyramidenberg.
» 7. » » Partie des Vorigen, vergrössert, um die Blattnarben zu zeigen.



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TAFEL XII.

Fig. 1—7. Ursapflanzen von der Bären-Insel. Fig. 8—10, 12—13. Pflanzenreste aus dem Untercarbon Spitzbergens. Fig. 11. Pflanzenrest aus dem Permocarbon von Novaja Zemlja.

Fig. 1. *Pseudobornia ursina* NATH. Zwei Exemplare mit Astnarben an einzelnen Knoten. Die scheinbare Knotenlinie etwas über der Mitte auf dem linken Exemplare ist nur ein zufälliger Riss, während die übrigen die wirklichen Knoten darstellen.

» 2. » » Exemplar, dessen unterer Knoten infolge der Astbildung angeschwollen ist.

» 3. » » Partie der Oberfläche, in der Nähe der Knotenlinie, vergrössert, um die eigenthümliche Skulptur zu zeigen.

» 4. » » Exemplar ohne Astbildung.

» 5, 6. » » Exemplare mit zwei Astnarben an den Knoten.

» 7. » » Exemplar mit einer Astnarbe am Knoten.

» 8. *Lepidostrobus Zeilleri* NATH. Pyramidenberg.

» 9. » » Partie des Vorigen, vergrössert, um die Sporen zu zeigen.

» 10. » » Abdruck des Zapfens, unten mit einer verkohlten Partie des Zapfens selbst.

» 11. *Cordaites Nordenskiöldi* HEER. Novaja Zemlja.

» 12 (vergrössert 13), 14 (vergrössert 15). *Lepidodendron Veltheimianum acuminatum*. Nordseite des Mitterhuks im Belsund.

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TAFEL XIII.

Ursapflanze von der Bären-Insel.

Pseudobornia ursina NATH. Grosses Stammstück mit granulirter Oberfläche. Bei *x* die Austrittsstelle eines Astes.

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TAFEL XIV.

Ursapflanzen von der Bären-Insel.

Fig. 1. Gabelige Farnspindel oder Stammstück von *Pseudobornia(?)* mit Zweigen.
» 2. *Calymmatotheca* sp. Zwei Sporangienhaufen.
» 3. » » Ein einzelnes Sporangium des vorigen Exemplares, vergrössert.
4. *Calamites(?)* sp.
5. *Pseudobornia ursina* NATH. Fragment eines Stammes mit einem noch erhaltenen Aste.
6. Zweifelhafter Stammrest mit Fragmenten von zwei grossen becherförmigen Eindrücken.
» 7. *Bothrodendron kiltorkense* HAUGHT. sp., mit z. Th. erhaltener Rinde und unter derselben die Knorrienform. Bei *x* eine Blattnarbe über der Spitze eines Knorrienwulstes.
8. » » Form mit flacher Oberfläche ohne Blattpolster und etwas Rhytidodendron-ähnlicher Skulptur.
» 9. » » Partie des Vorigen, vergrössert, um die Oberflächenskulptur zu zeigen.
10. *Bothrodendron Carneggianum* HEER sp.
» 11—13. » » Blattnarben des vorigen Exemplares, vergrössert, um die verschiedenen Formen derselben zu zeigen.
» 14. » » Eine Blattnarbe eines anderen Exemplares, vergrössert, mit den drei Spurpunkten.
» 15. *Bothrodendron Weissi* NATH.
» 16. » » Eine Blattnarbe des vorigen Exemplares vergrössert.


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TAFEL XV.

Ursapflanzen von der Bären-Insel.

Fig. 1, 2. Knorrien. (Als *Calamites radiatus* bei Heer.)
» 3. Knorrienform von *Bothrodendron kiltorkense*, der Gegenabdruck von Fig. 4.
» 4. *Bothrodendron kiltorkense* Haught. sp. Exemplar mit Blattnarben (vergl. die Figur im Texte) und kleineren Eindrücken, die aber wahrscheinlich nur zufällig sind.
» 5—7. » » Blattnarben des vorigen Exemplares, vergrössert, um die Spurpunkte zu zeigen.
» 8, 9. » » Die beiden Gegenplatten eines Exemplares mit hohen Blattpolstern (*Halonia* bei Heer).
» 10. » » Exemplar mit kleinen Blattpolstern und längsrunzeliger Oberfläche.
» 11. » » Ein Blattpolster mit der Blattnarbe von dem vorigen Exemplare, vergrössert.
» 12, 13. » » Vergrösserte Blattnarben mit Spurpunkten von der flachen Form Fig. 8, Taf. XIV.
» 14. *Bothrodendron Wijkianum* Heer sp. Partie eines Stammes in natürlicher Grösse.
» 15. » » Ein Blattpolster mit der kleinen Blattnarbe von dem vorigen Exemplare, vergrössert.

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TAFEL XVI.

Fig. 1—8. Pflanzenreste aus dem Oberdevon von Kiltorkan, Irland.
Fig. 9—11. Pflanzenreste aus der deutschen Steinkohlenformation.

Fig. 1—3. *Bothrodendron kiltorkense* HAUGHT. sp. Verschiedene Rindenstücke mit verschiedener Stellung der Blattnarben.

» 4, 5. » » Blattnarben mit umgebender Rinde, vergrössert, um die Oberflächenskulptur zu zeigen.

» 6. » » Abdruck einer Blattnarbe mit den drei Spurpunkten, vergrössert.

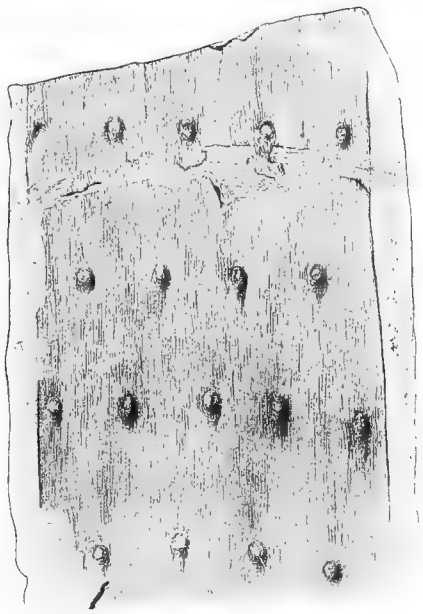
» 7. *Bothrodendron sp.* Abdruck der Rinde mit sehr kleinen Blattnarben.

» 8. » » Eine Blattnarbe mit umgebender Rinde von dem vorigen Exemplare, vergrössert.

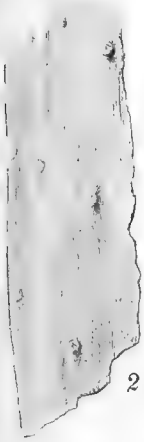
» 9. *Sigillaria rimosa* GOLDENBERG aus Saarbrücken, mit *Knorria* als Steinkern. Originalexemplar GOLDENBERGS.

» 10. » » Abdruck einer Blattnarbe eines anderen Exemplares.

» 11. *Lepidodendron* (*lycopodioides* STERNB. = *elegans* BRONGN.) mit endständigem Zapfen, in GOLDENBERGS Sammlung.



1



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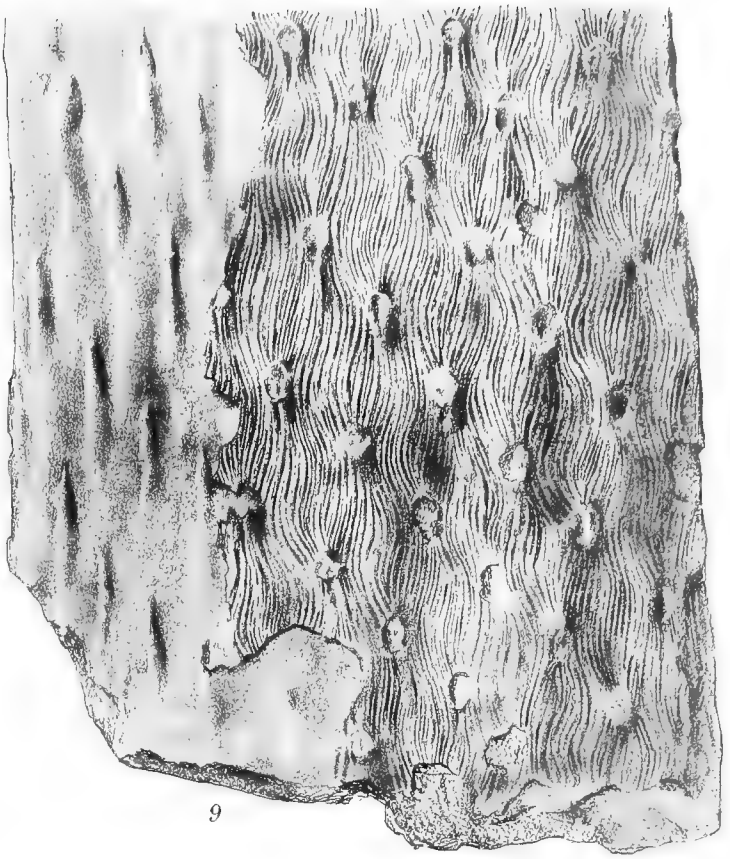

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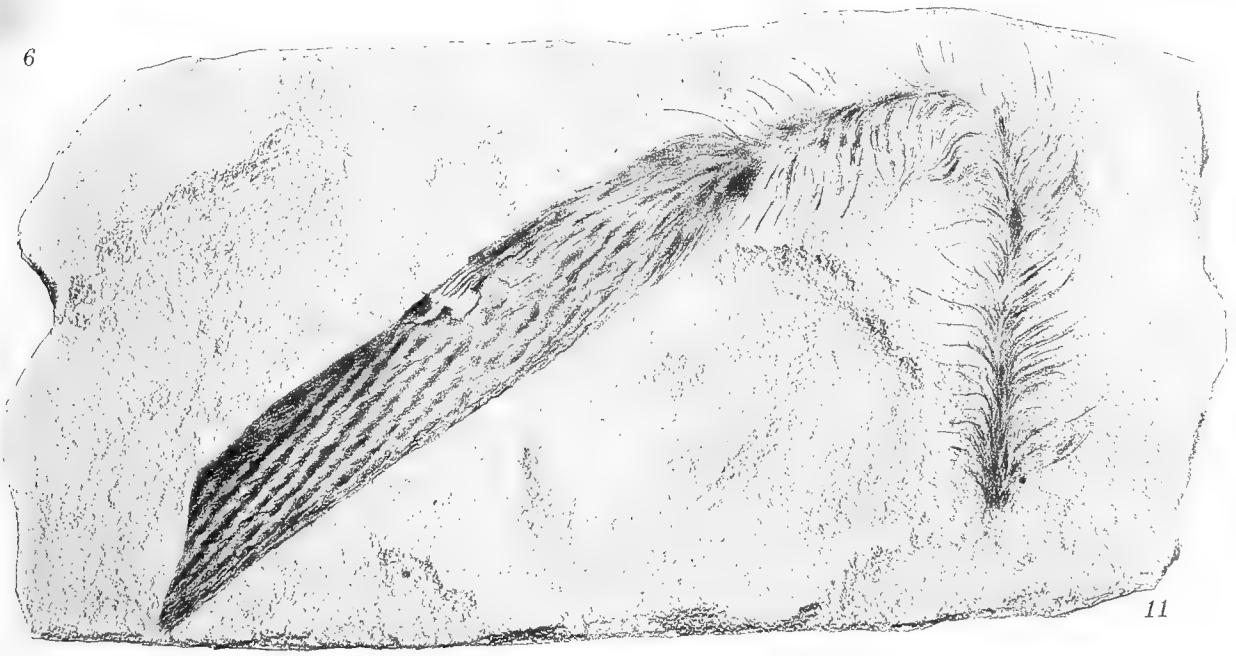


11

KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N:o 5.

UNTERSUCHUNGEN

ÜBER

DIE SPECTRA DER METALLE

IM

ELECTRISCHEN FLAMMENBOGEN.

I. SPECTRUM DES CHROMS.

VON

B. HASSELBERG.

DER KÖNIGL. AKADEMIE DER WISSENSCHAFTEN VORGELEGT DEN 7. JUNI 1893.

STOCKHOLM 1894.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

zulänglichkeit des spectroskopischen Materials. So lange in dieser Hinsicht nicht wesentlich bessere Verhältnisse geschaffen sind, ist die auf solche theoretische Untersuchungen niedergelegte Arbeit meines Erachtens als eine nahezu verfehlte zu betrachten. —

Unter solchen Umständen ist es gewiss mit der grössten Befriedigung zu begrüssen, dass nunmehr auf diesem Gebiete eine durch die mächtigen spectroskopischen Hilfsmittel der Jetztzeit unterstützte regere Thätigkeit sich zu entwickeln beginnt. In einer Reihe werthvoller Abhandlungen [1] haben bereits KAYSER und RUNGE in Hannover die Spectra mehrerer Metalle im elektrischen Flammenbogen mit einer Genauigkeit und Ausführlichkeit behandelt, welche bisher unerreicht waren und den gegenwärtigen Bedürfnissen der Spectroskopie völlig angemessen erscheinen. Ferner steht, einer Mittheilung der John Hopkins University zufolge, die baldige Veröffentlichung ähnlicher Untersuchungen seitens Prof. ROWLAND [2] zu erwarten. In Anbetracht dieser Umstände könnte das vorliegende Unternehmen vielleicht überflüssig erscheinen; indessen lassen sich jedoch für das Gegentheil Gründe angeben, welche wie ich meine triftig genug für das wünschenswerthe noch einer Behandlung des Gegenstandes sprechen.

Die ausserordentliche Schärfe, mit welcher nunmehr relative Ortsbestimmungen im Spectrum durch die vorzüglichen ROWLAND'schen Beugungsgitter erhalten werden können, ist jedem Spectroskopisten bekannt. In der That lässt es sich behaupten, dass Untersuchungen wie die vorliegenden nur dadurch und mit Hilfe seines so überaus vollendeten Atlas des Sonnenspectrums überhaupt möglich geworden sind. Obschon nun diese Mittel zumal in Verbindung mit einer genügend weit getriebenen photographischen Technik jedem geübten Beobachter eine erhebliche Genauigkeit seiner Wellenlängenbestimmungen sicher verbürgern, so kann andererseits eine unabhängige Controle der erlangten Resultate nur als besonders wünschenswerth betrachtet werden, und dies hat mich u. A. auch als bestimmender Grund bei dem Entwurf der vorliegenden Untersuchungen geleitet. Wie im folgenden sich zeigen wird, sind auch die von mir gewonnenen Ortsbestimmungen sowohl mit denen von KAYSER und RUNGE wie von ROWLAND im Allgemeinen in vortrefflicher Uebereinstimmung. Es giebt aber ein anderer Umstand, welcher denselben einen von den KAYSER-RUNGE'schen etwas verschiedenen Character verleiht. Als Hauptziel der Letzteren haben die Verfasser in erster Linie das Aufsuchen gesetzlicher Beziehungen in der Linienvertheilung der Spectra der Elemente hingestellt und dem entsprechend auch ganz besonders ihr Augenmerk auf eine möglichst weit getriebene Vollständigkeit der Spectra gerichtet. Das Vorhandensein einer grösseren oder geringeren Anzahl fremder Linien in den Spectra ist dabei von weniger Bedeutung wenn nur die Anwesenheit der dem Element wirklich gehörenden Linien als gesichert angesehen werden kann. Es haben auch die Verfasser von einer strengeren Ausmerzung fremder Linien vorläufig abgesehen. Für die Zwecke der Astrophysik, und namentlich für die Chemie der Sonne ist neben genauen Ortsbestimmungen jedoch das Herstellen von fremden Verunreinigungen möglichst freier Spectra eine Frage von fundamentaler Wichtigkeit, und dies ist ein Ziel, welches ich im Folgendem nach Möglichkeit zu verfolgen gesucht habe. Dasselbe schon jetzt in der erwünschten

[1] Abhandl. der Akademie d. Wiss. zu Berlin 1888, 1889, 1890, 1891, 1892, 1893.

[2] John Hopkins University Circulars Vol. X, N:o 85, 1891.

Vollendung zu erreichen ist offenbar unmöglich; indessen hoffe ich mich demselben insoweit genähert zu haben, dass aus den Spectra wenigstens die am meisten störenden Verunreinigungen beseitigt sein werden. —

Von den Spectra der Metalle ist dasjenige des Eisens für die Astrophysik ohne Frage das wichtigste. Bei der eingehenden Behandlung, welche dasselbe theils durch THALÉN theils durch KAYSER und RUNGE gefunden hat, habe ich es am zweckmässigsten erachtet zunächst die dem Eisen am nächsten stehenden Metalle Chrom, Nickel, Cobalt, Mangan und Titan der Untersuchung zu unterziehen. Da diese Elemente nebst dem Eisen sich gegenseitig stets mehr oder weniger verunreinigen, so hat das Studium ihrer Spectra gleichzeitig getrieben werden müssen, um jedes derselben von Linien der übrigen möglichst frei zu erhalten. Das Nähere dieser Vergleichungen, sowie derjenigen, welche mit den bereits vorliegenden Beobachtungen der Spectra anderer Metalle von KAYSER und RUNGE angestellt worden sind, wird weiter unten ausführliche Erörterung finden. [1]

In dieser Weise bin ich für den Haupttheil des Spectrums des Chroms von D bis λ: 343 oder für das einem mit dioptrischen Fernröhren versehenen Spectrographen photographisch zugängliche Gebiet desselben zu den im Folgenden näher beschriebenen Resultaten gelangt, welche wie man finden dürfte eine nicht unwesentliche Erweiterung unserer Kenntnisse dieses Spectrums bezeichnen.

§ 1. Altere Beobachtungen.

In seinen Untersuchungen über das Spectrum der Sonne und die Spectra der chemischen Elemente hat KIRCHHOFF für Chrom im Ganzen nur vier der stärksten Linien mit aufgenommen. Weit ausführlicher sind die kurz nachher von HUGGINS [2] ausgeführten Messungen; da dieselben aber ursprünglich nach einer willkürlichen Skala gegeben sind, von welcher eine Reduction auf Wellenlängen nur angenähert sich bewerkstelligen lässt, so sind die in der Weise von WATTS [3] erhaltenen Zahlen zu unsicher um hier weitere Berücksichtigung zu erheischen. Günstiger stellt sich die Sachlage in Betreff der von THALÉN [4] und LOCKYER [5] herrührenden Bestimmungen, welche schon von Anfang an in Wellenlängen gegeben sind und für ihre Zeit eine recht bedeutende Genauigkeit besitzen. Um sie mit den vorliegenden vergleichbar zu machen, habe ich sie theils auf das ROWLAND'sche Wellenlängensystem reducirt, theils die THALÉN'schen Intensitätsschätzungen auf meine Skala übergeführt und somit die folgende Zusammenstellung erhalten:

[1] Die Vergleichungen mit Mangan, welche bisher ausgeführt sind, haben noch nicht die Vollständigkeit erreicht, welche ich ihnen zu geben wünsche. Im Folgenden werden dieselben daher vorläufig nicht mit aufgeführt um so mehr als wenigstens im sichtbaren Theil des Spectrums nur eine geringe Anzahl Coincidenzen mit Chrom vorhanden zu sein scheinen.

[2] Phil. Trans. 1864.

[3] Index of Spectra.

[4] Acta Soc. Sci. Upsal. 1868.

[5] Phil. Trans. 1881.

λ		I		λ		I		λ		I	
Thalén.	Hasselberg.	Th.	H.	Thalén.	Hasselberg.	Th.	H.	Lockyer.	Hasselberg.		H.
5410,0	5409,99	5	6	4654,8	52,31	2	4. 5	3992,9	92,95	—	2. 3
5343,5	48,50	1	5		51,44		4. 5	91,8	91,81	—	2. 3
5342,0	45,98	1	5	4647,3	46,33	2	4. 5		91,26	—	3
5319,0	18,97	1	2	4496,0	97,02	2	3. 4	90,0	90,14	—	2
5314,0	13,05	1	2	4382,4	85,11	2	4	84,4	84,48	—	2. 3
5297,6	98,43	1	5	4369,8	71,44	2	4	84,0	84,02	—	3. 4
	98,14		3	4359,7	59,78	2	4	76,3	76,81	—	4
5297,1	97,52	1	3. 4	4352,4	51,91	5	5	69,6	69,89	—	3. 4
	96,86		5		51,20		4		69,20	—	2
	76,20		4	4345,0	44,66	5	4. 5	68,6	68,62	*Ca.*	
5275,3	75,85	2	3	4338,8	40,26	5	2. 3	63,5	63,82	—	3. 4
	75,31		4	4338,1	39,85	5	4	41,3	41,66	—	2. 3
5264,3	64,32	2	5		39,60		4	28,6	28,79	—	4
5255,0	55,27	2	2	4337,4	37,70	3. 4	4	20,9	21,20	—	3. 4
	55,08		2. 3	4290,0	89,87	6	6	19,1	19,31	—	4. 5
5247,2	47,68	2	4	4275,2	74,91	6	6	16,4	16,38	—	3
5208,5	08,58	6	6	4254,5	54,49	6	6		15,96	—	3
5206,1	06,20	6	6					09,0	08,87	—	3. 4
5204,6	04,67	6	6								
4924,8	22,40	2	3. 4								

Man sieht, dass die Uebereinstimmung im Allgemeinen so befriedigend ist, wie es in Anbetracht der Verschiedenheit der Instrumente und der Beobachtungsmethode wohl erwartet werden kann. Besonders auffallenden Differenzen begegnet man zunächst in Betreff der beiden starken Linien 5348,50 und 5345,98 deren Wellenlängen von Thalén um resp. 5 und 4 Å. E. kleiner als von mir gefunden sind. Da in der Nähe dieser Stelle im Spectrum ausser diesen keine Linien von bedeutender Intensität vorkommen, so kann über deren Identität bei Thalén und mir kein Zweifel obwalten, und da ferner Beobachtungsfehler von solchem Betrag jedenfalls ausgeschlossen sind, so dürfte zur Erklärung der Abweichung die Annahme eines Versehens von 5 Å. E. wahrscheinlich erscheinen. Die grosse verschwommene Triplette 5328,50, 5329,30, 5329,91 fehlt bei Thalén gänzlich und mag daher im Spectrum des Inductionsfunkens wenig hervorragend gewesen sein. Bei der grossen Gruppe 5298,43—5296,86 werden die Thalén'schen Örten sich wahrscheinlich auf die beiden scharfen Grenzlinien beziehen, während in Betreff der Gruppe 5276,20—5275,31 die angegebene Wellenlänge für das Ganze gelten mag. Im übrigen findet man grössere Differenzen nur bei den Linien 4922,40, 4652,31, 4385,11, wogegen sonst, und besonders bei den Hauptlinien des ganzen Spectrums, die Uebereinstimmung eine sehr befriedigende ist. Dass in dieser Beziehung in dem kleinen mir und Lockyer gemeinschaftlichen Theil des Spectrums grössere Gleichförmigkeit herrscht, ist nur was man erwarten konnte, da in beiden Fällen die Linien mit Hilfe der Photographie bestimmt worden sind. Aus der Lockyer'schen Liste muss, beiläufig bemerkt, jedoch die Linie 3968,6, welche mit *H.* identisch ist und demnach *Ca* gehört gestrichen werden. Dieselbe rührt bekanntlich ebenso wie die

zweite mit *K.* zusammenfallende *Ca*-Linie von den Kohlenelectroden her und kommt bei allen Aufnahmen vor, welche ich unter Anvendung solcher Electroden erhalten habe.

In Betreff der Intensitätsschätzungen kommen, wie man findet, zwischen unseren Beobachtungen bedeutende Differenzen vor. So fehlt z. B., wie schon bemerkt, die starke Gruppe 5328,5 — 29,9 bei THALÉN vollständig, und ebenso sind die in dieser Gegend liegenden glänzenden Linien bei THALÉN mehrfach nur als ganz schwach notirt. Es ist dies ein Unterschied zwischen Funken- und Bogenspectra, der häufig vorkommt und im gegenwärtigen Falle wohl auch darauf zurückgeführt werden kann, dass THALÉN nicht das Metall, sondern eine Chlorverbindung desselben benutzt hat.

Von den zahlreichen Linien des Chromspectrums ist nur bei den folgenden, stets sehr verschwommenen Hauptlinien eine Umkehrung, aber dann auch immer, beobachtet worden:

5208,6	4289,9	3605,5
5206,2	4274,9	3593,5
5204,7	4254,5	3578,8

Dieselben Linien nebst einigen noch weiter im Ultravioletten liegenden sind auch von LIVEING und DEWAR[1] als umgekehrt beobachtet worden, wobei indessen die Umkehrung durch Verdampfung von Chromoxyd oder Ammoniumbichromat in einem Strom von Wasserstoff erhalten wurde.

§ 2. Instrumente und Beobachtungsmethode.

Der bei meinen vorhergehenden Untersuchungen über das Absorptionsspectrum des Broms und das Spectrum der Thonerde benutzte Spectograph hat auch jetzt ausschliesslich Anwendung gefunden. Ein grosses Concavgitter von 6,5 Meter Krümmungsradius und 20,000 Striche pr Zoll, welches hauptsächlich für die Untersuchung des äussersten Ultraviolett benutzt werden soll, hat bisher noch nicht vollständig montirt werden können, weshalb nach dieser Richtung die Grenze der Untersuchung durch die Durchlässigkeit der Fernrohrobjective des Spectographen bestimmt wird. Nach der entgegengesetzten Seite des Spectrums hin findet man jenseits *D* nur einige wenige unbedeutende Linien, so dass das ganze Spectrum bis λ 343 mit Hilfe der Photographie hat durchgemustert werden können. Die Aufnahmen sind fast durchgängig in der III. Ordnung gemacht; nur für die Strecke *D* bis λ 540 ist meistens die II. Ordnung benutzt worden. Um bei den Aufnahmen in der dritten Ordnung das Ultraviolett IV. Ordnung auszuschliessen, habe ich wieder mit bestem Erfolg die Absorption des Schwefelkohlenstoffs benutzt und bei denjenigen in der II. Ordnung mehr oder weniger concentrirte Lösungen von Kaliumbichromat. Um indessen bei der Anwendung des Schwefelkohlenstoffs jede Absorption der sichtbaren Strahlen zu vermeiden, muss derselbe wasserhell sein, was sich in sehr befriedigender Weise durch Destillation des käuflichen Präparats erreichen lässt. Dabei hat sich jedoch das Eigenthümliche ergeben, dass die so gewonnene wasserklare Flüssigkeit nur beim Aufbewahren

[1] Proc. Roy. Soc. 32, p. 402—405. 1881.

im Dunkeln ihre Durchsichtigkeit bewahrt, während das Aussetzen derselben im Tageslicht schon nach kurzer Zeit eine immer tiefer werdende Gelbfärbung hervorruft. Ueber dies Verhalten des Schwefelkohlenstoffs entbehre ich bis jetzt jede befriedigende Erklärung.

Bei meinen Untersuchungen über das Spectrum der Thonerde ist der nöthige electrische Strom von einer Dynamo der hiesigen technischen Hochschule geliefert worden. Gewisse Änderungen im Maschinenbetrieb dieser Anstalt haben mich jedoch veranlasst für das physikalische Institut der Academie eine eigene electrische Anlage zu beschaffen. Dieselbe ist in einem dazu eingerichteten Kellergewölbe untergebracht und besteht aus einer Siemens'schen Shuntdynamo, welche durch einen 4-pferdigen Otto'schen Gasmotor betrieben einen Strom von 20 Ampères bei 120 Volts Spannung geben kann. Da der Motor eincylindrig ist, so kann der Gang desselben in Bezug auf Gleichförmigkeit nicht den strengsten Anforderungen genügen, weshalb zur Ausgleichung der noch übrigen Schwankungen im Gange zwischen seinem Schwungrad und der Dynamo eine mit Schwungrad versehene Federtransmission eingeschaltet ist. Die Construction dieser Transmission besteht einfach darin, dass die vom Motor direct getriebene Riemenscheibe derselben nicht fest, sondern durch eine starke Spiralfeder mit der Axe verbunden ist. Durch das auf dieser Axe befestigte zweite Schwungrad wird hierdurch bewirkt, dass jede Änderung im Gange des Motors erst allmählich auf die zweite Riemenscheibe der Transmission und auf die mit dieser verbundene Dynamo übergeführt wird. Durch diese Einrichtung ist der Gang der Dynamo sogar bei geringer Belastung auch für Glühlampenbeleuchtung von befriedigender Gleichförmigkeit geworden.

Als Lampen habe ich, wie vorher, ausschliesslich die Siemens'sche sog. Bandmodelle benutzt. Wenn in derselben die untere positive Electrode aus einer dicken Dochtkohle, die obere aus einer etwas dünneren compacten Kohle besteht, so bildet sich in der ersteren bald ein sehr heisser Krater, in welchem die Metallfragmente ganz ruhig verdampfen. Da zum Zweck der Eliminirung fremder Linien neben den für die eigentlichen Messungen bestimmten Doppelaufnahmen des Sonnen- und Metallspectrums noch andere Aufnahmen von je zwei Metallspectra nöthig sind, und ein Umtauschen der Electroden zwischen den Expositionen deshalb unausführbar ist, weil dadurch theils Erschütterungen des nahestehenden Spectographen, theils eine mangelhafte Centrirung des neuen Bogens in Bezug auf den Spalt zu befürchten wäre, so habe ich statt dessen eine Einrichtung getroffen, mittelst welcher jeder Spalthälfte successive eine besondere Lampe ohne Erschütterung und bei völliger Centrirung vorgeführt werden kann. Auf einer festen hölzernen Grundplatte erhebt sich zu dem Zweck eine vertikale konische Metallaxe, um welche eine zweite solide Platte mittelst einer auf der Axe aufgeschliffenen Metallbüchse sich sanft drehen kann in derselben Weise wie der Horizontalkreis eines Theodolithen. Diese zweite Platte trägt zwei einander diametral gegenüberstehende Bandlampen, welche vor der Exposition so justirt werden, dass der Lichtbogen der einen Lampe der oberen, derjenige der zweiten der unteren Hälfte des Spalts gegenüber steht, wenn die betreffende Lampe durch Drehen der Platte dem Spalt vorgeführt wird. Die richtige Lage der Drehplatte wird durch eine einschnappende Feder markirt. Dabei wird durch einen Schleifcontact der Strom stets derjenigen Lampe zugeführt, welche sich gerade vor dem Spalt befindet. Hat man also

durch die eine Spalthälfte z. B. das Licht eines Chrombogens auf die photographische Platte zugelassen und dreht darauf die Lampenplattform 180° oder bis die Feder wieder einschnappt, so gelangt nunmehr durch die zweite Spalthälfte das Licht des zweiten z. B. Eisenbogens und dieser Umtausch der Lichtquellen erfolgt dabei so sanft und genau, dass weder Erschütterungen noch Centrirfehler entstehen können. Bei der Entwicklung der Platte erhält man dadurch die beiden Spectra in genauem Anschluss an einander, so dass über etwaige Liniencoincidenzen mit der grössten Sicherheit geurtheilt werden kann.

Die als Electroden benutzten Kohlenstäbe wurden durch eine hiesige electrotechnische Anstalt von Siemens in Berlin bezogen. Dieselben sind sehr rein und zeigen nur wenige, in der Regel ziemlich lichtschwache Metalllinien. Nur im Ultravioletten treten die stärkeren Eisenlinien in vermehrter Zahl und Intensität auf, ohne jedoch derart zu stören, dass ihre Trennung von den eigentlichen Linien des zu untersuchenden Metalls irgend welche Schwierigkeit darböte. Dagegen häufen sich im Violetten und Ultravioletten die Elementarlinien der bekannten Kohlenbanden dermassen, dass in diesem Gewirr die schwächeren Metalllinien gänzlich verschwinden. Für diese Spectraltheile müssten daher Electroden aus anderem Material benutzt werden und ich habe dazu schliesslich dicke Stäbe aus electrolytisch ausgefälltem Kupfer gewählt, von denen der untere zur Aufnahme des Metallfragments kraterförmig ausgehöhlt wurde. Der Kupfer besitzt bekanntlich im unteren Ultraviolett nur einige wenige, verschwommene, leicht zu erkennende Linien und eignet sich daher zum vorliegenden Zweck sehr gut; jedoch hat man dabei mit dem Uebelstand zu kämpfen, dass der Bogen oft nur mit Schwierigkeit und durch häufiges Speisen mit neuem Material dazu zu bringen ist, auf das eingeführte Metallfragment zu übergehen. Seine Tendenz, seitwärts von diesem direct zwischen den Kupferstäben zu übergehen, macht ein stetiges Ueberwachen während der Exposition unerlässlich, ohne dass man auch dann über die wirkliche Dauer derselben in Bezug auf das eingeführte Metall anders als angenähert entscheiden könnte. Indessen ist es mir jedoch gelungen in dieser Weise sehr gute Negative der fraglichen Spectraltheile zu erzielen, auf denen die Linien des Metalls mit Leichtigkeit sich haben bestimmen lassen.

Was die photographische Technik betrifft habe ich fast durchgängig das früher befolgte Verfahren benutzt. Versuche mit verschiedenen Entwicklern, wie Hydrochinon Eikonogen u. s. w. haben mir keine nennenswerthe Vortheile über das Eisenoxalat gewährt, weshalb auch dies Präparat bis auf die letzte Zeit benutzt wurde. Neuerdings ist jedoch ein Präparat in den Handel gebracht worden, welches als Entwickler für Aufnahmen vorliegender Art sich ausserordentlich vortheilhaft erwiesen hat, nämlich das Diamidophenol. Die grosse Energie, welche diese Substanz als Entwickler besitzt, macht dieselbe besonders dann schätzenswerth, wenn die Exposition für gewöhnliche Entwickler zu kurz gewesen, ein Fall, der bei meinen Spectralaufnahmen wegen der grossen Dispersion häufig genug eintritt. Aber auch in solchen Fällen, wo ohne Schwierigkeit eine hinreichende Belichtung gegeben werden kann, ist die Möglichkeit, dieselbe auf ein Viertel oder mehr reduciren zu können, von so erheblicher Bedeutung, dass dadurch die Anwendung des neuen Präparats ohne weiteres geboten erscheint. Abgesehen von dem Zeitgewinn lässt sich nämlich daraus ausserdem eine grössere Schärfe der Aufnahmen erwarten, weil bei

kurzer Belichtung die unvermeidlichen Temperaturänderungen des Gitters nicht mehr einen zur Beeinträchtigung der Bildschärfe hinreichenden Betrag erlangen.

Die früher benutzten orthochromatischen Platten von EDWARDS habe ich nunmehr durch solche von der Firma LUMIÈRE in Lyon ersetzt. Sowohl mit dem Eisenoxalat als mit Diamidophenol habe ich auf diesen Platten Negative erhalten, welche an Brillanz und Feinheit des Korns den strengsten Anforderungen genügen. Die Lumière'schen Platten stehen bei merklich grösserer Empfindlichkeit in dieser Beziehung den Edwards'schen entschieden voran. Dies gilt zunächst für die grünempfindliche Sorte. Mit der rothempfindlichen habe ich ohne besonders lange Exposition im Sonnenspectrum II. Ordnung bis *C* gehen können; für die Metallspectra dagegen ist die Empfindlichkeit noch zu gering, indem um ein ausexponirtes Bild zu erhalten, die Belichtung so lang genommen werden muss, dass infolge der Temperaturänderungen des Gitters die Spectrallinien zu viel an Schärfe verlieren.

§ 3. **Ausmessung der Platten und Ableitung der Wellenlängen.**

Auf den in obiger Weise erhaltenen Aufnahmen des Spectrums findet man in fast allen Theilen desselben einen ausserordentlichen Reichthum an Linien. Unter diesen Linien giebt es jedoch eine namhafte Anzahl, welche nicht dem Chrom gehörend, theils auf Verunreinigung durch fremde Metalle, in erster Linie Eisen, theils auf sog. Ghosts der intensivsten Chromlinien zurückgeführt werden müssen. Diese letzteren Linien, welche bekanntlich in einer periodischen Ungleichheit der Gittertheilung ihren Ursprung haben, kommen bei meinem Gitter in der Nähe glänzender Metalllinien regelmässig als drei zur Hauptlinie symmetrisch stehende Paare vor, um denen das erste sich der Metalllinie als ein schwacher Begleiter zu jeder Seite dicht anschliesst, während die übrigen beiden in grösseren aber gleichen Abständen zu jeder Seite stehen. Diese Abstände nehmen mit der Wellenlänge an Grösse ab. Jede intensive Metalllinie bildet daher mit ihren Ghosts eine Gruppe von sieben Linien. In solchen Fällen, wo mehrere starke Metalllinien nahe zusammenstehen, bildet infolge dessen das Ganze häufig ein scheinbar schwer zu lösendes Liniengewirr, namentlich wenn ausserdem feinere Metalllinien in der Gruppe vorkommen. Indessen lässt sich durch die symmetrische Anordnung der falschen Linien und mit Kenntniss ihrer gegenseitigen Abstände fast immer ihre Unterscheidung von den wirklichen Spectrallinien sicher genug bewerkstelligen, um die Fälle als selten bezeichnen zu können, in denen aus diesem Grunde den Metallen nicht existirende Linien zugeschrieben worden sind.

Um nun bei den Messungen durch diese falschen Linien nicht gestört zu werden und um zugleich die vorhandenen Eisenlinien, welche die hauptsächlichste Verunreinigung bilden, schon von Anfang an möglichst zu eliminiren, wurden vor Anfang der Messungen die Platten zunächst einer Durchmusterung unterzogen unter gleichzeitigem Vergleich mit Aufnahmen des Eisenspectrums, theils zusammen mit der Sonne, theils mit Chrom. In dieser Weise konnte ein vorläufiges Verzeichniss der Chromlinien mit aus ROWLANDS Atlas entnommenen Wellenlängen angefertigt werden, aus welchem sowohl Ghosts wie die meisten Eisenlinien entfernt waren. Diese Trennung ist in allen Fällen vollkommen sicher zu be-

werkstelligen, in denen die Wellenlängendifferenz der betreffenden Chrom- und Eisenlinien die Grenze $\pm$ 0,05 Å. E. nicht untersteigt. Bei kleinerem Abstand der Linien von einander oder bei völliger Coincidenz lässt sich aus dem Intensitätsverhältniss gewöhnlich die Abstammung derselben entscheiden.

Nachdem in solcher Weise ein provisorischer Catalog der Chromlinien erhalten war, wurde zu den definitiven Messungen geschritten. Dazu wurde dieselbe Theilmaschine von PERRAUX benutzt, welche zu meinen früheren Messungen des Thonerdespectrums gedient hatte. Als Normallinien wurden ROWLAND'sche Standards in Abständen von etwa 20—30 Å. E. genommen, mit welchen die Metalllinien durch 3 unabhängige Einstellungen lineär verbunden wurden. Die erhaltenen Wellenlängen schliessen sich demnach dem letzten ROWLAND'schen, auf BELL's verbesserte Wellenlänge der *D*-linien gegründeten System strenge an. Um schliesslich die Linienpositionen gegen Fehler durch zufällige Verziehungen der Gelatinhaut sicher zu stellen, habe ich zwei derartige Messungsreihen immer auf verschiedenen Platten ausgeführt und aus den Resultaten derselben die Mittel als definitive Wellenlänge angenommen. Wie nahe die Werthe der beiden Reihen mit einander übereinstimmen, lässt sich am besten aus der folgenden Tabelle ersehen, in welcher von 763 gemessenen Linien die Anzahl (N) der Fälle aufgeführt ist, in denen die jedesmaligen Werthe um den beigeschriebenen Betrag (Δ) von einander abweichen:

Δ =	0,00 Å. E.	N = 119
	0,01	203
	0,02	162
	0,03	121
	0,04	69
	0,05	37
	0,06	21
	0,07	16
	0,08	7
	0,09	3
	0,10	0
	> 0,10	5

Da der wahrscheinliche Fehler einer Wellenlänge auf etwa $\pm$ 0,02 bis $\pm$ 0,03 Å. E. geschätzt werden kann, so sieht man hieraus, dass nur in 52 Fällen oder 7 % des Ganzen die Abweichungen der beiden Reihen von einander die Grenzen der wahrscheinlichen Messungsfehler überschreiten. Unter solchen Verhältnissen wird der Schluss berechtigt erscheinen, dass Verziehungen der empfindlichen Haut von einem hier schädlichen Betrag als nicht vorhanden angesehen werden können.

Zur weiteren Beurtheilung der Genauigkeit der erhaltenen Positionen der Chromlinien bietet das neulich von ROWLAND[1] veröffentlichte erweiterte Verzeichniss von Normallinien ein sehr erwünschtes Mittel. Als Grundlage dieses Systems dient die absolute Wellenlänge der D_1-linie, für welche ROWLAND die folgenden Bestimmungen benutzt:

[1] Astronomy and Astrophysics 1893, p. 321.

ÅNGSTRÖM-THALÉN	λ — 5895,81	Gew. 1
MÜLLER-KEMPF	96,25	» 2
KURLBAUM	95,90	2
PEIRCE	96,20	» 5
BELL	96,20	» 10
	Mittel: 5896,156	

Da dieser Werth mit demjenigen identisch ist, welcher dem früheren von mir benutzten ROWLAND'schen Fundamentalcatalog[1] zu Grunde liegt, so sind unsere Messungen auch unmittelbar mit einander vergleichbar. Eine solche Vergleichung in Bezug auf die bei ROWLAND vorkommenden Chromlinien enthält die nachstehende Tabelle, in welcher jedoch ROWLAND's Wellenlängen auf nur zwei Decimalstellen abgerundet sind.

	ROWLAND.	HASSELBERG.	Bemerkungen.
Cr, Fe	5791,21	91,20	
Cr	5788,14	88,15	
Cr	5784,08	84,09	
Cr	5410,00	09,99	
Ni, Fe. Cr	5371,69	71,71	⊙-lin. dupl. Comp. n. R. = 71,68 (Fe), n. V. = 71,56 (Ni). Wenn Chrom eine Linie hier hat, so muss dieselbe nebst der starken Fe-linie der Comp. n. R. entsprechen, welche selbst eine äusserst enge dupl. ist. Aus der Liste der Chromlinien habe ich sie vorläufig gestrichen.
Cr	5300,92	00,90	
Cr	5296,87	96,86	
?, Cr, Co	5276,20	76,20	⊙ Tripl.
Ca, Ni?, Cr	5265,88	65,88	
Ca, Cr	5261,88	61,87 61,91	Cr-lin. coincidirt nicht völlig mit der ⊙-lin. $\Delta\lambda = 0{,}04$, folglich $\lambda_{Cr} = 61{,}92$ wenn für die ⊙-lin. 61,88 angenommen wird.
Cr, Fe	5204,71	04,67 04,75	⊙-lin. dupl. Comp. n. R. 04,75 = Fe. » n. V. 04,67 = Cr.
Cr, Fe	4903,49	03,40 03,48	Cr-lin. coincidirt nicht mit der ⊙-lin. $\Delta\lambda = -0{,}08$. ⊙-lin. gehört Fe.
Cr?	4588,38	88,38	
Cr, Zr	4497,04	97,02	
Ni, Cr, Zr	4359,78	59,78	⊙-lin. enge Tripl. Die mittlere Comp am stärksten; gehört Cr. Sehr nahe n. V. eine starke Ni-lin.
Cr, Fe	4343,39	43,32 43,39	Die Cr-lin. scheint keine entsprechende ⊙-lin. zu haben. — 43,39 = Fe.
Cr	4289,88	89,87	
Cr	4274,96	74,91	
Cr	4254,50	54,49	
Fe, Cr	4121,97	21,96	Absolute Coinc.
Cr, Co	4121,48	21,41 ——	Cr-lin. coincidirt nicht mit der ⊙-lin. $\Delta\lambda = -0{,}06$. $\therefore \lambda_{Cr} = 21{,}42$.
Zr, Mn, Cr	4048,89	—— —— 48,94	Die Cr-lin. coincidirt nicht mit der ⊙-lin. sondern liegt etwas n. R. ⊙-lin. dupl.
Cr, Fe	3984,08	84,02 ——	⊙-lin. dupl. sehr eng. Comp. n. R. = Fe. » n. V. = Cr. $\Delta\lambda < 0{,}10$. ROWL. giebt $\Delta\lambda$ etwa = 0,06.
Cr	3883,77	83,78	
Mn, Cr	3823,65	23,64	
Fe, Cr	3794,01	94,02	
Ti, Fe, Cr	3743,50	—— —— 43,67	Die Cr-lin. liegt im Schatten der ⊙-lin 43,50 (Fe).
Cr, Fe	3640,54	——	Diese Linie bei Cr nicht gesehen.
Cr	3605,48	05,46	⊙-lin. starke dupl. 05,62 (Fe). 05,46 (Cr).

Eine nähere Betrachtung dieser Tafel zeigt eine Uebereinstimmung wie sie nur schwerlich besser gewünscht werden kann. Unter den Fällen, in denen die Coincidenz

[1] JOHN HOPKINS University Cirkulars Vol. VIII, p. 78, 1889.

mit Sonnenlinien unzweifelhaft ist, übersteigt die Differenz unserer Werthe mit *einer* Ausnahme niemals 0,02 Å. E. Diese Ausnahme betrifft die Linie 4274,91, dessen Wellenlänge um 0,05 Å. E. von mir kleiner gefunden ist als von ROWLAND. In einigen wenigen Fällen, in denen Differenzen, grösser als 0,02 Å. E. vorkommen, lassen sich dieselben, wie aus den beigefügten, meinem Beobachtungsjournal entnommenen Bemerkungen hervorgeht, befriedigend erklären.

§ 4. Eliminirung fremder Linien.

Bei weitem der schwierigste Theil der Spectroskopie der Metalle ist die Ausscheidung fremder Linien. Dieselbe in aller Vollständigkeit zu bewirken ist offenbar nur dann möglich, wenn für sämmtliche Metallspectra Untersuchungen in gleicher Vollständigkeit und Genauigkeit vorliegen, aber selbst dann wird man aller Wahrscheinlichkeit nach auf die Erreichung eines vollkommen befriedigenden Resultats verzichten müssen. Um so mehr bin ich mir der Unvollkommenheit völlig bewusst, welche in dieser Hinsicht der vorliegenden Untersuchung noch immer anhaftet, da es mir nicht möglich gewesen ist mehr als die am meisten auffallenden Verunreinigungen des Spectrums zu beseitigen.

Die Methode, welche ich zu diesem Zweck benutzt habe, ist sehr einfach. Was das Eisen betrifft, welches den grössten Contingent fremder Linien abgiebt, wurde der Haupttheil dieser Linien in oben erwähnter Weise schon bei Aufstellung des provisorischen Catalogs der Chromlinien beseitigt. Bei dieser Ausschliessung war die Annahme massgebend, dass wenn eine schwache Linie im Spectrum des Chroms einer intensiven in demjenigen des Eisens entsprach, dieselbe als eine Verunreinigung des ersteren Spectrums durch Eisen angesehen werden konnte. Nach Abschluss der Messungen der Chromlinien wurde darauf zwischen den für dieselben erhaltenen Wellenlängen und denjenigen des Eisens nach KAYSER und RUNGE eine eingehende Vergleichung angestellt, wobei für eine Anzahl Linien so nahe übereinstimmende Örter gefunden wurden, dass eine erneuerte Vergleichung derselben unter einander ausgeführt werden musste. Dieser Vergleichung dienten Aufnahmen der beiden Spectra neben einander auf derselben Platte, welche in schon beschriebener Weise hergestellt waren. Dabei ergab sich, dass diese gemeinsamen Linien in zwei Gruppen geordnet werden können, von denen die eine eine nicht unbedeutende Anzahl Linien umfasst, deren Intensität im Chromspectrum dermassen überwiegt, dass dieselben entschieden als dem Chrom gehörig und demnach als Verunreinigung des KAYSER-RUNGE'schen Spectrums angesehen werden müssen, während in der zweiten Gruppe die Intensität gering und so nahe gleich ist, dass dieselben, wo absolute Coincidenz stattfindet, wahrscheinlich auf gemeinsame Verunreinigung durch ein drittes Metall zurückzuführen sind. Die Resultate dieser Vergleichung werden nebst den analogen, mit anderen schon von KAYSER und RUNGE gemessenen Metallspectra angestellten Vergleichungen gleich weiter unten folgen. Für einige andere Metalle, durch welche man in erster Linie eine Verunreinigung des Chroms oder der Electroden zu befürchten hat, wie Nickel, Cobalt, Titan und Mangan, habe ich in derselben Weise wie für Chrom zunächst vorläufige Wellenlängencataloge aufgestellt und mit den Örtern der Chromlinien verglichen. Alle diejenigen Linien, welche bei dieser Vergleichung um weniger als 0,10 Å. E. in der Wellenlänge von einander abwichen, wurden darauf einer neuen Vergleichung unterworfen auf Platten,

welche diese Spectra neben demjenigen des Chroms enthalten. Dabei hat sich in sehr vielen Fällen die Übereinstimmung der Örter als nur angenähert erwiesen und der Beweis erbracht werden können, dass die Mehrzahl dieser Linien wirklich von einander, wenn auch um sehr geringe Beträge, getrennt und daher unabhängig sind. Diejenigen Linienpaare aber, für welche eine solche Trennung nicht oder nur unsicher gelang, finden sich in den gleich weiter unten folgenden Tafeln zusammengestellt.

a) Vergleichungen mit Eisen.

Als Electroden dienten etwa halbzolldicke Stäbe aus weichem, möglichst reinem Eisen. Die folgenden beiden Tabellen enthalten in den mit Cr und Fe bezeichneten Columnen die Wellenlängen und Intensitäten der Linien, welche in meinem Chromspectrum und im Spectrum des Eisens nach KAYSER und RUNGE identische oder sehr nahe identische Lagen einnehmen[1]. Des leichteren Vergleichs wegen sind dabei die Intensitätsschätzungen von KAYSER und RUNGE auf meine Skala reducirt und schliesslich in der letzten Columne die Ergebnisse der Vergleichungen auf meinen Platten aufgeführt.

Tabelle a.

Cr λ	Cr i	Fe λ	Fe i	Bemerkungen.	Cr λ	Cr i	Fe λ	Fe i	Bemerkungen.
5791,20	4	91,21	3		4526,65	4	26,72	3	Fe-lin. unbedeutend.
5784,09	3	84,07	1		4475,47	2. 3	75,41	1	Fehlt bei Fe.
5702,56	2. 3	02,56	1		4459,95	2. 3	59,93	1	Ebenfalls.
5698,55	3	98,61	2		4428,71	2	28,79	1	Ebenfalls.
5296,85	5	96,88	1	In Fe nicht vorhanden.	4414,00	2	14,05	1	Ebenfalls.
5276,20	4	76,25	1	Ebenfalls.	4403,68	2	03,65	1	Ebenfalls.
5255,08	2. 3	55,14	2	Fe schwach. Coinc.	03,55	2			
5206,20	6	06,19	2	In Fe nicht vorhanden.	4351,20	4	51,17	1	Ebenfalls.
5192,17	2. 3	92,16	1	Ebenfalls.	4344,66	4. 5	44,67	1	Fe-lin. sehr schwach.
5013,48	2. 3	13,54	1	Ebenfalls.	4340,26	2. 3	40,26	1	Fe-lin. Spur.
4954,92	3	54,96	1	Ebenfalls.	4337,70	4	37,76	1	Fehlt bei Fe.
4921,11	2	21,17	1	In Fe Spuren.	4325,24	2. 3	25,24	1	
4792,61	3	92,68	1	In Fe nicht vorhanden.	4295,92	2. 3	95,88	1	Fehlt bei Fe.
4756,30	3	56,26	1		4289,87	6	89,89	2	Ebenfalls.
4729,89	2	29,90	1	In Fe sehr schwach.	4274,91	6	74,92	2	Ebenfalls.
4698,60	3	98,57	1	In Fe Spuren.	4261,49	2. 3	61,52	2	Bei Fe Spuren.
4666,07	2. 3	66,15	1	Ebenfalls.	4254,49	6	54,49	2	Ebenfalls.
4652,31	4. 5	52,27	1	Fehlt bei Fe.	4240,82	2. 3	40,83	1	Ebenfalls.
4646,33	4. 5	46,40	1	Ebenfalls.	4203,71	2. 3	03,69	1	Ebenfalls.
4591,56	3. 4	91,58	1	Ebenfalls.	4197,38	2	97,38	1	
4546,15	4	46,19	1	Ebenfalls.	4192,25	2	92,27	1	
4542,83	2	42,90	1	Ebenfalls.	4163,76	3	63,80	2	Bei Fe Spuren.
4540,90	4	40,83	1	Ebenfalls.	3885,35	3	85,31	1	Fehlt bei Fe.
40,70	4				3825,54	2. 3	25,54	1	Bei Fe Spur.
4539,96	3	39,93	1		3823,64	2	23,66	1	Fehlt bei Fe.

[1] Die Wellenlängen von KAYSER und RUNGE sind hier auf die neueren von mir benutzten ROWLAND'schen Standards reducirt.

Tabelle b.

Cr λ	Cr i	Fe λ	Fe i	Bemerkungen.
5373,92	1. 2	73,91	3	Die Cr-lin. vielleicht getrennt von der Fe-lin.
5328,50	5	28,56	5	Cr vv. Coincidenz unmöglich zu entscheiden.
5221,90	1. 2	21,95	1	Fehlt bei Fe. Wahrscheinlich Cr.
5221,06	1. 2	21,15	1	Ebenfalls.
4857,50	1	57,47	1	
4824,31	1	24,32	1	
4757,76	1. 2	57,76	2	
4741,27	1	41,32	1	Fehlt bei Fe.
4714,34	1. 2	14,35	1	Ebenfalls.
4356,91	1. 2	57,00	1	
4305,61	2	05,63	2	
4284,99	1. 2	84,95	1	Fehlt bei Fe. Ebenso 84,25. Dagegen ist 84,60 vorhanden, obgleich bei K.-R. alle gleiche Intensität haben.
4270,08	1. 2	70,17	1	Fehlt bei Fe.
4268,90	1. 2	68,91	3	
4255,65	2	55,68	2	
4248,84	1. 2	48,81	1	Fehlt bei Fe.
4239,08	2. 3	39,02	5	
4224,64	2	24,67	2	
4217,75	2. 3	17,73	4	
4172,88	3	72,87	4	
4142,31	1. 2	42,37	1	Fehlt bei Fe.
4121,96	2	21,94	4	
4077,81	1. 2	77,80	1	Fehlt bei Fe.
4058,89	2. 3	58,92	3	Vielleicht getrennt.
4051,47	1. 2	51,46	1	Fehlt bei Fe.
4049,90	1	49,98	1	Ebenfalls.
3953,34	1. 2	53,31	3	
3892,07	2	92,02	3	
3883,41	3	83,39	4	
3868,41	1. 2	68,37	1	Vielleicht getrennt.
3845,60	—	45,58	1	Diese Cr-lin. ist stark auf mehreren Platten, nur auf einer Platte schwach. Gemeinsame Verunreinigung?
3821,71	1. 2	21,71	1	

Das erste was in diesem Verzeichniss hervortritt ist die im Allgemeinen sehr befriedigende Uebereinstimmung unserer Messungen. Die Abweichungen scheinen durchweg innerhalb der Grenzen der beiderseitigen wahrscheinlichen Messungsfehler zu liegen. Ferner dürfte in Betreff der Tafel *a* der Vergleich der beiden Intensitätscolumnen kaum einen Zweifel darüber zurücklassen, dass die dort aufgeführten Linien dem Chrom und nicht dem Eisen zugeschrieben werden müssen und daher aller Wahrscheinlichkeit nach aus dem Eisenspectrum von Kayser und Runge auszuschliessen sind. In dieser Ansicht bin ich noch mehr durch die Aussagen der letzten Columne bestärkt worden, nach denen die Mehrzahl dieser Linien in meinem Eisenspectrum fehlt. Dieser Umstand kann in zweierlei Weise erklärt werden. Entweder ist das von mir benutzte Eisen factisch reiner gewesen als das von Kayser und Runge angewandte käufliche Präparat, was mit Rücksicht auf die bekannte Reinheit des schwedischen Eisens im Allgemeinen mir allerdings nicht unwahrscheinlich erscheint, oder es können Kayser und Runge eine namhaft grössere Stromstärke benutzt haben, wobei natürlich Linien hervortreten können, welche bei schwächerem Strom nicht erscheinen. Sollte die erste Alternative zutreffen, so wäre natürlich die Frage von der Abstammung dieser Linien definitiv erledigt, aber auch unter Voraussetzung der Richtigkeit der zweiten wird man in Anbetracht der Intensitätsverhältnisse kaum Veranlassung haben über den Ursprung der Linien im Ungewissen zu sein.

In Betreff der in der Tabelle *b* aufgeführten Linien liegt die Sache etwas anders. Die Intensität ist in beiden Spectra im Allgemeinen ziemlich gering und nahe dieselbe, weshalb in solchen Fällen, in denen die Coincidenz als absolut angesehen werden kann,

die Wahrscheinlichkeit vorliegt, dass die Linien weder Chrom noch Eisen sondern irgend einem dritten Metall angehören, welches in beiden Spectra als Verunreinigung auftritt. Die definitive Entscheidung dieser Frage wird erst dann möglich sein, wenn für sämmtliche Metalle entsprechende Untersuchungen vorliegen.

b) Vergleichungen mit Calcium.

Unter den Spectrallinien dieses Metalls, welche im Catalog von KAYSER und RUNGE vorkommen, sind die folgenden als von den Kohlen herrührende Verunreinigungen immer auf meinen Aufnahmen des Chromspectrums beobachtet worden:

Cr λ	Cr i	Ca λ	Ca i	Bemerkungen.
4455,00	1. 2	54,97	6	Umgekehrt.
4435,10	1	35,13	6	Umgekehrt.
4318,83	1	18,80	5	Umgekehrt.
4307,92	1	07,91	5	Umgekehrt. Entspricht der einen Componente von *G*. Die zweite mit λ 08,08 gehört Fe.
4302,69	1. 2	02,68	6	Umgekehrt. Kommt auch im Fe-Spectrum von KAYSER und RUNGE mit λ 02,73 als Verunreinigung vor.
4283,13	1	83,16	5	Umgekehrt.
4226,86	4	26,91	6	Umgekehrt.

Die Intensitätsangaben lassen, wie man findet, über den Ursprung dieser Linien keinen Zweifel übrig.

c) Vergleichungen mit Strontium, Barium und Magnesium.

Die Vergleichung mit den übrigen von KAYSER und RUNGE bisher veröffentlichten Metallspectra hat nur für die oben genannten Metalle einige mit Chrom nahe übereinstimmende Linien ergeben, welche ich hier zusammenstelle. Die beigefügten Bemerkungen lassen die Annahme wahrscheinlich erscheinen, dass die resp. Linien von einander unabhängig sind.

Strontium.

Cr λ	Cr i	Sr λ	Sr i	Bemerkungen.
4855,32	1	55,27	4	
4729,89	2	29,93	—	Die Sr-Lin. sehr verschwommen. Unsicherheit in $\lambda = \pm 0{,}10$. Zusammenhang mit Cr unwahrscheinlich.
4305,61	2	05,60	4	Dieselbe Bemerkung wie bei 4729,9. Beide Linien kommen auch als Verunreinigung im Fe-Spectrum von KAYSER und RUNGE vor.

Barium.

Cr λ	Cr i	Ba λ	Ba i	Bemerkungen.
5177,58	2	77,60	2	Verschwommen. Unsicherheit = ± 0,05.
4554,10	1.2	54,21	6	Wahrscheinlich von einander unabhängig. Die Fe-Lin. 54,22 bei KAYSER und RUNGE wahrscheinlich Verunreinigung.
4359,78	4	59,80	2	⊙ hat eine enge Tripl. mit schwachen Seitenlinien. Vielleicht eine von diesen Ba.
3794,75	2	94,77	2	Ba sehr verschwommen. Unsicherheit = ± 0,20. Nichts mit einander zu thun.

Magnesium.

Cr λ	Cr i	Mg λ	Mg i	Bemerkungen.
4571,27	1.2	71,33	3	
3832,43	1.2	32,46	6	Umgekehrt, gehört Mg. Aus Cr gestrichen.

d) Vergleichungen mit Nickel.

Das zu den Aufnahmen benutzte Nickel stammt aus der chemischen Fabrik von SCHUCKARDT in Görlitz und hat sich bei einer chemischen Untersuchung im Laboratorium des Herrn Baron NORDENSKIÖLD als sehr rein und namentlich frei von Cobalt erwiesen. Nichtsdestoweniger kommen auf den Platten verschiedene fremde, gewöhnlich dem Eisen aber auch Cobalt gehörende Linien vor; es dürften aber dieselben aller Wahrscheinlichkeit nach hauptsächlich aus den Kohlenstäben stammen, und ihre Eliminirung bietet daher keine Schwierigkeit. Von den übrigen Linien, welche beim Vergleich des Chromcatalogs mit dem provisorischen Verzeichniss der Nickellinien als nahe identisch in der Lage erscheinen, liess sich ein Theil bei der Untersuchung der Doppelaufnahmen der beiden Spectra von den Chromlinien deutlich trennen, während für einige wenige die Trennung und daher der wahre Ursprung noch zweifelhaft bleibt. Es sind dies die Linien:

Cr λ	Cr i	Ni λ	Ni i	Bemerkungen.
5664,26	2.3	64,20	2.3	Ni verschwommen.
5184,73	2	84,75	1.2	
4754,95	1.2	55,00	1.2	Unmöglich sicher zu trennen. Vielleicht $\lambda_{Cr} > \lambda_{Ni}$.
4752,27	2.3	52,25	1.2	Völlige Coincidenz. Cr kann nicht Ni verunreinigt haben, denn von naheliegenden starken Cr-Linien ist bei Ni nichts zu sehen.
4686,38	1.2	86,40	2.3	Wahrscheinlich getrennt.
4543,99	1.2	44,00	1	
4368,42	1.2	68,47	1.2	Getrennt?
4359,78	4	59,80	3	Vergl. Ba. Die Ni-Linie vielleicht etwas brechbarer als Cr.
4142,31	1.2	42,30	1	

Cr		Ni		Bemerkungen.
λ	i	λ	i	
4046,89	1	46,90	1	Exacte Coincidenz. Wahrscheinlich gemeinsame Verunreinigung.
3969,20	2	69,22	1. 2	Die hier bei Ni gefundene Linie gehört Co.
3749,13	3	49,10	2	Coincidenz nahe exact. Vielleicht $\lambda_{Cr} > \lambda_{Ni}$.
3744,63	2	44,60	1. 2	Wahrscheinlich getrennt.
3689,41	1. 2	89,40	1	Vielleicht getrennt. Ursprung zweifelhaft.

In dieser Liste findet man ein Beispiel der ab und zu vorkommenden Fälle einer exacten Coincidenz zwischen Linien verschiedener Spectra, ohne dass aus der Intensitätsverschiedenheit der Linien eine völlig befriedigende Entscheidung über ihren Ursprung zu treffen wäre. Die Linie 4752,27, welche bei Chrom so intensiv ist, dass über ihre Zugehörigkeit zum Chromspectrum kein Zweifel besteht, ist im Spectrum des Nickels nur unbedeutend und würde daher unter gewöhnlichen Verhältnissen als eine Verunreinigung des Nickels durch Chrom aus dem Nickelspectrum zu streichen sein. Der Umstand aber, dass von mehreren, in der Nähe liegenden, ebenso starken oder sogar noch stärkeren Chromlinien im Nickelspectrum keine Spur zu sehen ist, lässt die Annahme einer Verunreinigung des Nickels durch Chrom wenig wahrscheinlich erscheinen, da in solchem Falle es nicht abzusehen ist warum gerade diese specielle Linie und nicht die übrigen im Nickelspectrum auftreten würde. Man wird deshalb, wie mir scheint, genöthigt, dieselbe auch dem Nickel zuzuschreiben und die Möglichkeit einer wenn auch zufälligen Identität zweier Strahlungen der beiden Metalle anzunehmen, wenigstens solange die Fehlergrenzen der spectroskopischen Ortsbestimmungen nicht enger gezogen werden können als hier der Fall ist.[1]

e) Vergleichungen mit Cobalt.

Das zu den Versuchen benutzte Cobalt wurde ähnlich wie das Nickel von SCHUCKARDT in Görlitz bezogen. In derselben Weise wie das letztere Präparat durch Cobalt erwies sich auch das Cobalt durch Nickel verunreinigt, obgleich wie es scheint, in etwas geringerem Grad. Mit Chrom verglichen zeigte das Cobaltspectrum, seinem Reichthum an Linien entsprechend, eine erhebliche Anzahl Fälle, in denen scheinbar exacte Coincidenzen stattfanden; bei genauer Untersuchung der Doppelaufnahmen der beiden Spectra konnte jedoch die bei weitem grösste Mehrzahl dieser Linienpaare von einander unzweideutig getrennt und zwischen ihnen bestimmte obwohl sehr geringe Positionsdifferenzen constatirt werden. Nur in den folgenden wenigen Fällen blieb die Entscheidung in dieser Hinsicht zweifelhaft:

[1] ROWLAND (JOHN HOPKINS Cirkulars Bd. X, N:o 85, p. 42) äussert in dieser Beziehung: »With the high dispersion here used the basic lines of LOCKYER are widely broken up and cease to exist. Indeed it would be difficult to prove anything except accidental coincidences among the lines of the different elements. Accurate investigation generally reveals some slight difference of wave-length or a common impurity».

Cr λ	i	Co λ	i	Bemerkungen.
5370,57	1.2	70,59	1	Coincidenz exact.
4754,10	1	54,15	3	Cr-Linie zweifelhaft.
4718,57	4	18,55	2.3	Wahrscheinlich getrennt und $\lambda_{Cr} > \lambda_{Co}$. Differenz gering.
3991,81	2.3	91,82	2	Coincidenz exact.
3894,20	3	94,12	5	Wahrscheinlich getrennt.
3575,10	2	75,05	3	Unmöglich zu trennen.
3552,85	2	52,85	2	Cr vv. Wahrscheinlich von einander unabhängig.

f) Vergleichungen mit Titan.

Um das Spectrum des Titans zu erzeugen wurde zunächst von SCHUCKARDT in Görlitz bezogenes pulverförmiges Metall in den Krater der unteren positiven Electrode gebracht. Die Verdampfung erfolgte indessen dabei so schnell, dass das Spectrum nur auf kurze Augenblicke sich zeigte und infolgedessen nicht photographirt werden konnte. Von Herrn Baron NORDENSKIÖLD erhielt ich dann Titansäure in Form von *Rutil*, welches nach seiner Angabe sehr frei von Eisen sein sollte. Eine kleine Scherbe dieses Minerals in den Kohlenkrater gebracht schmilzt augenblicklich zu einer Perle zusammen, über welche der Bogen mit grosser Ruhe brennt und ein glänzendes, stundenlang andauerndes Titanspectrum giebt. Bei der Durchmusterung der Aufnahmen erwies sich zunächst die Angabe über die Eisenfreiheit des Minerals als völlig zutreffend; in der That sind nur hie und da schwache Spuren der stärksten Eisenlinien zu sehen, die ebenso wohl von den Kohlenstäben wie vom Rutil herrühren können. Die Vergleichung des provisorischen Wellenlängencatalogs des Metalls[1] mit den Messungen des Chromspectrums ergab weiter eine nicht unbedeutende Anzahl angenähert übereinstimmender Linien, von denen jedoch bei einer genauen Untersuchung der Doppelaufnahmen der beiden Spectra nur ein geringer Theil als wirkliche Coincidenzen sich herausstellte, während für die Mehrzahl eine wenn auch kleine Positionsdifferenz unzweifelhaft nachgewiesen werden konnte. Die Linien, welche bei dieser Vergleichung nicht getrennt werden konnten, sind die folgenden:

Cr λ	i	Ti λ	i	Bemerkungen.
5397,32	1	97,28	2	Coincidenz exact. Gehört weder Cr noch Ti, sondern Fe. K.-R. geben $\lambda = 97{,}34$, $i = 6$.
5225,08	3	25,15	2.3	Die Ti-Linie vielleicht getrennt von der Cr-Linie. In dem Fall liegt sie zwischen den Cr-Linien 25,17 und 25,08.
5224,70	1.2	24,71	2	Cr möglicherweise etwas brechbarer als Ti.
4656,60	1.2	56,60	3.4	Vielleicht eine kleine Differenz in der Lage. Unsicher.
4639,85	1.2	39,83	2.3	Vielleicht $\lambda_{Cr} > \lambda_{Ti}$.
4527,53	3	27,48	3	Wahrscheinlich getrennt.

[1] Während des Druckes ist das Titanspectrum gemessen worden, so dass die in der Tafel aufgeführten Wellenlängen der Titanlinien definitiv sind.

Cr		Ti		Bemerkungen.
λ	i	λ	i	
4300,68	2	00,73	3.4	Wahrscheinlich getrennt, $\lambda_{Cr} < \lambda_{Ti}$.
4295,92	2.3	95,91	3.4	Coincidenz scheint genau. Unmöglich zu trennen.
4263,28	—	63,28	—	Möglicherweise $\lambda_{Cr} > \lambda_{Ti}$.
4261,77	1.2	61,75	2	Coincidenz scheint exact.
1122,31	2	22,31	2	Unmöglich zu trennen. Vielleicht $\lambda_{Cr} > \lambda_{Ti}$.
3836,22	2	36,22	1	Exacte Coincidenz. Ti-Linie schwach. Gehört wahrscheinlich Cr.
3786,38	1	86,44	1.2	Coincidenz. Wahrscheinlich gemeinsame Verunreinigung.
3757,80	2.3	57,82	1.2	Wahrscheinlich getrennt, und $\lambda_{Cr} < \lambda_{Ti}$. Differenz äusserst gering.
3696,02	1	96,00	1	Coincidenz. Fehlt in einigen Ti-Spectra. Verunreinigung?
3558,74	2.3	58,66	2	Cr. vv. Wie die vorhergehende Linie.
3556,27	1	56,32	1.2	Fehlt in einzelnen Photogrammen des Cr.

Auch hier lassen sich dieselben Bemerkungen machen wie oben in Bezug auf Nickel. Wenn demnach auch z. B. bei den Linien 4656,60, 4300,7, 4295,91 eine Untersuchung mit kräftigeren Mitteln nicht zu einer unzweifelhaften Trennung von den entsprechenden Chromlinien führt, so wird man jedoch bei Chrom die Linien nicht als Verunreinigung durch Titan ansehen können, da von anderen naheliegenden Titanlinien ähnlicher Intensität im Chromspectrum keine Spuren vorkommen.

§ 5. **Resultate der Beobachtungen.**

In dem folgenden Catalog sind die Ergebnisse der im Vorhergehenden beschriebenen Untersuchung des Chromspectrums enthalten. Die erste Columne giebt die definitiven Wellenlängen aus den in der zweiten aufgeführten ROWLAND'schen Normallinien abgeleitet, deren Mittheilung den Zweck hat, die Uebertragung jeder derselben in Zukunft möglicherweise zukommenden Correction auf die Linien des Metalls zu ermöglichen. Eine solche Correction ist dabei einfach mit ihrem Zeichen den Wellenlängen hinzuzufügen, welche jeder Normallinie unmittelbar folgen. Die relativen Intensitäten der Metall- resp. Sonnenlinien nach den photographischen Negativen geschätzt, sind in der dritten und vierten Columne aufgeführt, wobei mit 1 die schwächsten, mit 6 die stärksten Linien bezeichnet sind. Schliesslich giebt die letzte Columne die Bemerkungen, zu denen die Durchmusterungen der Platten Veranlassung gegeben haben. Die Buchstaben s und v bedeuten resp. scharfe und verschwommene Linien, wobei ihre Wiederholung eine Steigerung dieser Eigenschaften anzeigen.

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
——	**5798**,09			
5797,02		1	1	
92,00		1	—	
91,20		4	2.3	
88,63		1.2	—	
88,15		3.4	2	
87,26		1.2	—	
86,00		2.3	—	
85,21		3	1.2	
84,09		3	1.2	
83,32		2.3	2	
82,01		2	1	
81,43		2	1	
81,20		1.2	—	
——	**5754**.89			
53,88		1.2	1.2	
46,65		1.2	—	
38,77		1.2	—	
36,88		1	—	
——	**5731**,98			
29,42		1.2	—	
20,06		1.2	—	
13,03		2.3	1	
12,87		1.2	1	
——	**5709**,69[1]			
02,56		2.3	1	
00,75		1.2	—	
5698,55		3	1	
94,93		2.3	1	
——	**5688**,43			
83,76		1	—	v.
82,67		2	—	v.
81,39		1.2	—	v.
74,42		1	—	
64,26		2.3	1	
——	**5662**,75			
58,85		1.2	2	
49,60		2	—	
42,60		1.2	—	
38,35		1	2	Coinc. zweifelhaft. Cr verschoben n. V.
——	**5634**,16			
28,87		2.3	1	⊙-Lin. äusserst schwach; fehlt bei R.
——	**5487**,96			
5480,71		2.3	1	
64,16		2.3	1	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
——	**5447**,12			
5442,61		2	—	
32,56		1	—	
——	**5409**,99			
09,99		6	2	
05,22		2	1	
00,82		3	—	Scheint nicht zu coinc. mit der ⊙-Lin. 00,73 (Fe).
5391,57		2	—	
90,60		2	1.2	
87,76		2.3	1	
87,17		2.3	1	
——	**5379**.77			
77,82		1	1.2	Coinc.?
73,92		1.2	1.2	
70,57		1.2	1	
68,73		1.2	1	
——	**5353**.59			
48,50		5	2.3	
45,98		5	2	
44,98		1.2	—	
40,66		2	1	
29,91		2.3	1	v.
29,30		3	2	v.
28,50		5	2	vv. Bei 28,56 eine bedeutende Fe-Lin. Coinc. nicht zu entscheiden wegen Verschwommenheit der Cr-Lin.
——	**5324**,37			
18,97		2	1	
13,05		2	1	
04,37		2	1	
00,90		3.4	1.2	
5298,43		5	2	
98,14		3	2	v.
97,52		3.4	2	v.
96,86		5	2.3	
——	**5296**,88			
93,57		1	—	
87,36		1.2	1	
80,48		1.2	1	
76,20		4	2.3	
75,85		3	2	
75,31		4	1.2	
73,57		2	2.3	Coinc. vielleicht nicht exact. ⊙-Lin. 73,53 gehört Fe. Die Fe-Lin. ist jedoch schwach.
72,17		2	1	
——	**5266**,73			

[1] Einstellung auf die Mitte der Dpl. 09,76 09 63.

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
5265,88		4	2	
65,31		2.3	1	
64,32		5	2.3	⊙-Lin. wahrscheinlich dpl. 64,45, 64,32. Die letztere Lin. scheint Cr zu gehören.
61,91		2	2	Nicht genaue Coinc. $\Delta\lambda$ = + 0,05. Für die Sonnenlinie finde ich 61,86. R. hat 61,88. K. u. R. geben hier eine Ca-Linie.
55,27		3	1.2	
55,08		2.3	2	
47,68		4	2	
43,53		2	1	
41,62		1	—	?
40,62		1	1	Deutliche Coinc. R. hat hier keine Linie.
39,13		2	1	
——	**5233**,12			
28,25		1.2	1	
27,04		1.2	3	Sehr nahe coinc. mit einer Fe-Lin. Wahrscheinlich nicht Fe, weil von der starken Fe-Lin. 27,40 keine Spur zu sehen ist. Möglicherweise ist auch die Coinc. mit ⊙ nicht absolut.
25,98		1.2	1	
25,17		1.2	1.2	Enge dupl. sowohl in der ⊙ wie bei Cr.
25,08		3	2	
24,70		1.2	1	
24,22		1	1	
22,83		1	1	
21,90		2	1.2	
21,06		1.2	1	
14,30		1.2	1	
08,58		6	4	⊙ dpl. 08,77 / ,60 Coinc. exact mit 08,60. Die erste Comp. gehört Fe. K.-R. geben 08,78. Die Cromlinie vv. umgekehrt.
06,20		6	—	vv. Umgekehrt.
04,67		6	—	vv. Umgekehrt. ⊙ dpl. 04,75 = Fe / ,67 = Cr
——	**5202**,49			
00,33		1.2	1	
5196,60		3	1	
93,66		1.2	1	
92,17		2.3	1	
84,73		2	1.2	Coinc. mit einer schwächeren Ni-Lin.
77,58		2	1	
—	**5173**,91			

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
5166,41		2.3	2	Möglicherweise zur ⊙-Lin. etwas verschoben $\lambda_{\odot}$ = 66,47
61,98		1.2	1	⊙-Lin. deutlich, bei R. kaum sichtbar.
——	**5146**,67			
44,87		1.2	1	
42,46		1	—	
39,82		2.3	1	⊙-Lin. ein schwacher Begleiter der starken dpl. 39,65, 39,45.
——	**5126**,37			
23,64		2	1	
22,98		1	—	
22,30		1.2	1	
13,31		1.2	1	
12,70		1	—	
10,93		2	1	
——	**5090**,96			
5092,08		1	1	
——	**5083**,53			
78,92		1	—	
73,10		2	1.2	
68,50		1	1	
67,90		2	1.2	
66,10		1.2	1.2	Coinc. vielleicht nicht absolut genau.
——	**5050**,01			
52,10		2	1	
48,96		1	—	⊙-Lin. 49,03 = Ni. Die Ni-Lin. deutlich getrennt von der Cr-Lin.
——	**5020**,20			
22,12		1	1	
13,48		2.3	1.2	
04,60		1	1	
——	**4994**,31			
4986,16		1	1	
——	**4981**,90			
65,02		2.3	1	
54,92		3	1	
53,87		1	—	
42,63		3	2	
36,51		3	1.2	
——	**4934**,24			
30,36		1.2	—	
22,40		3.4	2	
21,11		2	1.2	
03,40		2.3	—	Coinc. nicht mit der ⊙-Lin. 03,48 = Fe. K.-R. geben 03,47.

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
——	**4890**.94			
4888,69		2	?	Coinc. nicht mit 88,78 (Fe). K.-R. geben 88,76. Die ⊙-Lin. scheint jedoch bei 88,70 einen schwachen Begleiter zu haben.
87,15		3	—	
86,11		1.2	1	
84,92		2.3	1	
85,12		1.2	—	
74,81		1	—	Cr.?
70,96		3.4	2	Ni hat eine Linie bei 71,00 getrennt von der Cr-Lin.
62,00		3	1.2	
61,38		2	?	Fällt in der Nebulosität von F.
——	**4859**.93			
57,50		1	—	Ni hat eine Lin. 57,59 deutlich getrennt von Cr. Bei 57,47 eine schwache Fe-Lin. (K.-R.).
55,32		1	—	
51,65		1.2	1	
48,39		1	1.2	
37,00		1.2	1	
31,79		1.2	1	
29,50		3	2	
24,31		1	2	
24,10		1	—	
——	**4824**,31			
16,31		1.2	—	Die Cr-Lin. hat einen Begleiter u. R.
14,44		1.2	1	Rowland hat eine schwache ⊙-Lin. wahrscheinlich dpl.
10,91		1.2	1	
06,44		1.2	1	
——	**4805**,25			
01,17		3	2	
4796,29		2	1	
92,61		3	2	
90,44		2	1	Coinc. sicher. Vier schwache ⊙-Lin. bilden eine Gruppe, in der die brechbarste 90,60 Fe gehört.
89,45		3.4	2.3	
83,16		1.2	1	v.
75,25		1.2	1	
74,63		1	—	
70,80		1	1	
67,98		2	1	
67,40		1.2	1	
66,77		2	1	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4764,81		1.2	1.2	Coinc. nicht völlig sicher.
64,45		2.3	1.2	
61,43		1	1	
57,76		1.2	1.2	Auch eine Fe-Lin. Beide gleich stark.
57,49		1.2	?	⊙-Lin. fraglich.
56,30		3	1.2	
55,36		1.2	1	⊙-Lin. dpl. Coinc. mit der brechbareren Comp.
54,95		1.2	1.2	Coinc. mit einer Ni-Linie. Vielleicht $\lambda_{Cr} > \lambda_{Ni}$.
——	**4754**,22			
54,10		1	—	
52,27		2.3	1.2	Auch eine schwache Ni-Lin.
45,48		2	1	⊙ dupl. 45,50, 45,30.
43,30		1	—	
41,27		1	—	
37,50		3	1.2	
30,88		3	1.2	
29,89		2	1.2	
——	**4727**,62			
27,33		2.3	1.2	
24,60		2.3	1.2	
23,28		2.3	1.2	
22,90		1.2	1	
18,57		4	2	
17,87		1.2	—	Coinc. nicht mit 17,80.
08,16		4	2	
06,25		1.2	—	Rowland hat hier 3 feine Linien, welche in III. Ordnung wahrnehmbar sind, aber nicht in II. Ordnung. Coinc.?
——	**4703**,98			
00,77		2	1	
4699,76		1.2	—	
99,12		1.2	—	
98,77		3	—	Coinc. mit zwei Comp. der Tripl. 98,95, 98,80, 98,60. Auch eine schwache Co-Lin. liegt bei 98,60, scheint aber brechbarer zu sein als die Cr-Lin. K.-R. geben bei 98,57 eine schwache Fe-Lin.
98,60		3	—	
97,57		1.2	—	
97,20		2.3	1.2	
95,32		2	1	
94,12		2.3	1	
——	**4690**,32			
89,54		3	1.2	⊙ dpl. 89,65 ,50

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4686,38		1. 2	2	Bei 86,40 eine bedeutende Ni-Linie. Wahrscheinlich jedoch $\lambda_{Ni} > \lambda_{Cr}$.
84,77		1. 2	1	
81,01		2	1	
80,65		2	1. 2	
73,30		1. 2	2	⊙ hat eine enge dpl. 73,40, 73,30. Die Cr-Lin. v. Vielleicht nicht völlige Coinc. K.-R. geben bei 73,35 eine Fe-Lin.
69,86		1. 2	1	s.
69,50		2. 3	1	⊙-Lin. ein schwacher Begleiter zu 69,30 (Fe).
——	**4668**,30			
67,36		2	—	Zwischen den ⊙-Lin. 67,45, 67,15.
66,67		3	1. 2	
66,35		2. 3	1. 2	
66,07		2. 3	1. 2	
64,94		3	2	
63,98		3	1. 2	⊙ dpl. 64,00, 63,90. Coinc. mit der ersten Comp.
63,47		3	1. 2	⊙-Lin. die mittlere Comp. einer engen Tripl.
57,00		1. 2	—	
56,61		1. 2	2	
56,34		2	1	
59,90		2. 3	—	Keine ⊙-Lin.
54,24		2	1	vv.
52,31		4. 5	2	
51,44		4. 5	2	
49,58		2. 3	1. 2	⊙-Lin. die erste eines schwachen Liniengitters zwischen 49,60—50,70.
49,04		2. 3	1. 2	⊙ enge dpl.
48,27		2	—	
48,00		1. 2	1. 2	
46,96		1. 2	1	⊙-Lin. eine schwache Comp. der dpl. 46,95, 46,85. Die Cr-Linie hat auch einen schwachen Begleiter n. R.
46,33		4. 5	2	
——	**4643**,64			
42,21		1. 2	—	
39,85		1. 2	2	
39,69		2	1	
37,92		2. 3	1	
37,35		2. 3	1	
34,23		1. 2	2	
33,45		2	1	
32,32		2	1	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
——	**4629**,50			
4627,83		1	1	
26,31		4	2	
26,07		1. 2	1	
25,46		1	—	
22,89		2	1	
22,60		3	1. 2	
22,07		3	1. 2	
19,70		2. 3	1	
16,28		4	2	
14,92		1. 2	?	Bei ROWLAND Spur einer ⊙-Linie.
14,70		1. 2	?	Ebenfalls. — Auch eine sehr schwache Ni-Linie.
14,34		1. 2	1. 2	
13,54		3. 4	2	⊙ dpl. 13,54. 13,35.
12,15		1. 2	—	
——	**4611**,44			
10,07		1. 2	1	
06,55		1. 2	—	
01,18		2	1. 2	⊙-Lin. dupl. Coinc. scheint mit der Comp. n. V. stattzufinden.
00,92		4	2. 3	
00,25		2. 3	1. 2	
4598,60		1. 2	1	
95,78		3	1	
94,57		1. 2	—	
91,56		4	2	⊙ dpl. 91,55, 91,70.
90,88		1. 2	—	
——	**4590**,12			
88,38		1. 2	2	
86,31		2	—	Zwischen 86,40—86,05.
85,23		1. 2	—	
85,08		1. 2	—	
84,25		1. 2	—	
84,02		1. 2	?	Vielleicht eine schwache ⊙-Linie.
81,22		1. 2	—	
80,22		3. 4	2	
78,55		1. 2	—	
75,26		2	—	
74,63		1	1	
71,85		3	1. 2	Begleiter n. R. λ 71,96.
71,27		1. 2	2. 3	
——	**4571**,27			
69,76		3. 4	1	⊙ dpl. wahrscheinlich auch Cr.
65,71		3	1. 2	⊙ die mittlere der Tripl. 65,90, 65,67, 65,50. 65,90 = Fe. K.-R. geben 65,87.

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4564,36		2	1	
63,82		2. 3	—	
63,43		1. 2	1	
——	**4563**,94			
58,81		2	2	
56,32		2. 3	2. 3	
55,45		1. 2	—	
54,98		2	—	
54,10		1. 2	—	⊙ hat eine Lin. 54,22 = Fe.
46,15		4	2	
45,51		2. 3	1	
44,77		3. 4	2	⊙ enge dpl. 44,85 44,75. Coinc. mit der letzteren.
43,99		1. 2	1	
42,83		2	1	⊙ enge dpl.
41,70		2	1. 2	
41,25		2. 3	1	
40,90		4	2	
40,70		4	2	
39,96		3	1. 2	
35,95		4	2. 3	
35,36		2. 3	1	
30,92		4	2	
30 04		2. 3	—	
27,65		2. 3	1	
27,53		3	2	
26,65		4	2. 3	⊙ dpl. 26,75 26,65. Coinc. mit der letzteren.
26,26		2. 3	1	
25,01		2	—	Wahrscheinlich keine Coinc. mit der schwachen ⊙-Lin. 25,07.
22,18		1. 2	—	
21,30		2+	—	
15,60		2+	—	Bei 15,50 ⊙-Lin. — Keine Coinc.
14,64		2. 3	2	v. Auch die ⊙-Lin. v. — Cr hat einen Begleiter u. V. ohne entsprechende ⊙-Lin.
12,05		3	1	
——	**4508**,45			
07,00		2+	1	Bei Rowland keine ⊙-Lin. Eine schwache solche scheint jedoch vorhanden zu sein.
01,92		2	1	
01,24		2. 3	1	
00,42		2. 3	1. 2	
4498,87		2+	1	
97,02		3. 4	2. 3	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4495,42		1. 2	—	Cr?
——	**4494**,72			
92,45		2. 3	1	
91,99		1. 2	1	
91,81		2	1	v.
90,70		1. 2	1	v.
89,60		2	1	
88,18		2	—	
83,01		2	1	⊙-Lin. ein schwacher Begleiter zu 82,95.
81,57		1. 2	—	Cr?
80,40		1. 2	1	Dpl.
75,47		2	1	v. ⊙ schwach. Coinc. deutlich. Bei 75.47 haben K.-R. eine schwache Fe-Lin.
73,91		1. 2	—	
67,72		1. 2	1	⊙ nur Spuren.
66,33		1. 2	—	
65,54		2	1	
65,31		1	1	
65,08		2	—	
64,84		1. 2	2	⊙ dpl. 64,92 (Fe) 64,84 (Cr). K.-R. haben 64,93.
62,98		1. 2	—	
60,95		1. 2	1	
59,95		2+	1. 2	
59,56		1. 2	1. 2	
58,75		2. 3	1. 2	
——	**4447**.90			
43,90		1. 2	2. 3	Coinc. vielleicht nicht exact.
42,43		1. 2	—	⊙ hat eine Linie 42,50 (Fe). K.-R. geben 42,51.
32,93		1	—	
32,30		2. 3	1. 2	⊙ v.
30,59		2	—	
3),07		1. 2	—	⊙ hat hier eine verschwommene Bande. Coinc.?
28,71		2	1. 2	
27,85		1	?	
25,27		1	1—	⊙-Lin. äusserst schwach.
24,40		2. 3	1. 2	⊙-Lin. v.
24,20		1. 2	1	
23,46		1. 2	—	
22,84		1. 2	—	Keine ⊙-Lin. Fe hat 22,80.
21,12		1	—	
19,26		1	1	Hier 4 äusserst schwache ⊙-Lin.
14,00		2	1. 2	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4412,42		2	1.2	
11,26		2	1.2	
11,15		1.2	?	
10,47		2	1*	⊙-Lin. eine schwache Comp. einer Tripl. Coinc. deutlich.
——	**4407**,85			
06,45		1	—	
03,68		2	1	
03,55		2	1.2	
4399,97		1.2	2.3	
97,40		2	1	
95,58		1.2	—	Coinc. nicht mit der ⊙-Lin. 95,60.
95,00		1	1	⊙ v.
93,66		1.2	1.2	
92,41		1	1	
91,90		2.3	2	⊙ enge dupl. 92,05 91,90.
87,64		2+	—	⊙ hat eine Tripl. 87,75. 87,65. 87,55.
87,54		1.2	—	
85,11		4	2	
83,04		1.2	—	Zwischen 83,10 82,95. — 83,10 schwache Ni-Lin.
81,25		2	1	
80,73		1	1	
79,93		1.2	1.2	
77,73		1.2	1	
76,95		2	1.2	Coinc. sehr nahe mit einer Fe-Lin., scheint jedoch davon getrennt zu sein. K.-R. geben 76,94.
——	**4376**,10			
75,52		2.3	1	
74,34		3	2.3	
73,83		1.2	—	Cr-Lin. deutlich getrennt von Fe 73,70. K.-R. geben 73,72.
73,41		3	1.2	
71,44		4	2	
68,42		1.2	1	Bei 68,47 eine Ni-Lin.
63,25		2.3	2	
60,17		1.2	—	
59,78		4	2.3	⊙ enge Tripl. Die mittlere stärkste Comp. scheint Cr zu gehören.
58,86		1	1.2	Cr?
57,70		1.2	1	
56,91		1.2	1	
——	**4352**,91			
51,91		5	3	⊙ dpl. 51,90 52,10.
51,20		4	2	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4347,00		2.3	1.2	
44,66		4.5	2.3	
43,32		1.2	—	
40,26		2.3	1	⊙-Lin. äusserst schwach.
39,85		4	2	
39,60		4	2	
38,95		1.2	1	
38,56		1.2	1	
37,70		2.3	2	
37,38		2	1.2	
32,75		1.2	1	
25,24		1.2	—	Scheint zu liegen zwischen 25,20 25,32, aber ohne entsprechende ⊙-Lin.
23,70		2	2	⊙-Lin. v.
21,80		2	1	
21,44		1.2	—	
20,75		1.2	1	
19,82		2	1	
——	**4318**,83			
12,65		1.2	2	Cr?
07,65		1.2	2	
05,61		2	2	Auch Fe und Sr haben hier Linien.
02,95		1.2	2	
01,33		2	1	⊙-Lin. schwach. Begleiter zu 01,23.
00,68		2	2	
4299,87		2	—	Keine ⊙-Lin.; die Cr-Lin. liegt zwischen 4300,00 u. 4299,80.
97,91		2.3	1	
97,21		2	—	
96,81		1	2.3	⊙-Lin. scheint dpl. Coinc. mit der Comp. u. V.
96,47		1	1	
95,92		2.3	1.2	⊙ dpl. 96,05 95,92.
93,73		2	1	⊙-Lin. sehr schwach.
——	**4293**,25			
92,14		2	2	⊙-Lin. scheint dpl. Coinc. mit der Comp. u. V.
89,87		6	3	Cr-Lin. umgekehrt vv.
84,99		1.2	1	
84,84		1.2	1	Ni hat eine ziemlich starke Linie ganz in der Nähe u. V.
80,53		2.3	1.2	
74,91		6	3.4	Umgekehrt vv.
73,04		2	1.2	
71,18		2	—	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4270,08		1.2	1.2	⊙-Lin. dpl. 70,08 69,95.
68,90		1.2	1.2	
——	**4267**,94			
66,96		1	1	
63,28		3	1.2	
62,53		1.2	1	
62,27		1.2	?	Von ⊙-Lin. nur eine Spur.
61,77		1.2	—	
61,49		2.3	1	
55,65		2	1.2	
54,49		6	3.4	Umgekehrt vv.
——	**4254**,49			
52,37		2	—	⊙ hat 52,45 (Ni) getrennt von der Cr-Lin.
48,84		1.2	2	
48,47		1.2	1	
40,82		2.3	1.2	
39,08		2.3	1	
37,83		1.2	1	
34,64		1.2	1	
33,00		1.2	1.2	K.-R. geben eine schwache Fe-Lin. bei 32,97. Die Linien sind von einander getrennt.
32,35		1.2	1—	
30,61		2	1—	⊙ dupl. 30,75 30,60 äusserst schwach.
24,64		2	2	s. Auch bei Fe, aber sehr schwach. K.-R. geben 24,67.
22,89		2	1	
——	**4222**,37			
21,71		2	—	
17,75		2.3	—	⊙ hat eine Lin. 17,70 = Fe. K.-R. geben 17,73. Die Linien scheinen getrennt.
16,50		2	1	Bei 16,16 fängt eine Cannelirung der Kohle an.
13,31		1.2	1	
12,77		2	2	
11,47		2	1—	
09,90		2	1—	
09,50		2.3	1	
08,50		2	1	
07,05		1.2	1—	
04,61		2	1	
04,37		1.2	1	
03,71		2.3	2	
00,27		2	1	⊙-Lin. äusserst schwach.

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
——	**4199**,25			
4198,65		2.3	?	⊙-Lin. fraglich.
97,38		2	1	⊙ hat 97,50 97,40. — Bei 97,25 Anfang einer Cannelirung der Kohle.
95,09		2		
93,80		2	1	
92,25		2	—	s. Keine ⊙-Lin.
91,90		1.2	—	Keine ⊙-Lin. Bei 91,80 hat ⊙ eine klare Lin. = Fe (K.-R.: 91,77). Diese Metalllinien deutlich getrennt.
91,41		2	1	
90,32		2	1—	⊙ hat drei schwache Linien 91,45 91,30 91,15.
86,50		1.2	1.2	
85,50		1.2	1—	
——	**4185**,05			
79,37		2.3	1 2	
76,09		2	1.2	
75,84		1.2	–	
74,98		2.3	1	⊙ hat 75,04 = Fe deutlich getrennt von der Cr-Lin. K.-R. geben 75,04.
72,88		2	2	Auch eine Fe-Lin.
71,81		2	2	
70,31		2	?	
69,94		2	?	Vielleicht eine schwache ⊙-Lin. als Begleiter zu 69,96 = Fe. Die Metalllinien getrennt.
65,67		2.3	?	
63,76		3	2	
61,55		2.3	1	
——	**4157**,94			
53,96		3		54,05 = Fe gut getrennt an der Cr-Lin. K.R. geben 54,10.
53,20		1.2	1	
52,89		1.2	1	
46,81		1.2	1	
42,31		1.2	1.2	Ni hat hier auch eine schwache Linie.
31,50		2	1	
28,53		1.2	1 –	⊙-Lin. nur Spur.
27,77		2	2	
27,44		2	1	
27,05		1.2	—	
26,67		3	1.2	
26,25		1.2	—	
23,55		2	1	
22,34		1.2	1	
21,96		2	2	Auch Fe. (K.-R.: 21,94.)
——	**4121**,96			

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4121,41		2—	—	Ni hat bei 21,45 eine starke Linie.
20,78		2	1	
09,74		2—	1	
08,54		1. 2	—	
04,90		2	—	
——	**4103**,10			
01,31		1. 2	1	
4099,16		1. 2	1	⊙ hat 99,30 99,16.
90,43		1. 2	1	
85,15		1	2	Coinc. mit Fe. Bei 85,40 hat Fe eine ebenso starke Linie, wovon jedoch Cr-Spectrum nichts zeigt. K.-R. geben 85,44 85,13.
——	**4083**,75			
81,88		1	—	
80,35		1. 2	2	Auch bei Fe. Andere stärkere Linien des Fe kommen in Cr nicht vor, daher wohl 80,35 keine Fe-Verunreinigung des Cr. K.-R.: 80,36.
71,81		2	—	
77,21		2	1	
76,20		2	—	
75,01		1. 2	1	⊙ hat 74,95 = Fe. K.-R.: 74,93.
71,13		1	—	
67,94		1	1	
67,05		3	—	⊙ hat 67,12 = Fe. K.-R.: 67,10.
65,84		2. 3	1	
60,77		1. 2	1—	
58,89		2. 3	2	
56,93		1	—	
56,17		1. 2	1	
——	**4055**,69			
51,47		1. 2	1	
50,18		1	2	
49,90		1. 2	1. 2	
48,94		2. 3	—	⊙ hat 48,88 = Fe. Keine Coinc. — ⊙ dpl. gehört wahrscheinlich Fe und Ni.
46,89		1	1	Auch bei Ni. Vielleicht gemeinsame Verunreinigung.
44,24		1. 2	1	
43,85		1. 2	1	
42,40		1. 2	1	
39,21		2 3	1. 2	
37,43		1. 2	1	
33,44		1. 2	—	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
4031,26		1. 2	1	
30,82		2	—	⊙ hat 30,87 = Fe. Cr und Fe deutlich getrennt. K.-R.: 30,90.
28,22		1	1	
——	**4029**,79			
27,24		2	1. 2	
26,30		2	1. 2	
25,60		1	1. 2	
25,14		2	1	
23,90		1. 2	1. 2	
22,38		2	1. 2	
18,36		1	—	Zwischen 18,40 18,25, welche Fe gehören. K.-R. geben 18,42 18,27.
16,95		1	1	
14,85		1	—	
12,63		2	—	
04,11		1	—	
——	**4003**,91			
01,58		2	1. 2	
3999,85		1	—	
94,10		1. 2	1. 2	
92,95		2. 3	2	
91,81		2. 3	3	
91,26		3	2	
90,14		2	1	⊙-Lin. ein schwacher Begleiter zur Dpl. 89,95.
84,48		2. 3	2	
84,02		3. 4	3	⊙ sehr eng dpl. Comp. u. R. 84,15 = Fe.
81,37		2	1	
79,99		1. 2	1—	
78,81		2	2	
——	**3977**,89			
76,81		4	3. 4	⊙ enge Dpl. Comp. u. R. = Cr. Die zweite Comp. entspricht einer unbedeutenden Fe-Lin.
72,85		1	—	
71,39		4	—	⊙ hat 71,45 = Fe deutlich getrennt von der Cr-Lin. K.-R.: 71,47.
69,89		3. 4	2	⊙-Lin. liegt in dem intensiven Schatten von H.
69,20		2	?	⊙ 69,40 = Fe. Cr-Lin. hat vielleicht auch eine entsprechende ⊙-Lin.
63,82		3. 4	2	
60,95		1	—	
——	**3954**,00			

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
3953,34		1.2	2	⊙ hat 53,35 53,15. Die erste gemeinsam für Cr u. Fe, beide unbedeutende Linien.
52,56		1.2	1	
51,93		1	1—	
51,26		1.2	—	
46,15		1.2	1	
45,68		1	—	
41,66		2.3	2	
——	**3926**,13			
28,79		4	1.2	
26,80		2	—	
23,51		1	—	
21,20		3.4	2	
20,25		1.2	—	
19,31		4.5	2	⊙ dpl. 19,30 = Cr. 19,20 = Fe. K.-R : 19,24.
17,75		1.2	1	
17,15		1—	1—	
——	**3916**,88			
16,38		3	1.2	
15,96		3	2	v.
15,65		1.2	1	
14,45		1.2	2	
08,87		3.4	2	
07,91		2	1	
07,40		1	—	
03,30		2.3	—	
03,02		3	—	Keine Coinc. Bei 03,10 eine ⊙-Lin. = Fe. K.-R. geben 03,12.
02,22		2	—	v.
3897,83		2.3	—	v.
——	**3897**,60			
94,20		3	2.3	⊙ dpl. Comp. n. R. = Cr; n. V. = Co. K.-R.: 94,15. Fe unbedeutend. Verunreinigung.
92,07		2	2	v.
86,94		3	1.2	
85,35		3	2.3	
83,78		2	1	
83,41		3	—	Fällt in eine starke Bande der ⊙. Auch Coinc. mit einer Fe-Lin. 83,39 (K.-R.).
81,37		2	—	v.
79,39		2.3	2	v.
——	**3875**,24			
68,41		1.2	1	
3865,73		1.2	—	Deutlich getrennt von der Fe-Lin. 65,65.
62,68		1.2	1	⊙ dpl. 62,70 62,60.
60,23		1.2	—	
57,74		3	--	Scheint nicht der starken ⊙-Lin. bei 57,80 zu entsprechen.
56,40		2	?	
55,75		2.3	2	
55,41		2	2	
54,36		3	1.2	
53,33		1.2	1	
52,33		2	1.2	
50,13		3.4	—	v. Coinc. nicht mit 50,10 = Fe. Die beiden Metalllinien deutlich getrennt. K.-R. geben 50,11.
49,66		2	1.2	v.
49,48		2.3	1.2	v.
49,15		2.3	2	v.
——	**3843**,40			
41,42		3.4	1.2	
36,22		2	2	
34,88		2.3	1	
33,62		1	?	
31,15		2.3	2	
30,17		3.4	1	v.
26,55		3	1.2	v.
25,54		2	1.2	v.
23,64		2	2	
22,22		1	2	
21,71		1.2	1	
——	**3821**,32			
21,00		1.2	1	
20,11		1	—	
19,68		2.3	—	Zwischen den ⊙-Lin. 19,75 19,60. Fe hat eine Linie 19,78 (K.-R.: 19,75) deutlich getrennt von der Cr-Lin.
18,61		2	1	
17,97		1.2	1	
16,30		2	?	Liegt in der Schattirung der ⊙-Lin. 15,90.
15,53		2.3	1.2	⊙-Lin. enge Dpl. im Schatten von 15,90. Coinc. mit der weniger brechbaren Comp.
14,74		2	—	Deutlich getrennt von der Fe-Lin. 14,84.
12,37		2	1	
08,06		2	1.2	
06,97		2	1	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
3806,68		1.2	?	
04,91		3	2	
3797,85		3	1	
97,28		2	1.2	Begleiter n. V.
94,75		2	1.2	
94,02		2	2	
——	**3794**,02			
93,46		2	2	
92,30		2	2	
91,51		2	1	
90,61		2	2	
90,36		1.2	1.2	⊙ dpl. 90,35 = Cr. 90,20 = Fe.
89,87		1.2	—	
89,00		2	1	
86,38		1	—	Zwischen ⊙ 86,30 86,45. Die erste = Fe. Fe und Cr deutlich getrennt.
——	**3770**,12			
69,13		1	1	
68,85		2	2	s. Cr-Lin. dpl. Comp. n. V. schwach.
68,37		2.3	2	s.
68,23		1.2	—	Getrennt von der Fe-Linie 68,15.
67,56		1.2	—	
58,14		2	1.2	
57,80		2.3	2	
57,28		1.2	1	
55,97		1	—	
——	**3754**,65			
49,13		3	2.3	⊙-Lin. wahrscheinlich dpl. Comp. n. R. = Cr. » n. V. = Fe.
48,73		2	1	
47,40		1.2	1	
44,63		2	2	
44,01		3	2	
43,67		3	2	Fällt in die Schattirung von 43,45 (= Fe).
43,08		2	2	
——	**3732**,54			
32,15		2	1.2	
30,91		2	2	
16,65		1.2	—	v. Getrennt von der Fe-Lin. 16,57.
——	**3695**,19			
3696,02		1	1	
89,76		1.2	—	Liegen neben der Fe-Linie 89,55.
89,41		1.2	—	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
3688,56		1.2	2	Auch Fe. Ob Verunreinigung?
88,24		1	1	⊙ dpl. 88,25 88,10.
87,65		2.3	—	v. Zwischen 87,70 87,50 welche Fe gehören.
87,41		2.3	—	v.
86,95		2.3	1.2	v.
85,70		2	1.2	v.
83,60		1.2	—	s.
81,81		1.2	1.2	s.
81,12		1	1	
80,34		1	—	
79,93		1.2	—	s. In der Schattirung von 80,05 = Fe. Die Metalllinien deutlich getrennt.
79,20		1.2	1.2	s.
78,00		1.2	2	
68,17		1.2	1.2	s. Auch eine unbedeutende Fe-Lin. Gemeinsame Verunreinigung?
——	**3667**,40			
66,78		2	?	
66,30		1	—	s.
66,10		1.2	—	s.
63,35		2.3	2	Ganz nahe einer unbedeutenden Fe-Lin. ($\Delta\lambda = 0{,}05$). Die Linien jedoch scharf getrennt.
62,97		1.2	2	
56,36		3	2	
54,05		2.3	2	
49,97		1	1	
49,12		3	1.2	
48,65		1.2	1	
46,26		1.2	1.2	
41,95		3	1.2	
41,61		2	1.2	
——	**3640**,53			
39,93		3.4	1.2	
36,72		2.3	2	⊙ Tripl. 36,85 (Fe) 36,72 (Cr) 36,60.
35,37		1	?	
35,09		1	2	⊙ vielleicht dpl.
32,92		2	1.2	
15,76		1.2	1.2	In der Nähe eine schwache Linie (Fe), aber keine Coinc.
13,78		1.2	?	
12,70		1.2	—	s.
——	**3612**,21			
10,17		1.2	—	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
3609,62		1.2	1.2	
08,52		1.2	?	
05,46		6	4	vv. Umgekehrt. ⊙-Linie starke Dupl. 05,62 (Fe) 05,45 (Cr).
03,86		2	?	v. Zwischen zwei starken ⊙-Lin.
02,68		1	?	Ganz in der Nähe eine starke Fe-Lin. 02,60.
01,76		2.3	1	
3599,51		1	1	
93,57		6	3.4	vv. Umgekehrt. ⊙ dupl. 93,62. 93,47.
84,45		2.3	?	vvv. Bande.
——	**3583**,48			
82,74		1.2	1.2	
78,81		6	4.5	vv. Umgekehrt.
75,10		2	2	Liegen in einer verschwommenen Bande.
74,93		2.3	1	
74,19		2	1	
73,79		2.3	?	⊙ hat 73,98 (Fe) 73,80. Coinc. fraglich.
72,90		2	1	
69,28		1	—	
66,23		2.3	?	vvv.
65,31		1	—	
64,87		1.2	1	
——	**3564**,68			
64,44		1	?	
62,57		1	—	
62,40		1	1	
59,90		1.2	1	
58,74		2.3	—	vvv.
56,27		1	1	

Chrom λ	R.	I Cr	I ⊙	Bemerkungen.
3555,88		1	1	
54,10		1	—	
52,85		2	—	vv
50,73		2.3	2	v
48,95		1.2	—	vv
——	**3540**,27			
33,04		1	—	
27,22		1	1	
——	**3518**,48			
11,93		1	1.2	
10,66		1.2	—	Bei 10,55 eine schwache Fe-Lin. deutlich getrennt.
3495,08		1.2	1	
——	**3491**,47			
88,60		1	1	
83,92		1	2.3	
81,66		1.2	1.2	
81,41		1.2	1.2	
——	**3464**,61			
67,86		1.2	2	
65,40		1.2	1	s.
60,60		1	?	
55,76		1.2	1.2	
——	**3455**,38			
53,46		1.2	1.2	
47,90		1	1	
47,55		1.2	1.2	Bei 47,40 eine unbedeutende Fe-Lin.
47,15		1	1.2	
45,71		1.2	1.2	
41,56		1.2	1.2	
36,31		1.2	2	
33,72		1.2	4.5	
33,42		1	2	

Dass in der Sonnenatmosphäre Chrom in reichlicher Menge als Absorbent vorkommt ist eine schon längst bekannte Thatsache, welche durch die Angaben dieses Catalogs noch zum Ueberfluss bestätigt wird. Indessen ist die Coincidenz der Chromlinien mit entsprechenden Linien der Sonne nicht generell, sondern es findet sich eine namhafte Anzahl Fälle, in denen dieselbe sich nicht hat nachweisen lassen. Zählt man die Coincidenzen und die Nicht-Coincidenzen ab und ordnet dieselben nach der Intensität der Metalllinien, so gelangt man zu der folgenden Uebersicht:

I.	Anzahl der Fälle von	
	Coincidenz.	Nicht-Coincidenz.
1—1.2	213	129
2—2.3	228	62
3—3.4	74	8
4—4.5	31	0
5—6	16	0
Summe	**562**	**199**

Man sieht, dass die Nicht-Coincidenzen hauptsächlich die schwächsten Linien betreffen. Werden diese als wirklich verbürgte Chromlinien angesehen, so würde vom ganzen Spectrum die Coincidenzen etwa 74 %, die Nicht-Coincidenzen 26 % betragen. Indessen unterliegt es kaum einem Zweifel, dass von diesen schwachen Linien noch eine gewisse, vielleicht nicht unbedeutende Anzahl dem Chrom fremd sind, obgleich es zur Zeit nicht möglich ist hierüber Gewissheit zu erlangen. Um daher die Umstände des Vorkommens des Metalls in der Sonne zu beurtheilen, dürfte man der Wahrheit näher kommen, wenn vorläufig die schwächste Intensitätsclasse ausgeschlossen bleibt, wodurch die Procentzahl der Coincidenzen und Nicht-Coincidenzen sich resp. auf 84 und 16 stellt. Jedenfalls können die stärksten und am meisten characteristischen Chromlinien als in der Sonne sicher vorhanden angesehen werden.

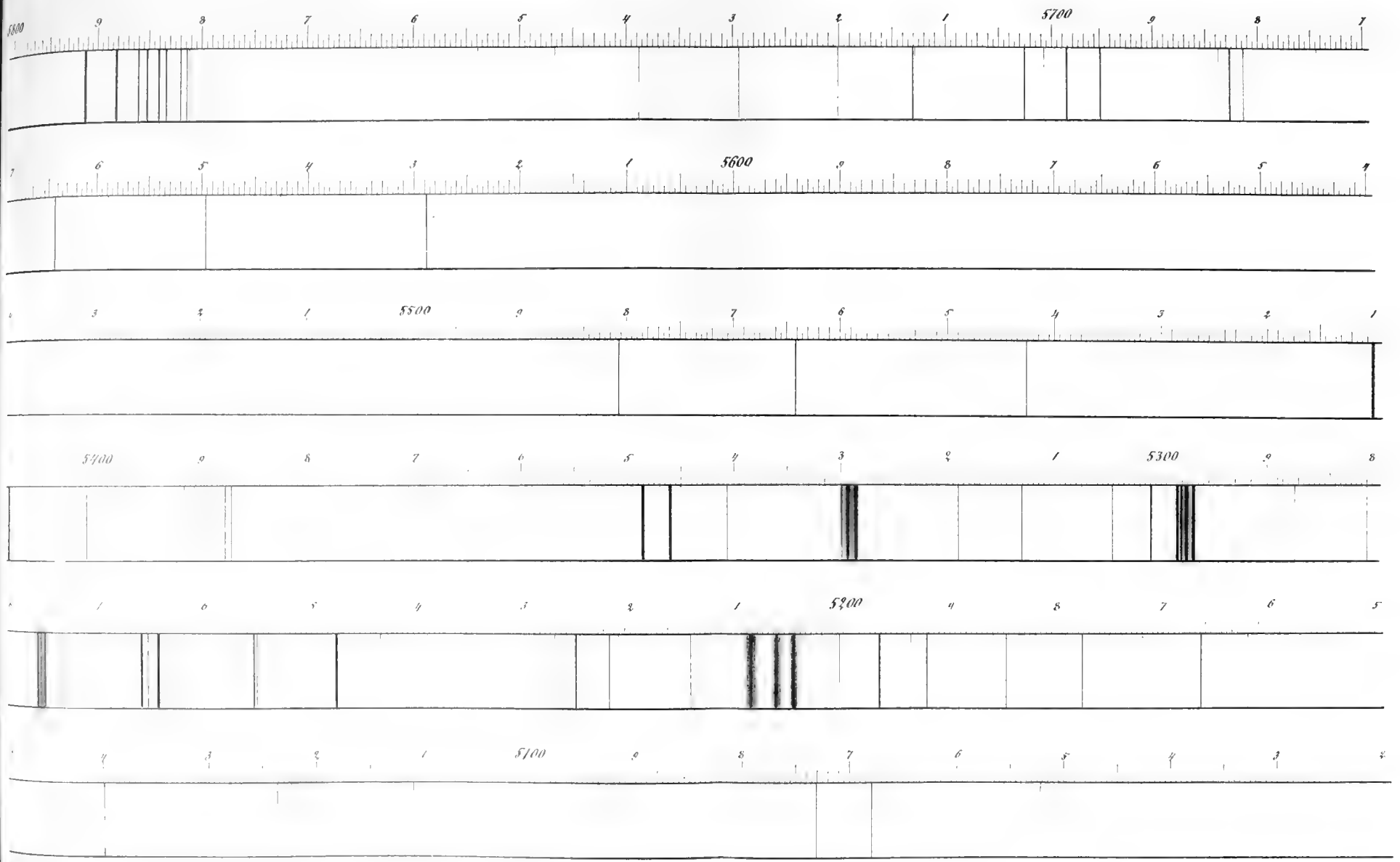
Vergleicht man die Intensitäten der Chromlinien mit denjenigen der entsprechenden Absorptionslinien im Sonnenspectrum, so lässt sich allerdings in vielen Fällen eine Uebereinstimmung constatiren, in anderen aber, und zwar in der Mehrzahl, ist dies nicht der Fall. Bei der bekannten Abhängigkeit der Spectra in dieser Hinsicht von den Temperaturverhältnissen des strahlenden Dampfes — ich erinnere nur an die oben bemerkten Unterschiede zwischen dem vorliegenden Spectrum und den THALÉN'schen Beobachtungen im Inductionsfunken — ist dies kaum befremdend, da eine künstliche Reproduction der solaren Verhältnisse uns bisher nicht möglich ist und wahrscheinlich niemals auch nicht einmal annäherungsweise möglich sein wird. Sucht man nach einem Grund zu den zwischen dem Sonnenspectrum und den Spectra unserer irdischen Elemente in dieser und anderen Beziehungen beobachteten Differenzen, so wird man jedenfalls in erster Linie mit dieser Thatsache zu rechnen haben, obgleich andererseits es nicht damit gesagt sein soll, dass dieselbe als die einzig wirkende oder als genügend angesehen werden kann. Jedenfalls sind wir noch immer weit davon entfernt für eine erfolgreiche Erörterung dieser Frage das nöthige Beobachtungsmaterial zu besitzen.[1]

[1] ROWLAND scheint bei seinen Beobachtungen eine bessere Uebereinstimmung zwischen den Intensitäten der Sonnen- und Metalllinien gefunden zu haben. Wie dem sein mag in Bezug auf andere Metalle bin ich augenblicklich nicht in der Lage aus eigener Erfahrung zu beurtheilen; für Chrom giebt es jedenfalls sehr viele Abweichungen. Den Grund hierzu in einer mangelhaften Auflösung enger Gruppen suchen zu wollen, wie es in Bezug auf LOCKYERS Beobachtungen von ROWLAND wohl mit Recht geschieht, ist hier offenbar nicht zulässig.

Erläuterung zu den Tafeln.

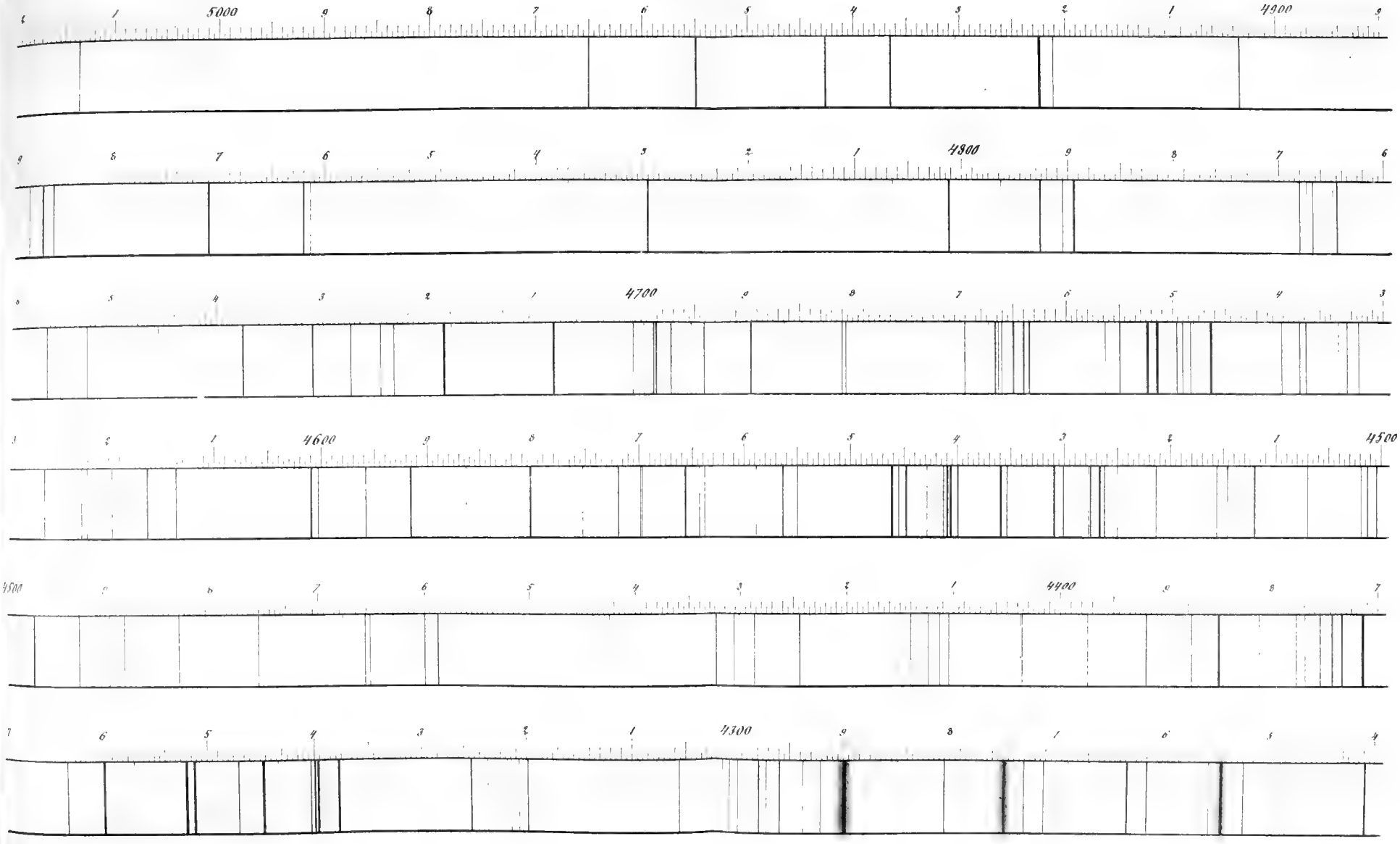
Obgleich der obige Wellenlängencatalog das Wesentliche der vorliegenden Untersuchung bildet, habe ich es jedoch für nicht überflüssig erachtet, demselben noch eine Zeichnung des Spectrums hinzuzufügen. Man gewinnt dadurch theils eine klarere Vorstellung von dem Spectrum, theils aber — und dies ist die Hauptsache — wird die Vergleichung mit anderen Spectra ganz ausserordentlich erleichtert. Handelt es sich z. B. darum, die Coincidenz oder Nicht-Coincidenz einer Chromlinie mit einer Linie von nahe identischer Position in einem anderen Spectrum, so ist auf dem Cliché, welches die beiden Spectra neben einander enthält, das Auffinden der betreffenden Linien ohne Zeichnung immer zeitraubend und häufig geradezu unmöglich, während mit Hülfe der Zeichnung keine Schwierigkeit in dieser Hinsicht entsteht. Die beste Abbildung wäre natürlich eine directe photographische Reproduction der Originalnegative, da jedoch eine solche nur mit Opfer der feineren Einzelheiten ausführbar ist, so habe ich es vorgezogen eine den Negativen sich möglichst genau anschliessende Handzeichnung in Lichtdruck zu reproduciren. Mit Rücksicht auf den oben angedeuteten Zweck dieser Tafeln fallen die kleinen Fehler in der Wiedergabe der Lage und des Aussehens der Linien nur sehr wenig ins Gewicht.

Spectrum des Chroms



Lipsiæ Gen Stab Lit Anst Stihle

Spectrum des Chroms



Ljustr. Gen. Stab. Lit. Anst. Stkhlm

Spectrum des Chroms

KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N:o 6.

JÄMFÖRELSE

MELLAN

MOLLUSKFAUNAN

I

MAMMILLATUS OCH MUCRONATA ZONERNA

I NORDÖSTRA SKÅNE
(KRISTIANSTADSOMRÅDET)

AF

BERNHARD LUNDGREN.

MED 2 TAFLOR.

TILL KONGL. VETENSKAPSAKADEMIEN INLEMNAD DEN 7 JUNI 1893.

STOCKHOLM, 1894.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

Såsom bekant hade redan Sven Nilsson i sitt för kännedomen om Sveriges kritbildningar så ytterst vigtiga arbete[1] påpekat, att de båda Belemnitarterna i Sverige ej förekomma tillsammans utan på skilda lokaler. Det var dock först genom Mobergs undersökningar[2] af förhållandena vid Istaby-Mörby och Ifö-Kjuge samt De Geers af de senare och dem vid Truedstorp-Hanaskog[3] som det kan anses säkert fastställdt, att kritsystemets lager i hvad som kallats Kristianstadsområdet kunna fördelas på två zoner (underafdelningar eller lag) näml. en undre, utmärkt genom förherrskande af Actinocamax mammillatus och sparsammare förekomst af Belemnitella mucronata, och en öfre, utmärkt af Belemnitella mucronata och saknaden af Actinocamax mammillatus. Denna klassifikation har sedermera blifvit allmänt antagen och De Geer anför (Beskrifning till kartbladen Kristianstad och Karlshamn) flera nya exempel på dessa zoners lagringsförhållande såsom vid Håsta och Sissebäck. Dessa zoner hafva äfven kallats Mammillatuskrita och Mucronatakrita eller *Ka* och *Kb*, för att begagna det på Sveriges Geologiska Undersöknings kartor använda beteckningssättet. I hvad mån denna en viss Belemnitarts förherrskande förekomst på vissa lokaler eller i vissa lager står i sammanhang med den densamma beledsagande faunan för öfrigt, vet man för närvarande högst obetydligt. De jämförelser mellan de de olika Belemniterna åtföljande andra arterna, som af Moberg gjorts för Istaby-Mörby och af De Geer för Truedstorp-Hanaskog, kunna ingalunda, så vigtiga ock särskildt de senare äro, anses hafva löst frågan, huruvida någon annan faunistisk skiljaktighet än den med afseende på Belemniterna förefinnes, lika litet som det försök till en paleontologisk karakteristik af de båda zonerna, som jag[4] för ett par år sedan framlagt. Jag har därföre ansett det kunna vara af intresse att egna denna fråga — de båda zonernas — Mammillatuskritan och Mucronatakritan — i n. ö. Skåne paleontologiska karakterer — en närmare granskning, för så vidt detta med den nuvarande kännedomen om vår kritfauna är möjligt. Sedan Kgl. Vetenskaps-Akademien tilldelat mig de Letterstedtska räntemedeln för 1891, har jag, särskildt med detta mål för ögonen, ånyo besökt de vigtigare kritlokalerna i n. ö. Skåne och v. Blekinge, och skall jag här framlägga de resultat, som synas mig framgå af såväl dessa som af äldre undersökningar. Jag har härvidlag ej tagit hänsyn till den s. k. Åhussandstenen, enär den förekommer endast såsom lösa block och dessutom Belemniter deri synas vara ytterst sällsynta, ej häller till utlandet, utan begränsat

[1] Petrificata Suecana Formationis Cretaceæ 1827.
[2] Ö. K. V. Ak. Förh. 1880.
[3] Geol. För. Förh. Bd. 5, 1881.
[4] Öfversigt af Sveriges Mesozoiska Bildningar. Lunds Universitets Årsskrift. T. 24, 1888.

det hela till en lokal undersökning. Synnerligen vigtiga bidrag till kännedomen om n. ö. Skånes kritbildningar innehållas i de af Sveriges Geologiska undersökning utgifna kartbladen Bäckaskog samt Karlshamn och Sölvesborg (Skånedelen) bearbetade af De Geer,[1] hvari ej blott alla förut bekanta kritlokaler noggrant angifvas och beskrifvas, utan ock detaljerade upplysningar lämnas om ett stort antal nya sådana. De Geer delar n. ö. Skånes kritbildningar i 3 underafdelningar näml.: 1:o Kaolin, sandsten och konglomerat, 2:o Mammillatuszonen (Ka) och 3:o Mucronatazonen (Kb), samt försöker att på stratigrafiskt geognostiska grunder bestämma åldersförhållandet mellan de båda sistnämde zonernas olika lokaler.

Inom Mamillatuszonen på bladet Bäckaskog anser De Geer lokalerna efter deras ålder böra ordnas sålunda, börjande med de älsta. 1:o V. Ifö, Flackarp, Söndraby, 2:o Håsta, 3:o Truedstorp, Hörröd, N. Oppmanna, 4:o Englamosse (d. v. s. Balsbergs nya brott) v. Olinge och Blaksuddens kalklager, samt såsom yngst 5:o lagren vid Balsbergsgrottan. Inom Mucronatazonen anser De Geer åldersföljden vara 1:o Kjuge, Balsvik, 2:o Ebbetorp, 3:o Roalöf, Harastorp, 4:o Hanaskog, Qviinge, Bifvaröd, 5:o Gryt, Hemmestorp. Lokalerna Stafversvad och Hemmingslycke betraktas såsom sannolikt strandfaciesbildningar af Mucronatakritan, ehuru deras ställning ej anses fullt säker. Af lokalerna på bladet Karlshamn räknas Axeltorp och Barnakälla till Mammillatuskritan, under det att såväl denna zon som Mucronatakrita finnes vid Sissebäck. De Geer påpekar vidare att Mammillatuskritan är en grundvattensbildning, hvaremot Mucronatakritan synes afsatt på något djupare vatten, hvarom dock mera sedan. I den följande framställningen kommer jag endast att sysselsätta mig med zonerna 2 och 3, enär fossil ej anträffats i 1.

Såsom ofvan angifvits, kunna af flerehanda skäl endast med stöd af redan offentliggjorda fossillistor knappast några fullt tillförlitliga resultat med afseende på det faunistiska förhållandet mellan de båda zonerna erhållas. Schlüter besökte, under sin för kännedomen om våra kritbildningar så vigtiga resa[2] i Skåne, i n. ö. delen af provinsen endast Mammillatuslokaler och i södra delen af hithörande lager endast Mucronatalokaler, hvarföre ock hans fullständiga och kritiskt noggranna fossillistor upprättats i öfverensstämmelse därmed och således Kristianstadsområdets alla kritbildningar, »Trümmerkalke», räknats till Mammillatuskritan. De Morgans lista[3] är alldeles för okritisk och Moberg meddelar visserligen[4] en förteckning öfver de på hvarje lokal funna arterna, men denna och dylika listor gifva ej någon bild af den rol de särskilda arterna spela på hvarje lokal, ehuru särskildt allmänna arter påpekas af Moberg, och de äro för nu i fråga varande ändamål ej användbara. För att gifva en verklig bild af faunan på en gifven lokal är det näml., såsom bland andra De Geer framhållit,[5] ingalunda nog att meddela en till och med fullständig förteckning på alla där funna arter, man måste ock angifva hvilken rol hvardera af dessa arter spelar. Tydligtvis kan nämligen en art, som är funnen i ett eller några få exemplar ej tillmätas samma geologiska betydelse som en art, hvilken förekommer till mycket stort antal. Exempelvis kan påpekas förekomsten af Crania Ignabergensis vid

[1] Sveriges Geologiska Undersökning. Ser. Aa, S. 103, 106, 107.
[2] Neues Jahrbuch für Mineralogie, Geologie und Paläontologie 1870, s. 929.
[3] Mém. de la Soc. Géol. de France. 3:e ser., t. 2. 1882.
[4] Cephalopoderna i Sveriges Kritsystem I. S. G. U. 1884.
[5] Geol. För. Förhandl. Bd 9, 1887.

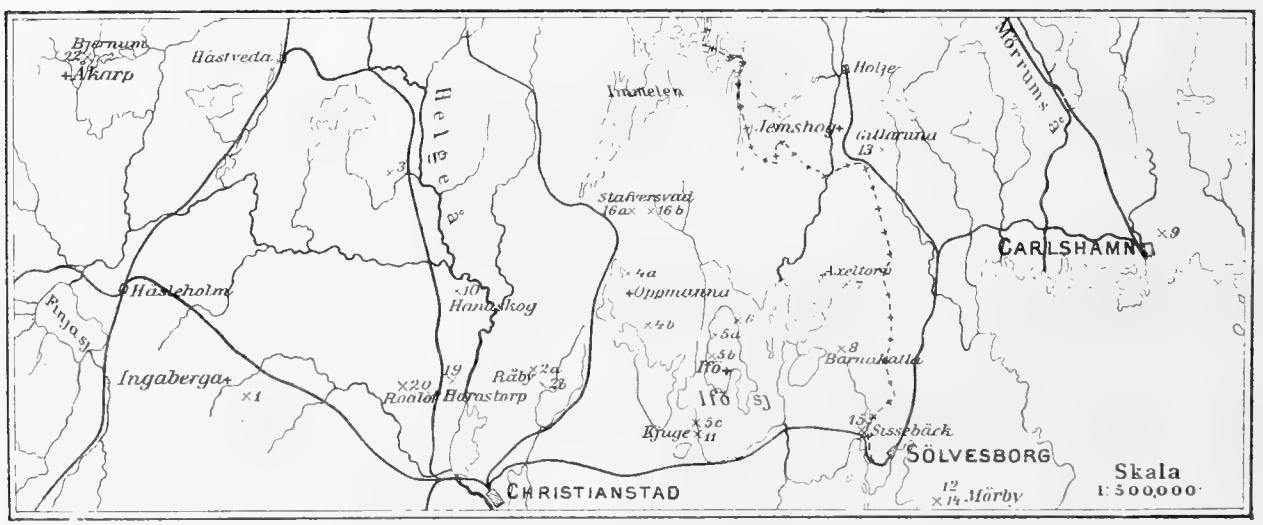
Ignaberga och Balsberg, hvilken art på det förra stället fins i ofantligt stor mängd och karakteriserar denna lokal, på det andra stället däremot är mycket sällsynt och ej utöfvar något inflytande på denna lokals faunistiska karakter. I de i museerna förvarade samlingarne finnas så godt som alltid de sällsyntare arterna i betydligt större proportion än de allmännare. De Geer har tagit tillbörlig hänsyn till alla dessa förhållanden vid uppräkningen af Barnakällegrottans fauna och den analys däraf han gifvit; ja han har till och med meddelat exakta sifferuppgifter öfver det antal exemplar af hvarje art, han funnit, och den procent af faunan, som hvar och en utgör.

Ehuru visserligen uppgifter — särskildt rörande sällsyntare arter — upptagits äfven från andra håll, äro dock de samlingar, som till hufvudsakligaste delen ligga till grund för efterföljande fossillistor, de nu i Lunds Geologiska Museum befintliga, och dessa hafva hopbragts under mycket olika tider och af olika personer. Vissa stuffer härröra från Kilian Stobæi tid, den hufvudsakligaste delen af S. Nilssons samlingar finnes här och mycket har tillkommit under senare tider, hvaribland särskildt bör framhållas en af framlidne Professor H. W. Malm gjord samling innehållande särdeles vackra exemplar, hvilken 1891 till Museet skänkts af Fiskeriintendenten Dr. A. H. Malm. Samlingarna hafva sålunda ingalunda hopbragts »opartiskt» och ett meddelande af det antal exemplar, hvari hvarje art fins från de särskilda lokalerna och uträkning af dess procenthalt af faunan skulle, långt ifrån att gifva riktiga resultat, helt säkert ofta nog vara vilseledande. Härtill kommer ock den stora svårigheten att vid hvarje särskildt tillfälle afgöra, hvad som bör förstås med ett exemplar så t. ex. Cirrhipeder, taggar och plåtar af Cidaris o. d., utan ock kolonibildande eller på hvarandra fastväxta former såsom Ostrea, Spondylus, Radiolites, Bryozoër, Serpula m. fl., för att nu icke tala om sådana, hvilka såsom Inoceramus oftast förekomma i små fragmenter, hvarföre jag anser den af De Geer brukade metoden ej härvidlag användbar.

För att dock emellertid gifva en *ungefärlig* föreställning om hvarje arts geologiska betydelse på hvarje lokal har jag efter mig föreliggande material i förening med iakttagelser i fältet infört följande beteckningssätt i fossillistorna. Om endast ett eller några få exemplar af en art föreligga = rr, om antalet är omkr. 5 — 10 = r; om 10 — 25 = x; om 25 — 50 = a; om öfver 50 = aa och om en art förekommer särdeles allmänt = aaa. Ungefär dessa proportioner för lokaler, från hvilka ett rikare material föreligger. För fattigare lokaler har samma beteckningssätt användts, men de respektive tecknen betyda då naturligtvis ett mindre antal exemplar och rr har ej just ofta användts. Naturligtvis kan af flera skäl ett dylikt tillvägagående ej gifva något absolut noggrant resultat och mycket kommer alltid att bero på den subjektiva uppfattningen, liksom äfven mot de valda tecknen och deras betydelse anmärkningar kunna göras, men genom dylika torde dock en vida klarare och tillförlitligare bild af faunan vinnas än genom en blott och bar, om än aldrig så fullständig uppräkning af de på hvarje lokal funna arterna.

Då det gäller att utröna om några och då hvilka paleontologiska karakterer utmärka hvardera af de båda zonerna — Mammillatus (Ka) och Mucronata (Kb) kritan — har jag ansett lämpligast att först taga i betraktande de såsom typiska ansedda lokalerna och sedan med från dessa vunnen erfarenhet behandla mindre vigtiga eller ej närmare bestämda lokaler, ehuru härvid dock ingalunda konsekvent förfarits. De nedan meddelade

listorna kunna naturligtvis långt ifrån göra anspråk på fullständighet — och åsyfta ej häller en sådan — dels emedan flera djurgrupper såsom spongier, foraminiferer, koraller, echinodermer, annelider, krustaceer, cyclostomata bland bryozoërna äro icke alls eller högst ofullständigt bearbetade, dels emedan äfven inom de bättre — dock ingalunda fullständigt — kända grupperna (således hufvudsakligen chilostomata bland bryozoërna, brachiopoder, pelecypoder, cefalopoder och vertebrater) ganska många finnas, som hittills ej anträffats i så väl bevarade och fullständiga exemplar, att de kunnat med säkerhet bestämmas. Jag ämnar därföre hufvudsakligen hålla mig till brachiopoderna och molluskerna, hvilka dessutom höra till de geologiskt vigtigaste grupperna, och af andra former endast omnämna sådana, som synas vara af större geologisk betydelse. Jag ämnar äfven i allmänhet förbigå sådana former som af en eller annan orsak ej kunnat tämligen säkert bestämmas, ehuru listorna på detta sätt naturligtvis komma att i fullständighet lämna mycket öfrigt att önska. Beträffande sådana former, som här första gången beskrifvas eller anföras från Sverige eller ock kunna föranleda några anmärkningar, skall jag i den paleontologiska delen meddela upplysningar. Utom Lunds Geologiska Museums material har jag äfven varit i tillfälle att undersöka åtskilliga former tillhörande Riksmusei Paleontologiska Afdelning, Sveriges Geologiska Undersökning och Upsala Geologiska Museum, hvarföre det är mig en angenäm pligt att till dessa museers föreståndare Herrar Professorerna G. Lindström, O. Torell och Hjalmar Sjögren framföra min förbindligaste tack, liksom ock till Kgl. Vetenskaps Akademien, som behagat tilldela mig de Letterstedtska räntemedeln för 1891 och därigenom gjort det för mig möjligt att ånyo, särskildt med denna fråga för ögonen, besöka de vigtigaste kritförekomsterna inom Kristianstadsområdet.



I. Mammillatuskrita eller Ignaberga kalksten. (Ka).

1. Ignaberga.

Med detta kollektivnamn betecknar jag, såsom det oftast sker, de olika brotten i trakten s. om Ignaberga station och för detaljnamn får jag hänvisa till Mobergs beskrif-

ning.[1] Dels på grund af bestämda lokaluppgifter, dels på grund af bärgartens beskaffenhet kunna några fossil bestämdt sägas härröra från det nu nästan alldeles igenrasade brottet vid Oretorp, men de vida flesta torde vara tagna i de öppna kalkbrotten vid landsvägen sål. Vedhygget. Bärgart och lagningsförhållanden äro så ofta och så väl beskrifna att jag därom intet har att tillägga. Spräcklig flinta, på hvars betydelse äfven såsom ledblock SCHLÜTER torde först fäst uppmärksamheten, är ej funnen i fast klyft härstädes. De vigtigaste här förekommande arterna äro:

Crania Bromelli LGN	rr	Ostrea sigmoidea REUSS	x
» comosa BOSQ.	rr	» vesicularis LAM. var.	rr
» Ignabergensis RETZ.	aaa	Spondylus labiatus WAHL.	x
» parisiensis DEFR.	rr	Lima denticulata NILSS.	rr
» pyramidata LGN	r	» elegans NILSS.	rr
» quadrangularis LGN	x	» Hoperi MANT.	r
» Stobæi LGN	rr	muricata GOLDF.	rr
Rhynchonella ala MARKL.	r	pusilla NILSS.	x
» Angelini LGN	r	» semisulcata NILSS.	r
Hagenowi LGN	rr	tecta GOLDF.	rr
triangularis WAHL.	r	Pecten cretaceus NYST.	rr
» Wahlenbergi LGN	x	dentatus NILSS.	rr
Thecidium Schlüteri LGN	rr	» Ignabergensis n. f.	rr
Terebratulina striata WAHL.	x	pulchellus NILSS.	a
Terebratula ciplyensis v. HANST.	r	7 plicatus NILSS	rr
» longirostris WAHL.	x	» serratus NILSS.	r
» Malmi v. HAG.	rr	subaratus NILSS.	x
minor NILSS.	rr	sublaminosus FAVRE	rr
» prælustris v. HAG.	rr	» undulatus NILSS.	rr
» rhomboidalis NILSS.	rr	» virgatus NILSS.	r
» forma α	r	Vola costata SOW.	a
» » γ	rr	Avicula Ignabergensis n. f.	rr
Waldheimia suecica LGN	rr	Inoceramus planus GOLDF.	rr
Terebratella scanica LGN	rr	» sp.	r
Magas costatus WAHL.	a	Radiolites suecicus LGN	rr
» spathulatus WAHL.	a	Nerita nodosa GEIN	rr
Ostrea auricularis WAHL.	aaa	» Malmi n. f.	rr
» cuculus COQ.	rr	Ammonites Stobæi NILSS.	rr
» diluviana L.	x	Belemnitella mucronata SCHLOTH.	r
» Hippododium NILSS.	rr	Actinocamax mammillatus WAHL.	aa
» laciniata NILSS.	r	Dessutom må nämnas	
lobata MARKL.	r	Cyclolites sp.	aa
» semiplana SOW.	x	Stephanophyllia suecica MICH.	a

Af dessa härröra Crania pyramidata LGN, Terebratula ciplyensis v. HANST., Waldheimia suecica LGN, Inoceramus sp. och Nerita Malmi n. f. med säkerhet från Oretorp, utan att jag likväl kan med bestämdhet uppgifva, om de saknas på de öfriga lokaler, som sammanfattas under benämningen Ignaberga.

Af DAVIS[2] anföras från Ignaberga och Oretorp följande fiskar:

Ptychodus decurres AG. Oretorp.

Scapanorhynchus tenuis AG. Oretorp.

» latus AG. »

Oxyrrhina Zippei AG. Oretorp.

[1] Cephalopoderna I, s. 11.

[2] On the fossil fish of the cretaceous formation of Scandinavia. Trans. R. Soc. Dublin. Ser. II, vol. 4. 1890.

Oxyrrhina conica Davis. Oretorp, Ignaberga.
Otodus appendiculatus Ag. » »
Corax Lindströmi Davis. »
Ischyodus brevirostris Newt. » »
Coelodus subclavatus Ag. » »

hvartill kommer Prionolepis angustus Eg. från Oretorp. Af dessa äro tänderna af Corax ganska allmänna vid Ignaberga.

De utan jämförelse allmännaste och här herrskande arterna äro Crania Ignabergensis och Ostrea auricularis, som här finnas i ofantligt stort antal. Som allmänna och karakteristiska böra, jämte talrika bryozoër, nämnas Actinocamax mammillatus, som äfven här förekommer i en bank, Cyclolites sp., Magas costatus och M. spathulatus. Därefter komma Vola quinquecostata, Pecten pulchellus, P. subaratus, Terebratalina striata och Stephanophyllia suecica. Med undantag af Ostrea auricularis äro Ostreerna här mera undanträngda och arter af Pecten allmännare. O. vesicularis är mycket sällsynt och alldeles icke funnen i sin typiska form.

2. Balsberg.

I äldre tider bröts kalkstenen vid denna redan sedan gammalt berömda och ofta beskrifna lokal i ett underjordiskt brott, enl. De Geer beläget 60 m. öfver hafvet och utgjorde brottet en genom konst utvidgad grotta, som i äldre tider beskrifvits af Linné och H. H. von Liewen, i nyare af De Morgan och De Geer.[1] Sedermera har kalkbrytningen flyttats närmare ned mot Råbelöfssjön till det s. k. nya brottet eller det vid Englamosse, hvilket, ett öppet brott, enl. De Geer på 32 m. höjd, dock äfven detta numera öfvergifvits. Bärgarten är visserligen på båda ställena s. k. gruskalk eller skalgruskalk men växlar dock rätt mycket; spräcklig flinta har ej anträffats i fast klyft vid någotdera brottet. I Englamossebrottet såg man för en del år sedan mycket stora block af urbärg inlagrade i kalkstenen, ja troligen själfva den underliggande gneisklippan blottad och bevuxen med Bryozoër, Serpula, Spondylus m. m., hvilka fossil stundom äfven finnas på i skalgruskalken inneslutna smärre stenar af urbärg. På ett dylikt knappt hufvudstort block sitta 5 exemplar af den annars sällsynta Crania parisiensis. Tyvärr har det icke alltid iakttagits att angifva från hvilket af de respektive brotten på Balsberg de insamlade fossilen härröra och ehuru det gamla brottets (grottans, 2*a*) bärgart i allmänhet stöter mera i gult, under det att kalkstenen i Englamossebrottet (2*b*) är mera hvitaktig, är det dock numera ej alltid möjligt att med full säkerhet afgöra, från hvilket brott ett i museet liggande och »Balsberg» etiketteradt fossil härrör. Hébert hade beaktat nivåskilnaden och på grund af Belemniternas olika uppträdande i de bägge brotten antog han, att Belemnitella mucronata, som är jämförelsevis allmän i Englamossebrottet, skulle intaga en lägre nivå än Actinocamax mammillatus, den enda i trakten af grottan förekommande Belemniten, och stödde just på detta förhållande sin uppfattning, att Mammillatuszonen skulle vara yngre än Mucronatazonen.[2] Emellertid måste äfven brottet vid Englamosse otvifvel-

[1] Carl Linnaei Skånska Resa s. 84; K. Vet. Akad. Handl. Bd. 13. 1752; Mém. Soc. Géol. de France. Sér. 3, tome 2. Geol. För. Förhandl., Bd. 8.

[2] Bull. Soc. Géol. France, Ser. 3, t. 3, s. 595.

aktigt räknas till Mammillatuszonen.[1] Med anledning af den betydliga höjdskilnaden af nära 30 m. har äfven De Geer, såsom ofvan anförts, antagit att de båda brotten tillhöra olika nivåer inom Mammillatuszonen. Jag skall därför först meddela en förteckning öfver de arter, som med full säkerhet äro funna vid hvartdera af dessa brott, och sedermera den vida längre listan på de arter, för hvilka endast Balsberg finnes angifvet och för hvilka det numera ej med full säkerhet kan afgöras, från hvilket af dessa brott de härröra.

	Englamosse.	Grottan.
Crania spinulosa Nilss.	r	o
Tenbratula longirostris	r	o
Tenbratulina striata Wahl.	o	r
Magas spathulatus Wahl.	o	r
» costatus Wahl.	a	x
Ostrea cuculus Coq.	a	a
» diluviana L.	r	rr
» lobata Markl.	rr	r
» Hippopodium Nilss.	r	o
» auricularis Wahl.	aaa	aa
Ostrea laciniata Nilss.	r	r
» lateralis Nilss.	r	o
Spondylus labiatus Wahl.	r	x
» lamellatus Nilss.	r	o
Pecten 7 plicatus Nilss.	o	r
» subaratus Nilss.	o	r
Radiolites suecicus Lgn.	r	r
Belemnitella mucronata Schl.	r	o
Actinocamax mammillatus Wahl.	a	r

Ett O i den ena kolumnen betyder naturligtvis ingalunda att ifrågavarande art här verkligen saknas, utan endast att den ej är anträffad i det jämförelsevis obetydliga material, som, samladt under senare tid, därifrån föreligger. För så vidt man af det lilla hittills kända får sluta, synes ej någon betydligare paleontologisk skiljaktighet mellan de båda fyndorterna förefinnas. Fäster man sig hufvudsakligen vid Belemniterna, skulle man snarast vara böjd att anse Englamossebrottet yngst, emedan, såsom Hébert först påpekat, Belemnitella mucronata här uppträder i något större mängd än vanligt på Mammillatuslokaler, under det att denna art ej är funnen vid grottan. Läget torde dock bestämdt angifva, att, såsom De Geer uppgifver, Englamosse tillhör den äldre delen af Mamillatuszonen. Ymnigheten därstädes af Ostrea auricularis och Magas costatus tala äfven emot dess förande till Mucronatazonen.

De i äldre tider gjorda samlingar, som äro etiketterade »Balsberg» härröra sannolikt alla från trakten kring grottan, som dessutom synes vara den vida rikare lokalen. Jag har dock ej vågat med bestämdhet föra dem dit, men däremot i den följande förteckningen öfver de vigtigaste från Balsberg utan speciallokal föreliggande samlingarne märkt sådana former, som med all sannolikhet härröra från grottan, med x och troligen kunde detta tecken sättas framför många flera.

Crania antiqua Defr.	rr
» Bromelli Lgn.	r
× » Craniolaris L.	a
» Ignabergensis Retz.	rr
» parisiensis Defr.	rr
» quadrangularis Lgn.	x
» Stobaei Lgn.	rr
Rhynchonella ala Markl.	r
» Angelini Lgn.	r
» Hagenowi Lgn.	rr
» spectabilis v. Hag.	rr
» triangularis Wahl.	x
Rhynchonella Wahlenbergii Lgn.	rr
» forma β	rr
Thecidium cf digitatum Son.	r
Terebratulina striata Wahl.	x
Terebratula longirostris Wahl	x
» minor Nilss.	r
» forme α	rr
Terebratella scanica Lgn.	rr
Magas costatus Wahl.	aa
» spathulatus Wahl	x
Ostrea auricularis Wahl.	aaa
» cuculus Coq.	x

[1] Bull. Soc. Géol. France. Ser. 3, t. 10, s. 456.

	Ostrea diluviana L.	x
	Hippopodium Nilss.	rr
	» laciniata Nilss.	x
	» lateralis Nilss.	rr
	. lobata Markl.	rr
	sigmoidea Reuss.	r
	Anomia cf subtruncata d'Orb.	r
×	Plicatula pectinoides Reuss.	rr
	Spondylus sp (cf Drakenbergi v. Hag.)	r
	labiatus Wahl.	aa
	. lamellatus Nilss.	rr
	. tenuistriatus Lgn.	rr
	Lima denticulata Nilss.	rr
	. elegans Nilss	rr
	» granulata Nilss.	r
	muricata Goldf.	rr
	ovata Nilss.	r
	. pusilla Nilss.	r
	. semisulcata Nilss.	x
×	» tecta Goldf.	rr
×	Pecten dentatus Nilss.	rr
	: sublaminosus Faon.	rr
	» pulchellus Nilss.	r
	» septemplicatus Nilss.	x
×	Pecten serratus Nilss.	r
	» subaratus Nilss.	x
	» virgatus Nilss.	rr
	Vola quinque costata Sow.	r
×	Avicula pectinoides Reuss.	rr
×	Mytilus ornatus Münst.	rr
×	Trigonia cf Buchi Gein.	rr
×	Cucullæa Matheroniana d'Orb.	rr
	Radiolites succicus Lgn	r
	» pusillus Lgn.	r
×	Pharella De Geeri n. f.	rr
×	Patella ovalis Nilss.	rr
×	Nerita nodosa Gein.	rr
×	» Retzii Nilss.	rr
×	Ammonites Stobaei Nilss.	rr
×	Baculites vertebralis Lam.	rr
×	Aptychus rugosus Sharp.	rr
	Actinocamax mammillatus Nilss.	a
	Belemnitella mucronata Schl.	r

Bland öfriga djurgrupper märkas:

	Cyclolites sp.	rr
	Stephanophyllia suecica Mich.	x
	Ceriopora sp. (cf stellata Goldf.)	aa

Af Davis anföras följande fiskar:

Otodus appendiculatus Ag.
Corax Lindströmi Dav.

Äfven vid Balsberg taget i vidsträckt bemärkelse är Ostrea auricularis den allmännaste arten; i motsats mot Ignaberga är däremot Crania Ignabergensis endast funnen i några få exemplar liksom ock de vid Ignaberga allmänna Volä quinquecostata och Cyclolites sp. Karakteristiskt för Balsberg är förekomsten af talrika bryozoër (särskildt den form som ofvan anförts såsom Ceriopora cf stellata Goldf.) af Magas costatus, M. spatulatus, Ostrea laciniata och Spondylus labiatus. Actinocamax mammillatus kan visserligen ingalunda sägas vara sällsynt men fins dock ej särdeles allmän och bildar inga sammanhängande lager, såsom vid Ignaberga och på flera andra ställen. Belemnitella mucronata är, såsom redan nämts, endast funnen vid Englamossebrottet.

Vid Englamossebrottet anträffade jag 1875 några större block af en bärgart, som såväl petrografiskt som ock paleontologiskt något skiljer sig från Balsbergs öfriga kritbärgarter. Samma bärgart har ock anträffats af herr von Schmalensée 1880 vid hans insamlingar för Sveriges Geologiska Undersöknings räkning och på de af honom samlade stufferna skola etiketterna »Balsberg 2» betyda yngre lager utanför grottan. Oaktadt jag vid upprepade senare besök såväl vid Englamossebrottet som vid Balsbergsgrottan haft uppmärksamheten riktad särskildt på denna bärgart, har jag ej lyckats återfinna densamma hvarken i fast klyft eller såsom lösa block. Dess stratigrafiska förhållande till Balsbergs öfriga kritbärgarter kan jag därför ej angifva. Äfven herr von Schmalensée synes endast hafva funnit lösa block däraf. Ehuru porös är dock denna bärgart fastare än Englamossekalkstenen och ej såsom denna endast bestående af mer eller mindre fast sammankittade kalkkorn. Den är däremot en mycket sandhaltig kalksten. Hufvudmassan af de

fina sandkornen är vattenklar kvarts, ehuru äfven grönfärgade korn förekomma i underordnad mängd. Bärgartens färg är vanligen mera gråaktig än den vanliga Englamossekalkstenen. Paleontologiskt karakteriseras denna bärgart genom den allmänna förekomsten af slägtet Fissurella, af hvilket sannolikt 4 arter kunna urskiljas, och må den därför tills vidare kallas Fissurellabärgarten. Fossilen häri äro illa bevarade, antingen stenkärnor och intryck eller, om skalen finnas kvar, med deras yttersida fast förenad med bärgarten, så att endast innersidan kan iakttagas. De vigtigaste häri funna arterna, som kunnat någorlunda bestämmas, äro

Ostrea	auricularis Wahl.	x	Eriphyla	lenticularis Goldf.	r
Anomia	cf subtruncata d'Orb.	x	Tellina	semicostata Roem.	rr
Spondylus	tenuistriatus Lgn.	x	Radiolites	sp.	aa
Pecten	septemplicatus Nilss.	a	Fissurella	sp sp.	aa
»	virgatus Nilss.	r	Belemnitella	mucronata Schl.	x
Vola	quinquecostata Sow.	rr	Pollicipes	Nilssoni Stp.	r

Beror förekomsten af Belemnitella mucronata och saknaden af Actinocamax mammillatus på en tillfällighet och det ringa föreliggande materialet eller därpå att Fissurellabärgarten tillhör Mucronatakritan? Det förra synes visserligen sannolikast, dels emedan ett par af Fissurellorna synas förekomma äfven annorstädes i Mammillatuskritan dels emedan äfven Pecten septemplicatus och Radioliterna synas hafva sin hufvudsakliga utbredning i denna zon. För sammanhangets skull har jag omtalat Fissurellabärgarten här, ehuru den rätteligen bort hafva sin plats under III.

3. Vestra Olinge.

Det numera öfvergifna kalkbrottet vid V. Olinge är, liksom flera dylika beläget omedelbart invid en uppskjutande urbärgsrygg. Kalkstenen är bankformigt afsöndrad, finkornig eller nästan tät, grågul med inneslutna korn af kvarts samt fragmenter af urbärg af ända till flera centimeters storlek, hvarigenom densamma stundom erhåller ett konglomeratartadt utseende. Spräcklig flinta finnes icke i fast klyft. Fossil äro ganska allmänna, om ock ofta svåra att lösgöra från bärgarten. De vigtigaste torde vara:

Rhynchonella	Hagenowi Lgn.	x	Ostrea	lateralis Nilss.	r
»	triangularis Wahl.	r	»	diluviana L.	rr
»	forma γ.	rr	Anomia	cf subtruncata d'Orb.	rr
Terebratulina	striata Wahl.	x	Spondylus	aequalis Héb.	rr
Terebratula	longirostris Wahl.	x	»	labiatus Wahl.	x
»	praelustris v. Hag.	a	»	reticulatus Lgn.	r
	minor Nilss.	r	Lima	Hoperi Mant.	r
»	forma γ.	r	Pecten	serratus Nilss.	r
Terebratella	scanica Lgn.	r	Vola	quinque costata Sow.	x
Magas	costatus Wahl.	a	Actinocamax	mammillatus Nilss.	aa
»	spathulatus Wahl.	aa			
»	Schloenbachi Lgn.	x			
Ostrea	auricularis Wahl.	aaa			
»	Hippopodium Nilss.	r			

Af andra djurgrupper må särskildt nämnas

Pollicipes	Nilssoni Stp.	aa

Härifrån anföras ock[1] Crania Stobaei Lgn och C. Retzii Lgn, men då båda uppgifvas förekomma i spräcklig flinta, torde de väl härröra från lösa block.

[1] Lundgren: Brachiopoderna s. 32 och 34.

Allmännast på denna lokal äro Ostrea auricularis, Actinocamax mammillatus och Magas spathulatus, den förstnämnda arten vanligen i små exemplar. Spondylus labiatus, Vola costata, Terebratula praelustris, Magas costatus och Rhynchonella Hagenowi äro också allmänna, liksom äfven carina af Pollicipes Nilssoni, hvilket senare synes vara för denna lokal egendomligt. Äfven bryozoër äro här ganska talrika.

De öfriga i denna trakt förekommande kritlokalerna, som beskrifvits af De Geer, Truedstorp, Quiinge samt den till Ab räknade lokalen vid Gryts kyrka äro nu alldeles otillgängliga; om Hanaskog se under II.

4. Oppmannatrakten.

I närheten af Oppmanna kyrka ligga två numera öfvergifna och mycket igenrasade kalkgrafvar, af hvilka den nordligaste torde lämpligen benämnas Oppmanna (4α) den sydligare Söndraby (4β). Kalken i brottet vid Oppmanna är en tämligen lös grofkornig gruskalk utan någon betydligare inblandning af urbärgsfragment och utan spräcklig flinta. Fossil äro tämligen sällsynta och de vigtigaste med säkerhet från denna lokal härrörande äro:

Ostrea auricularis Wahl.	a	Ostrea laciniata Nilss.	r
» Hippopodium Nilss.	x	Pharella De Geeri n. f.	r
» diluviana L.	r	Actinocamax mammillatus Nilss.	x

Allmännast äro utan fråga Ostrea auricularis, så Actinocamax mammillatus och Ostrea Hippopodium; bryozoër spela ej någon betydande rol. Af intresse är förekomsten af Pharella De Geeri.

Bärgarten i de mycket igenrasade brotten eller grafvarna vid Söndraby är en särdeles oren gruskalk, uppblandad med kvartskorn och ofta grönfärgade fragmenter af urbärg. Under den egentliga gruskalken synes stundom en mycket fin, hvit sand; spräcklig flinta saknas här liksom vid Oppmanna. Fossil äro här allmännare än vid Oppmanna och de vigtigaste från Söndraby föreliggande torde vara:

Crania Ignabergensis Retz.	r	Ostrea Hippopodium Nilss.	x
» spinulosa Nilss.	x	» semiplana Sow.	a
» craniolaris L.	r	» vesicularis Lam. var.	x
Terebratella scanica Lgn.	r	Anomia cf subtruncata d'Orb.	r
Ostrea acutirostris Nilss.	x	Spondylus labiatus Wahl.	r
» auricularis Wahl.	x	Actinocamax mammillatus Nilss.	aaa
» cuculus Coq.	r	Belemnitella mucronata Schl.	r
» curvirostris Nilss.	r		

Actinocamax förekommer här i två lager tillsammans med Ostreer m. m. Det öfre är ung. 10 cent. mäktigt och i dess utgående kan man på en meters längd räkna ungefär 50 exemplar af Actinocamax mammillatus. Ung. 5,5 cent. under detta ligger ett annat liknande lager af ung. 12 cent. mäktighet och hvari ung. 60 Actinocamax-exemplar kunna räknas på metern. Jämte denna art, som är den allmännaste, förekomma just i dessa Belemnitbankar Ostreer i stor mängd särskildt O. semiplana, Hippopodium, laciniata och auricularis, hvilken sistnämnda art dock här synes träda tillbaka för de andra. O. vesicularis var. spelar här en ej ovigtig rol, hvaremot O. diluviana och Magasarterna synas sak-

nas. De Geer hänför brotten vid Oppmanna och Söndraby till olika nivåer inom Mammillatuskritan och anser det senare älst. Det hade varit högeligen önskvärdt att genom paleontologiska bevis bekräfta eller vederlägga detta, hvilket dock med nu föreliggande faunistiskt material ej är möjligt.

I literaturen anföras stundom[1] ett betydligt större antal arter från Oppmanna än som här ofvan uppräknats. Dessa uppgifter grunda sig i väsentlig mån på en samling fossil, som 1869 inköptes till Lunds Museum efter aflidne Apotekare Hjortsberg i Oppmanna. Samlingen, som saknade lokaletiketter, uppgafs härröra från Oppmanna, hvilket väl här får snarast anses liktydigt med Oppmannatrakten. Sannolikt härröra många, ja flertalet, stuffer från Söndraby, men i samlingen funnos äfven, utom tydliga lösa block, fossil, som genom vidhängande bärgart visa sig härstamma från Ignaberga Kjuge m. fl. st. Dessa hafva visserligen utrangerats från den egentliga Oppmannasamlingen, men det blir det oaktadt ej säkert vid hvilken lokal i Oppmannatrakten fossilen äro funna. För utredandet af det faunistiska sammanhanget mellan lokalerna Oppmanna och Söndraby är samlingen sålunda obrukbar, men då den innehåller flera intressanta former och med tämligen stor säkerhet kan anses härröra från Oppmannatrakten torde det dock vara skäl att meddela en förteckning på de vigtigaste arterna.

Crania antiqua Defr.	rr	Ostrea cuculus Coq.	a
» craniolaris L.	aaa	» curvirostris Nilss.	a
» Ignabergensis Retz.	rr	» diluviana L.	x
» » var. paucicostata	rr	» Hippopodium Nilss.	r
» parisiensis Defr.	r	» laciniata Nilss.	a
» spinulosa Nilss.	a	» lateralis Nilss.	r
Rhynchonella ala Markl.	r	» scaniensis Coq.	a
» Angelini Lgn.	rr	» semiplana Sow.	aaa
» Hagenowi Lgn.	rr	» vesicularis Lam.	x
» triangularis Wahl.	r	Anomia cf subtruncata d'Orb.	rr
» Wahlenbergi Lgn.	r	Spondylus labiatus Wahl.	a
Terebratulina striata Wahl.	x	» lamellatus Nilss.	r
Terebratula longirostris Wahl.	x	Lima denticulata Nilss.	r
» Malmi v. Hag.	x	» granulata Nilss.	r
» minor Nilss.	r	» muricata Goldf.	rr
» praelustris v. Hag.	x	» ovata Nilss.	r
» rhomboidalis Nilss.	rr	» semisulcata Nilss.	r
» forma γ.	rr	Pecten cretaceus Nyst.	r
Waldheimia suecica Lgn.	rr	» pulchellus Nilss.	r
Magas costatus Wahl.	x	» subaratus Nilss.	x
» Nilssoni Lgn.	r	Vola quadricostata Sow.	r
» spathulatus Wah.	rr	Pharella De Geeri n. f.	r
Ostrea acutirostris Nilss.	aa	Radiolites pusillus Lgn.	r
» auricularis Wahl.	x	Actinocamax mammillatus Nilss.	a
» cornu arietis Nilss.	a	Belemnitella mucronata Schl.	rr

Af andra djurgrupper må särskildt påpekas Caratomus peltiformis Wahl., som förekommer i ganska stor mängd.

Davis anför härifrån följande fiskar:

Scapanorhynchus gracilis Dav.
Odontaspis acuta Dav.
Lamna elegans Ag.
incurva Dav.

[1] Moberg, Cephalopoderna I, s. 17.

Oxyrhina Mantelli Ag. — Otodus appendiculatus Ag.
» Lundgreni Dav. — Corax Lindströmi Dav.
» Zippei Ag. — Ischyodus brevirostris Newt.

hvarjämte två arter af Mosasaurus härifrån anföras af Schröder.

Då, såsom ofvan nämnts, nu anförda fossil ej med full säkerhet kunna hänföras till någon bestämd lokal, torde det vara försigtigast att icke på dem grunda några slutsatser.

Påfallande är den stora mängd, i hvilken O. semiplana föreligger äfven som den ganska talrika förekomsten af O. vesicularis typica och O. cornu arietis. Jämte dessa äro i denna samling Crania craniolanis, Actinocamax mammillatus, O. acutirostris, O. curvirostris, O. laciniata och O. cuculus allmänna, hvaremot O. auricularis föreligger jämförelsevis fåtalig och mest i små exemplar.

5. Vestra delen af Ifösjön.

Bärgarten här är en starkt sandblandad och oren gruskalk utan flinta och kunna härstädes 3 lokaler urskiljas, hvilka dock säkerligen stå i sammanhang med hvarandra näml. *a*) norr om Ugnsmunnarna, *b*) trakten kring Ugnsmunnarna och *c*) nordligaste delen af Kjugestrand.

a) De Geer har meddelat,[1] att han på den nordligaste punkten af V. Ifö, där kritsystemet går i dagen, jämte den äfven där herrskande Actinocamax mammillatus funnit 2 exemplar af A. quadratus Bl. Äfven jag har sommaren 1891 på denna lokal funnit ett exemplar af denna art och därjämte B. mucronata. De mig härifrån föreliggande arterna äro:

Crania	craniolaris L.	rr	Ostrea	laciniata Nilss.	r
Ostrea	acutirostris Nilss.	r	Spondylus	labiatus Wahl.	r
»	auricularis Wahl.	aa	Pecten	cretaceus Nyst.	r
»	cuculus Coq.	x	Actinocamax	quadratus Bl.	r
	curvirostris Nilss.	r	»	mammillatus Nilss.	a
»	Hippopodium Nilss.	a	Belemnitella	mucronata Schl.	r

Vid denna sannolikt älsta för närvarande bekanta fossilförande lokal ej blott på Ifö, utan väl i N. Ö. Skåne öfverhufvudtaget, äro O. auricularis, O. Hippopodium och Actinocamax mammillatus de herrskande arterna; faunan har för öfrigt snarast prägeln af en Mammillatusfauna, hvari dock såväl A. quadratus som Belemnitella mucronata förekomma och synes mig intet skäl föreligga att på grund af förekomsten af A. quadratus räkna denna lokal såsom typ för en särskild, af denna art karakteriserad zon.

Utom från denna lokal anför De Geer (Bladet Bäckaskog och Geol. För. Förhandl. Bd 7, s. 737, 1885) A. quadratus ännu på två ställen, på hvilka jag ej funnit densamma näml. Söndraby och Flackarp, hvilket senare ställe jag ej besökt, då genomskärning redan 1891 syntes vara helt och hållet nedrasad och otillgänglig. På förra stället har De Geer endast funnit ett exemplar, på det senare däremot 10 ex. och därjämte 13 ex. af B. mucronata och 193 af Act. mam. I full öfverensstämmelse med De Geer anser jag äfven denna lokal bäst böra räknas till Ka och anser det ej lämpligt att urskilja en särskild zon

[1] Geol. För. Förhandl. Bd 7, s. 478, 1885.

med Aquadratus. Af de här funna 10 exemplaren uppgifver De Geer de 9 tillhöra Blainvilles typ. B. quadratus, liksom de af De Geer på Ifö förut funna, det 10:de Blainvilles form granulatus. I beskrifningen till bladet Bäckaskog sid. 36 angifver De Geer äfven A. westfalicus förekomma vid Flackarp, hvilken form annars ej är bekant från Kristianstadsområdet.

b) Något sydligare, omkring Ugnsmunnarne. Såsom De Geer påpekat, förekomma längs hela vestra sidan af Ifö flera (vanl. 3) lager eller bankar af Belemniter, i hvilka dock äfven Ostreer, Spondylus m. m. i väsentlig mån ingå. I det öfversta af dessa lager kan man omkring Ugnsmunnarne räkna omkr. 20 Belemnitexemplar på metern; det mellersta är obetydligt, hvaremot det undre är något rikare. Kunna dessa Belemnitbankar möjligen parallelisera med de liknande vid Söndraby? Utom i dessa lager eller bankar förekomma Belemniter äfven spridda i den öfriga bärgarten.

De vigtigaste arterna i faunan vid Ugnsmunnarne äro:

Crania craniolaris L.	r	Anomia cf subtruncata d'Orb.	r
» Ignabergensis Retz.	r	Spondylus labiatus Wahl.	x
Terebratulina striata Wahl.	r	Pecten pulchellus Nilss.	r
Ostrea acutirostris Nilss.	a	Vola quinquecostata Sow.	r
» auricularis Wahl.	aaa	Arca exaltata Nilss.	r
» cuculus Coq.	a	Radiolites suecicus Lgn.	r
» curvirostris Nilss.	a	Actinocamax mammillatus Nilss.	aaa
» diluviana L.	r	Belemnitella mucronata Schl.	x
» Hippopodium Nilss.	a		
» laciniata Nilss.	r	Bland fiskar anföras af Davis:	
lateralis Nilss.	r	Lamna elegans Ag.	
» scaniensis Coq.	r	Corax Lindströmi Dav.	
» sigmoidea Reuss.	r	Ischyodus brevirostris Newt.	
vesicularis Lam. var.	r		

De allmännaste arterna äro således Actinocamax mammillatus och Ostrea auricularis, den senare oftast i små exemplar; därefter komma O. cuculus, O. Hippopodium, O. acutirostris, O. curvirostris, hvadan Ostreerna äro den herrskande djurgruppen. Magasarterna äro ej funna här och Brachiopoder öfverhufvudtaget sällsynta, liksom ock Echinider och arter af Pecten. Bryozoërna äro utan större vigt.

c) Såsom direkt fortsättning af lagren på v. delen af Ifö äro de vid Kjugestrand att anse och den nordligaste lokalen härstädes måste väl räknas till Mammillatuskritan, hvaremot de sydligare tillhöra Mucronatakritan (se härom sedermera) hvadan här föreligger en profil genom kritbildningarne med ung. samma facies från de äldsta lagren till den egentliga Mucronatakritan. Nilsson[1] omnämner förekomsten af Actinocamax mammillatus vid nordligaste delen af Kjugestrand, men denna fyndort synes hafva råkat i glömska och har först sedermera igenfunnits och beskrifvits af De Geer[2] och af honom utmärkts på den geol. kartan. På den angifna punkten träffades sommaren 1891 Actinocamax mammillatus m. fl. fossil i strandgruset just i sjöns nivå, och om också dessa fossil ej lågo i fullt säker fast klyft, är dock sådan säkerligen anstående på högst ringa djup. De funna arterna äro:

[1] Petr. Succ. Form. Cnt. 1. 10.
[2] Meddelande i Mobergs Cephalopoder s. 18; Beskrifningen till bladet Bäckaskog.

Crania craniolaris L.	a	Ostrea auricularis WAHL.	r
» Ignabergensis RETZ.	a	Actinocamax mammillatus NILSS.	x
Rhynchonella Wahlenbergi LGN.	r		

hvilken senare är den för zonbestämningen vigtigaste arten och torde denna punkt väl representera den öfversta delen af Mammillatuszonen.

6. Östra sidan af Ifö.

På nordligaste delen härstädes förekommer en af DE GEER[1] upptäckt och beskrifven kritlokal — Blaksudden —, som i ganska mycket skiljer sig, ej blott från de på Ifös vestra sida förekommande kritbildningarne, utan ock från de vida flesta i Sverige. Kalkstenen, som hvilar på Kaolin (DE GEERS zon N:o 1) är nämligen ej s. k. gruskalk, liknande Ignabergas, Ifös eller Hanaskogs, utan en nästan tät kalksten uppfyld af fossil. Den erhåller ett poröst utseende, därigenom att en stor, ja kanske största delen af fossilen förekomma såsom stenkärnor och intryck, och tomrummen efter de upplösta kalkskalen meddela bärgarten just detta porösa utseende. Spräcklig flinta förekommer icke och fragmenter af urbärgs-bärgarter äro mycket sällsynta, om de också icke helt och hållet saknas. Ostreerna spela ej här den herrskande rol som vid Ugnsmunnarne m. fl. ställen, utan de allmännaste formerna tillhöra stenkärnor af dimyarier, ofta med mycket skarpa intryck. De vigtigaste formerna, för hvilka museet hufvudsakligen har att tacka Kabinettskammarherren Grefve H. G. WACHTMEISTER på Årup och Dr. S. W. NIELSEN, Allarp, äro, för så vidt de kunnat bestämmas, följande:

Rhynchonella triangularis WAHL.	x	Gervillea solenoides DEFR.	r
forma β	r	Inoceramus Crippsi MANT.	x
Terebratula longirostris WAHL.	r	Cucullæa exaltata NILSS.	x
» prælustris v. HAG.	aa	Arca pharelloides n. f.	rr
Magas costatus WAHL.	r	Trigonia cf Buchi GEIN.	r
» spathulatus WAHL.	r	Eriphyla lenticularis GOLDF.	x
Ostrea auricularis WAHL.	aa	Crassatella arcacea ROEM.	r
» cuculus COQ.	rr	Radiolites sp.	r
diluviana L.	r	Cardium productum SOW.	aa
Hippopodium NILSS.	r	Cytherea ovalis SOW.	x
laciniata NILSS.	r	Tapes faba SOW.	r
» lobata MARKL.	rr	Pharella De Geeri n. f.	aa
» Marklini n. f.	x	Panopæa regularis d'ORB.	a
Anomia cf subtruncata d'ORB.	r	Icanotia grosseplicata n. f.	x
Spondylus labiatus WAHL.	a	Liopistha æquivalvis GOLDF.	rr
» lamellatus NILSS.	r	Cerithium?	x
Lima ovata NILSS.	r	Ammonites sp.	r
Pecten dentatus NILSS.	rr	Actinocamax mammillatus NILSS.	a
septemplicatus NILSS.	r	Belemnitella mucronata SCHL.	rr
» serratus NILSS.	a		

Jämte nu uppräknade former förekomma flere andra, särskildt dimyarier, som dock på grund af dåligt bevaringssätt ej kunna säkert bestämmas. Ostrea auricularis och Actinocamax mammillatus äro visserligen äfven här allmänna, men de talrikaste individerna tillhöra dock Cardium productum och Pharella DE GEERI; därefter komma Lima ovata, Spondylus labiatus och Panopæa regularis. För lokalen särskildt karakteristiska

[1] Beskrifningen till Bladet Bäckaskog. s. 38.

äro Icanotia grosseplicata och stenkärnor af en större, ej närmare bestämbar, gastropod, som provisoriskt uppförts såsom Cerithium.

Något sydligare på Ifös östra sida finnas vid Ljungasanden i rätt stor mängd block af en bärgart, som öfverensstämmer med Blaksuddens och hvars fauna, ehuru fattigare, äfven liknar Blaksuddens, såsom nedanstående förteckning utvisar.

Rhynchonella sp.
Ostrea auricularis WAHL.
» diluviana L.
» laciniata NILSS.
Pecten septemplicatus NILSS.
» serratus NILSS.
Inoceramus Crippsi MANT.
Gervillea solenoides DEFR.
Radiolites sublævigatus LGN.
Trigonia cf Buchi GEIN.
Cardium productum SOW.
Eriphyla lenticularis GOLDF.
Icanotia grosseplicata n. f.
Actinocamax mammillatus NILSS.

På bägge ställena finnas lämningar af en chimæroid (troligen Ischyodus brevirostris NEWT.). Med undantag af Trigonia cf Buchi, af hvilken 5 exemplar, dels stenkärnor, dels intryck, föreligga, finnas af de öfriga arterna endast ett eller två exemplar från Ljungasanden. Dessa block tillhöra otvifvelaktigt samma afdelning som Blaksudden.

7. Axeltorp.

Från denna obetydliga lokal, en numera så godt som alldeles igenrasad märgelgraf, föreligga 2 exemplar af Actinocamax mammillatus och ett par obestämbara Ostreer.

8. Barnakällegrottan.

Öfver denna af DE GEER upptäckta kritlokal föreligger af honom en ytterst noggrann och detaljerad beskrifning,[1] till hvilken jag intet har att tillägga. Äfven denna lokal är rik på dimyarier, ja troligen t. o. m. rikare än Blaksudden. På grund af bärgartens beskaffenhet äro dock hvarken stenkärnorna eller intrycken så väl bevarade som på sistnämda lokal. De arter, som i Lunds museum finnas från Barnakällegrottan, äro hufvudsakligen följande.

Crania Ignabergensis RETZ.	x	Magas costatus WAHL.	a
» spinulosa NILSS.	aa	» pentagonalis LGN.	rr
» Stobæi LGN	r	» spathulatus WAHL.	aa
» sp.	aaa	Ostrea auricularis WAHL.	aaa
Rhynchonella ala MARKL.	a	» cuculus COQ	aa
» Angelini LGN	rr	» diluviana L.	aa
» triangularis WAHL.	r	Hippopodium NILSS.	aaa
» Wahlenbergi LGN.	x	» laciniata NILSS.	aa
Terebratulina striata WAHL.	aaa	» lobata MARKL.	rr
Terebratula longirostris WAHL.	aaa	» Marklini n. f.	r
» Malmi v. HAG.	x	» vesicularis Lam var.	aa
» minor NILSS.	x	Anomia cf subtruncata d'ORB.	x

[1] Om Barnakällegrottan. Geol. För. Förhandl. Bd 9, s. 287. 1887 o. Sveriges Geol. Undersökning, Ser. C, n:o 90.

Anomia cf semiglobosa Gein	r
» sp.	x
Spondylus sp. (cf Drakenbergi v. Hag.)	x
» labiatus Wahl.	aa
» lamellatus Nilss.	x
tenuistriatus Lgn	rr
Lima elegans Nilss.	x
» granulata Nilss.	x
Hoperi Mant.	rr
» muricata Goldf.	rr
ovata Nilss.	aaa
pusilla Nilss.	x
» semisulcata Nilss.	a
tecta Goldf.	rr
Pecten cretaceus Nyst.	rr
» pulchellus Nilss.	r
» septemplicatus Nilss.	aa
serratus Nilss.	a
» subaratus Nilss.	aaa
» virgatus Nilss.	a
Vola quadricostata Sow.	a
» quinquecostata Sow.	x
Gervillea solenoides Defr.	r
Inoceramus Crippsi Mant.	r
Cucullæa exaltata Nilss.	r
Trigonia cf Buchi Gein	rr
Astarte similis Goldf.	r
Eriphyla lenticularis Goldf.	a
Crassatella arcacea Roem.	r
Radiolites hercynius Ewald	x
» suecicus Lgn	x
» pusillus Lgn	x
Cardium productum Sow.	r
Tapes faba Sow.	r
Cytherea ovalis Sow.	r
Icanotia grosseplicata n. f.	rr
Pharella De Geeri n. f.	a
Pholadomya elliptica Goldf.	rr
Goniomya designata Goldf.	rr
Liopistha æquivalvis Goldf.	a
Emarginula cf Buchi Gein	a
» pelagica Passy.	r
Haliotis cretacea n. f.	rr
Nerita nodosa Gein.	rr
Actæonina doliolum Müll.	r
Baculites vertebralis Lam.	x
Ammonites Stobæi Nilss.	r
Actinocamax mammillatus Nilss.	aaa
Belemnitella mucronata Schl.	rr

Af öfriga djurgrupper märkas

Stephanophyllia suecica Mich.	aa
Salenia areolata Wahl.	aaa
» Lovéni Cotteau	x

hvarjämte äfven torde böra nämnas att Plesiosaurus cf Helmerseni Kijpr. funnits ung. 5 kil. s. v. om Barnakällegrottan i Ifvetofta by.

Ofvanstående lista är långt ifrån en fullständig förteckning på alla vid Barnakällegrottan funna arter, ej ens af brachiopoder och mollusker. En mängd stenkärnor af dimyarier har ej säkert kunnat bestämmas, och utom de ofvan nämde finnas åtskilliga såväl koraller som echinodermer och bryozoër. De Geers lista upptager åtskilliga arter, som ej finnas i min och tvärtom, hvilket väl hufvudsakligen torde bero på det olika material, som legat till grund för dessa listor. Enligt mitt material äro de allmännaste arterna i ordning följande, af hvilka de fyra första föreligga i mer än 200 exemplar hvardera. 1) Ostrea auricularis (318), 2) Terebratulina striata (240), 3) Salenia areolata (240), 4) Pecten subaratus (208), 5) Terebratula longirostris (139), 6) Lima ovata (120), 7) Actinocamax mammillatus (100), 8) Ostrea Hippopodium (94), 9) Crania sp. (88), 10) Spondylus labiatus (80), 11) Magas spathulatus (58), 12) Ostrea vesicularis var. (57), 13) Pecten septemplicatus (52), 14) Crania spinulosa (50), 15) Ostrea cuculus (50), 16) Ostrea laciniata (45). Enligt De Geers lista komma de 16 allmännaste arterna i följande ordning: 1) Actinocamax mammillatus (150), 2) Terebratulina striata (98), 3) Terebratula longirostris (92), 4) Salenia areolata (91), 5) Pecten subaratus (58), 6) Ostrea Hippopodium (48), 7) Ostrea laciniata (45), 8) Magas spathulatus (43), 9) Lima ovata (41), 10) Terebratula prælustris (40), 11) Crania sp. (37), 12) Spondylus labiatus (34), 13) Ostrea haliotoidea (33), 14) Pecten septemplicatus (25), 15) Pharella De Geeri (23) och 16) Liopistha æquivalvis (19).

Ordningsföljden öfverensstämmer i det stora hela ganska väl, dock finnas några olikheter, som förtjäna beaktas. Den största bristen på öfverensstämmelse är otvifvel-

aktigt att Ostrea auricularis, som hos mig är N:o 1, hos De Geer är först N:o 13, under det att De Geers N:o 1 Actinocamax mammillatus hos mig kommer i 7:de rummet. De Geers Pecten pulchellus är helt säkert P. subaratus. I min lista saknas De Geers N:o 10. Terebratula prælustris, hvaremot De Geers saknar min N:o 12 Ostrea vesicularis var. Af min N:o 14 Grania spinulosa har De Geer blott 10 exemplar och af min N:o 15 Ostrea cuculus endast 12. De Geers N:o 15 Pharella De Geeri och 16 Liopistha æquivalvis skulle hos mig intaga ordningsnumren 21 och 22. Jag har endast velat påpeka dessa olikheter såsom exempel på det inflytande, det sätt, hvarpå samlingar göras, har på beskaffenheten af samlingarne, och huru liten tilltro exakta siffror i själfva verket förtjäna.

9. Karlshamn.

Här äro Ostreerna förherrskande och förekomma jämte Spondylus labiatus i mycket stor mängd. Hela bildningen påminner mycket om postglaciala skalgrusbankar med Ostrea edulis vid Sveriges vestkust, men bärgarten vid Karlshamn utmärker sig genom den ganska rikliga inblandningen af fina, svarta eller mörkgröna korn. De vigtigaste arterna äro

Crania Ignabergensis Retz.	r	Ostrea diluviana L.	aa
» » paucicostata Bosq.	r	» Hippopodium Nilss.	r
» quadrangularis Lgn	r	» lobata Markl.	r
» spinulosa Nilss.	r	» Marklini n. f.	x
Rhynchonella ala Markl.	r	Anomia cf subtruncata d'Orb.	r
» Angelini Lgn	r	Spondylus sp. (cf Drakenbergi)	r
» Hagenowi Lgn	r	» labiatus Wahl.	aa
» spectabilis v. Hag.	r	» squamiferus Lgn	r
» triangularis Wahl.	rr	» triangulatus Lgn	r
» Wahlenbergi Lgn	r	Lima denticulata Nilss.	r
Thecidium Schlüteri Lgn	x	» granulata Nilss.	r
Terebratulina striata Wahl.	x	» ovata Nilss.	r
Terebratula ciplyensis v. Hanst.	r	» tecta Goldf.	r
» longirostris Wahl.	x	Pecten serratus Nilss.	r
» Malmi v. Hag.	rr	» subaratus Nilss.	r
» prælustris v. Hag.	x	Vola quadricostata Sow.	r
» rhomboidalis Nilss.	r	» striatocostata Goldf.	r
Waldheimia suecica Lgn	rr	Cucullæa exaltata Nilss.	r
Magas costatus Wahl.	r	Opis bicornis Gein	r
» Nilssoni Lgn	rr	Crassatella arcacea Roem.	r
» pentagonalis Lgn	a	Clavagella Ostreæ Gein.	r
» spathulatus Wahl.	x	Actinocamax mammillatus Nilss.	x
Ostrea auricularis Wahl.	aa	Belemnitella mucronata Schl.	rr

Actinocamax mammillatus är här visserligen ingalunda sällsynt, men är dock mindre karakteristisk än Ostreerna.

Såsom af ofvanstående framgår, finnas Ostrea auricularis och Actinocamax mammillatus på alla till Ka hörande lokaler, på de flesta i stor mängd, och äro ofta de herrskande arterna. Magas costatus och M. spathulatus äro också på de flesta hithörande ställen allmänna, stundom äro de dock sällsynta (ss. Blaksudden) eller saknas helt och hållet (Ifö). Spondylus labiatus fins likaledes nästan öfverallt och är oftast allmän. Belemni-

tella mucronata finnes visserligen äfven på flertalet Mammillatuslokaler, men är öfverallt mycket mera sällsynt än A. mammillatus. Af Ostrea vesicularis är den typiska formen ej med full säkerhet (obs. dock Oppmanna) funnen på någon mammillatuslokal, men däremot äro egendomliga varieteter af denna art på flera ställen ej sällsynta. Ostrea cornu arietis är ej funnen vid någon annan Mammillatuslokal än »Oppmanna» och härrör möjligen i själfva verket icke därifrån. Ostrea acutirostris, O. curvirostris äro endast funna i denna zon, dock ingalunda öfverallt, och nästan detsamma gäller om Pecten septemplicatus, Radioliterna och Cyclolites sp., hvilken senare dock endast på en lokal är allmän (Ignaberga). I petrografiskt afseende utmärkes Mammillatuszonen, hur växlande dess beskaffenhet för öfrigt må vara, därigenom att spräcklig flinta ej är däri funnen i fast klyft.

II. Mucronatakrita eller Hanaskogskalk (Kb).

10. Hanaskog.

För förhållandena härstädes har De Geer så fullständigt redogjort [1] att härom intet är att tillägga. Den finkorniga kalkstenen erinrar om vissa varieteter af Mæstrichterkalktuffen eller Saltholmskalkens blötsten; spräcklig flinta förekommer i fast klyft i flera lager. Fossil äro sällsynta och museets förråd därifrån är mycket ringa, hvarföre jag vid uppgörande af nedanstående lista äfven begagnat De Geers uppgifter.

Terebratula ciplyensis v. Hanst.	r	Pecten membranaceus Nilss.	r
Rhynchonelia ala Markl.	r	» undulatus Nilss.	aa
Ostrea auricularis Wahl.	x	Vola quinquecostata	r
» vesicularis Lam. typica	aaa	Lima granulata Nilss.	r
» semiplana Sow.	x	» semisulcata Nilss.	r
Spondylus labiatus Wahl.	r	Belemnitella mucronata Schl.	aaa
Pecten cretaceus Nyst.	r		

Af öfriga djurgrupper anför De Geer en spatangid och de Morgan Micraster Idæ, om hvilka mera sedan. Belemnitella mucronata och den typiska Ostrea vesicularis Lam äro de vida allmännaste arterna, hvartill ock kommer Pecten undulatus. Ostrea auricularis och Spondylus labiatus förekomma ock, men betydligt sällsyntare, isynnerhet den senare.

11. Kjugestrand, sydligare delen.

Omkring 400 m. s. om den förut (s. 15) omnämda lokalen vid Kjuge går kritsystemet ånyo i dagen. Bärgarten öfverensstämmer med den på Ifö och är lika grofkornig som denna, om ock kanske något mindre sandblandad, spräcklig flinta fins, åtminstone i den sydligaste delen såsom vid Knutehus. Fossilen förekomma liksom kring Ugnsmunnarne, i bankar af Belemniter och Ostreer, dock herrska vid Kjugestrand Belemni-

[1] Geol. Fören. Förhandl. Bd 5, n:o 9, 1881.

tella mucronata (under det att arter af Actinocamax helt och hållet saknas) och Ostrea cornu arietis, hvarefter komma O. diluviana, O. auricularis, O. semiplana, Spondylus labiatus, S. lamellatus, Pecten subaratus samt Caratomus peltiformis. De vigtigaste fossilen äro

Crania craniolaris L.	x	Spondylus labiatus WAHL.	aa
» Ignabergensis RETZ.	rr	» lamellatus NILSS.	a
» spinulosa NILSS.	a	Lima elegans NILSS.	r
Rhynchonella triangularis WAHL.	r	» granulata NILSS.	x
Terebratula longirostris WAHL.	x	» ovata NILSS.	r
» minor NILSS.	a	» pusilla NILSS.	r
» prælustris v. HAG.	r	» semisulcata NILSS.	x
» rhomboidalis NILSS.	r	Pecten cretaceus NYST.	r
Magas Nilssoni LGN	rr	» dentatus NILSS.	r
Ostrea auricularis WAHL.	aa	» pulchellus NILSS.	r
» cornu arietis NILSS.	aaa	» septemplicatus NILSS.	rr
» cuculus COQ.	r	» serratus NILSS.	r
» diluviana L.	aa	» subaratus NILSS.	aa
» Hippopodium NILSS.	r	» virgatus NILSS.	r
» laciniata NILSS.	x	Vola quinquecostata SOW.	r
» lateralis NILSS.	x	Belemnitella mucronata SCHL.	aaa
» semiplana SOW.	a	dessutom	
Anomia cf subtruncata d'ORB.	r	Stephanophyllia suecica MICH.	x
Spondylus sp. (cf Drakenbergi v. HAG.)	r	Caratomus peltiformis WAHL.	aa

12. Mörby.

Kritsystemets bärgarter synas öfverallt i trakten bilda underlaget under slättlandet och anträffas på flera ställen under de föga mäktiga lösa jordlagren. Den noggranna belägenheten af den lokal, som i den äldre literaturen kallas Mörby, och hvarifrån samlingar föreligga, kan jag ej bestämdt uppgifva. Bärgarten därifrån, öfver hvilken HISINGER lämnat den bästa beskrifningen[1] är en hvit sandblandad gruskalk (calx glarcosa NILSSON). Spräcklig flinta fins ej i stufferna därifrån. De vigtigaste arter, som föreligga i en sådan bärgart med etiketten Mörby, äro:

Crania spinulosa NILSS.	a	Ostrea Hippopodium NILSS.	x
Rhynchonella ala Markl.	aa	» laciniata NILSS.	x
Terebratulina striata WAHL.	aa	» lateralis NILSS.	r
Terebratula ciplyensis v. HANST.	r	» semiplana SOW.	r
» longirostris WAHL.	r	Anomia cf subtruncata d'ORB.	r
» prælustris v. HAG.	r	Spondylus labiatus WAHL.	a
» rhomboidalis NILSS.	r	» lamellatus NILSS.	x
Magas costatus WAHL.	rr	Pecten dentatus NILSS.	r
Ostrea auricularis WAHL.	a	» virgatus NILSS.	r
» diluviana L.	r	Belemnitella mucronata SCHL.	a

Terebratulina striata (särskildt formen Defrancei) och Rhynchonella ala äro häribland de allmännaste arterna; jämte dessa märkas Crania spinulosa, Ostrea auricularis, Spondylus labiatus och Belemnitella mucronata. Om en något olika bärgart från Mörby se sedermera.

[1] Anteckningar i Physik och Geognosie under resor i Sverige och Norrige. Häft. 4, s. 136, 1828.

	Ka											Kb		
	Ignaberga.	Balsberg.	V. Olinge.	Oppmanna.	Söndraby.	V. Ifö. Norr.	V. Ifö. Ugnsmunnarne.	Kjuge, norr.	Blaksudden.	Barnakälla.	Karlshamn.	Hanaskog.	Kjuge.	Mörby.
Cyclolites sp.	aa													
Crania craniolaris L.		a			r	rr	r	a					x	
» Ignabergensis RETZ.	aaa	rr			r			a		x	r		rr	
sp.										aaa				
Rhynchonella ala MARKL.	r	r								a	r	r		a
Terebratulina striata WAHL.	a	x	x				r			aaa	x			aa
Magas costatus WAHL.	a	aa	a						r	a	r			rr
» spathulatus WAHL.	a	x	aa						r	aa	x			
Ostrea auricularis WAHL.	aaa	aaa	aaa	a	x	aa	aaa	r	aa	aaa	aa	x	aa	a
» acutirostris NILSS.					x	r	a							
» cornu arietis NILSS.													aaa	
curvirostris NILSS.					r	r	a							
diluviana L.	x	x	rr	r			r		r	aa	aa		aa	r
» hippopodium NILSS.	rr	rr	r	x	x	a	a		r	aaa	r		r	x
» laciniata NILSS.	r	x		r		r			r	aa			x	x
semiplana SOW.	x				a							x	a	r
vesicularis typ.												aaa		
» » var.	x				x		r			aa				
Pecten septemplicatus NILSS.	rr	x								aa			rr	
» subaratus NILSS.	x	x							r	aaa	r		aa	
Spondylus labiatus WAHL.		aa	x		r	r	x		a	aa	aa	r	aa	a
Pharella De Geeri n. f.		rr		r					aa	a				
Actinocamax mammillatus NILSS.	aa	a	aa	x	aaa	a	aaa	x	a	aa	x			
Belemnitella mucronata SCHL.		r			r	r	x		rr	rr	rr	aaa	aaa	a

Föregående tabell (s. 22) visar en öfversigt öfver de allmännaste arternas förekomst och utbredning på de olika zonernas vigtigaste lokaler.

Af denna sammanställning framgå hufvudsakligen följande paleontologiska skiljaktigheter mellan Mammillatus- och Mucronata-lagren. På alla Mammillatuslokaler (Ka) förekommer denna art, oftast talrikt eller mycket talrikt; därjämte finnes därstädes oftast Belemnitella mucronata ehuru alltid mer eller mindre sällsynt. I Mucronatakritan (Kb) saknas Actinocamax mammillatus helt och hållet och endast från Håsta uppgifver [1] Moberg ett exemplar däraf bland en mängd exemplar af Belemnitella mucronata. Ostrea auricularis är öfverallt allmän i Ka och fins därstädes ofta i stora massor, den fins äfven i Kb, ehuru vanligen dock ej i så stor mängd. Ostrea laciniata finnes på de flesta lokaler i bägge zonerna, men är kanske något allmännare i Ka och samma förhållande synes ega rum med Ostrea diluviana; hvaremot O. semiplana synes vara allmännare i Kb än i Ka. Ostrea acutirostris och O. curvirostris äro endast funna i Ka, O. cornu arietis endast i Kb, liksom ock O. vesicularis typica, dock må härvid anmärkas att dessa båda arter finnas i den köpta samlingen från Oppmanna, hvarom ofvan (s. 17) talats. Varieteterna af O. vesicularis äro afgjordt allmännare i Ka än i Kb. Spondylus labiatus synes vara allmännare i Ka än i Kb, Sp. lamellatus tvärtom. Pecten septemplicatus finnes på åtskilliga Mammillatuslokaler och stundom i ej ringa mängd, är mycket sällsynt i Kb. Magas costatus, M. spathulatus och Radioliterna äro karakteristiska för Ka, ehuru de ej finnas på alla lokaler, i Kb äro de mycket sällsynta; Rhynchonella ala finnes i båda zonerna, men tillhör snarast Kb. Pharella De Geeri är endast funnen i Ka likaså Cyclolites sp., ingendera af dem dock öfverallt. Såsom hittills endast funna i Ka skulle ytterligare kunna anföras åtskilliga arter (såsom t. ex. Ostrea lobata, O. Marklini, Lima Hoperi, L. tecta, Vola quadricostata, V. striatocostata, Avicula pectionides, Gervillea solenoides, Trigonia cf Buchi, Eriphyla lenticularis, Opis bicornis, Crassatella arcacea, Cardium productum, Icanotia grosseplicata, Liopistha æquivalvis, Emarginula-arterna m. fl.) men då dessa vanligen blott äro funna på en eller annan lokal och oftast äfven äro sällsynta, synas de för närvarande knappast kunna begagnas såsom tillförlitliga ledfossil. I petrografiskt hänseende förtjänar betonas att spräcklig flinta endast är funnen i Kb i fast klyft. Skilnaden i faunistiskt afseende mellan de båda zonerna är sålunda med undantag af Belemniterna ganska ringa och lokala och facies olikheter synas större än de kronologiska. Mammillatus och Mucronatakritan kunna såsom zoner ingalunda i paleontologiskt afseende jämföras med t. ex. olika zonerna inom Paradoxides och Olenuskiffrarna, ja knapt ens med de olika fossilförande bankarne inom Sveriges Rhät-Lias. Naturligtvis finnes ej häller någon skarp gräns mellan Mucronata- och Mammillatuszonerna, om det ock är svårt att med det nu till buds stående materialet med bestämdhet utpeka gränslagen utom möjligen på vestra delen af Ifösjön. De Morgan har ansett lagren vid Kjuge såsom sådana och deras geol. läge hänvisar dem ock platsen nederst i Mucronatakritan. Nedanstående tabell visar de vigtigaste formernas utbredning vid vestra delen af Ifösjön, hvarest en, visserligen ej fullt sammanhängande profil med samma faciesutbildning från de älsta till de yngre lagren förekommer.

[1] Cephalopoderna I, s. 17, hvaremot Håsta ej nämnes som fyndort för Actinocamax mammillatus i II, s. 56.

	N. Ifö.	Ugnsmunnarne.	N. Kjuge.	S. Kjuge.
Crania craniolaris L.	rr	r	a	x
Ostrea auricularis WAHL.	aa	aaa	r	aa
» Hippopodium NILSS.	a	a		r
» laciniata NILSS.	rr	x		x
» acutirostris NILSS.	r	a		
» curvirostris NILSS.	r	a		
» diluviana L.		r		aa
Spondylus labiatus WAHL.	r	x		aa
Radiolites suecicus LGN.		r		
Actinocamax quadratus BL.	r			
» mammillatus NILSS.	a	aaa	x	
Belemnitella mucronata SCHL.	r	x		aaa

Det har ej varit mig möjligt att på paleontologiska grunder med någon säkerhet kronologiskt ordna de olika lokalerna och sålunda kan jag hvarken bekräfta DE GEERS på hypsometriskt geognostiska grunder gjorda åldersbestämning ej häller vederlägga densamma.

DE GEER har framhållit att Ka är afsatt på grundare vatten än Kb och detta hufvudsakligen emedan bärgarten i Ka (Ignabergakalksten) är gröfre än den i Kb (Hanaskogskalk), och så är nog i allmänhet förhållandet. Dock finnas inom Ka mycket växlande bärgarter; flertalet kan visserligen hänföras till Ignabergakalkstenens typ med mer eller mindre riklig inblandning af kvartskorn o. d., men å andra sidan finnas kalkstenar, som äro ganska finkorniga, ja nästan täta såsom t. ex. vid V. Olinge och Blaksudden. Från den typiska Hanaskogskalken, den för Kb utmärkande bärgarten, afviker bärgarten vid Kjuge och Mörby ganska betydligt och den förra är lika grofkornig som den till Ka hörande bärgarten vid Ugnsmunnarne. Äfven om de finkorniga bärgarterna äro afsatta på något djupare vatten än de grofkorniga — och inom båda zonerna finnas bägge slagen — så synas mig dock båda zonernas bildningar, särskildt genom Ostreernas förherrskande, böra räknas till Laminarie-zonen.[1]

SCHLÜTER[2] var den förste, som påpekade bristen på Spatangider (här fattadt i mera allmän bemärkelse innefattande ZITTELS underfamiljer Ananchytinæ och Spatanginæ) i n. ö. Skånes kritbildningar och han sammanstälde detta förhållande med liknande på åtskilliga ställen i N. Tysklands Quadratakrita, såsom hvars ekvivalent han ansåg Skånes »Trümmerkalk» eller gruskalk. Äfven jag har framhållit detta förhållande.[3] Visserligen har en eller annan spatangid anträffats i n. ö. Skåne, men de äro därstädes mycket sällsynta och deras geologiska betydelse ringa. Då det emellertid kan vara af intresse att på ett ställe sammanföra hvad om dylika formers förekomst härstädes är kändt, skall jag här meddela de upplysningar därom jag lyckats samla. De mig bekanta exemplaren äro följande.

[1] FISCHER: Manuel de Conchyliologie s. 183.
[2] Neuen Jahrbuch etc. 1870, s. 932.
[3] Öfversigt etc. s. 80.

1.	Anancites ovatus LAM.	Tosteberga.
2.	» » »	Åhus.
3.	»	N. Strö.
4.	»	Hanaskog?
5.	Holaster scaniensis COTTEAU.	Edenryd.
6.	Cardiaster sp.	Övedskloster (block af spräcklig flinta).
7.	» »	Lunds vattenledning » » » »
8.	» »	Obekant lokal » » » »
9.	Hemipneustes sp.	Ignaberga.
10.	» »	»
11.	» »	Råby (block af spräcklig flinta).
12.	» »	Araslöf.
13.	Micraster sp. mellan Årup och Östersjön (block af spräcklig flinta).	
14.	» » » » » » » » » »	
15.	» » Öfvarp, Strö sn.	
16.	» Idæ Cotteau.	Hanaskog enl. DE MORGAN.
17.	Spatangid.	» » DE GEER.
18.	»	Barnakälla » » »

N:o 1 förvaras i framlidne Hans Excellens, grefve TROLLE-WACHTMEISTERS samling på Trolle-Ljungby. Det är ett ganska stort exemplar ung. 90 mm. i längd, 80 i bredd och 67 i höjd; i form och dimensioner erinrar det om de vid Köpinge förekommande. I ett afseende skiljer det sig dock från alla mig från fast klyft bekanta exemplar från Sverige, liksom ock från det vida öfvervägande antalet lösa block, nämligen däri att kalkplåtarna ej stöta omedelbart intill hvarandra, utan att sömmarne äro förkislade och något upphöjde öfver själfva plåten, hvilket gifver exemplaret ett egendomligt utseende. Denna egendomlighet återfinnes äfven hos N:r 2, tillhörigt Upsala Geologiska Museum och taget af Professor W. LILLJEBORG, sannolikt ett löst block. Ännu ett tredje exemplar med denna egendomlighet är mig bekant från Sverige. Det är funnet vid Hörby och tillhör Herr Stationsinspektor G. PEHRSSON i Halmstad. Längden är omkring 81, bredden 71 och höjden 47 mm., således ett ganska platt exemplar. Såvidt man genom mun och analöppning kan se består det inre af en ljus sandblandad kalksten. Vid Hörby fins ej kritsystem i fast klyft, men väl enligt TULLBERG[1] block af en »murbruksliknande» kalksten jämte spräcklig flinta. De vid Hörby funna blocken häntyda på härstamning från N.O., hvadan sålunda sannolikt äfven nu omnämda Anancites ursprungligen tillhört Kristianstadsområdet. Huruvida de såsom N:is 3 och 4 uppförda verkligen tillhöra Kristianstadsområdet, torde vara mycket osäkert, då den flinta som bildar dessa stenkärnor, ej är spräcklig utan grå och liknar Saltholmskalkens. De äro för illa bevarade för att kunna närmare bestämmas; dock företer N:o 4 (uppgifven med? från Hanaskog) stor likhet med Anancites sulcatus. N:o 5 från Edenryd, i Hans Exc. Grefve TROLLE-WACHTMEISTERS samling står Holaster scaniensis COTT. mycket nära och är möjligen därmed identisk. Vid hela Hanöbugtens kuststräcka finnas block af kritsystemets bärgarter. De 3 exemplaren af Cardiaster (6, 7, 8) förekomma i spräcklig flinta och hänvisa därigenom till Kristianstadsområdet såsom deras ursprungliga moderklyft och Mucronatazonen. N:o 9 och 10 äro funna i fast klyft vid Ignaberga och tillhöra sannolikt samma art, men äro ej nog fullständiga och väl bevarade för en noggrann bestämning. Såväl exemplaret N:o 11, sten-

[1] Beskrifning till kartbladet Övedskloster, s. 81, 1882.

kärna i spräcklig flinta, funnet af trädgårdsmästare Ohlsson vid Råby, som det från Araslöf (N:o 12, tillhörigt Riksmuseum) tillhöra såväl från den förra som från hvarandra skilda arter, så att slägtet Hemipneustes i Sverige förekommer med minst 3 arter. N:o 13, 14 och 15 tillhöra sannolikt en och samma art, hvilken, om ock närstående Micraster Idæ Cott, dock är därifrån skild. Huruvida den af de Morgan under namnet Micraster Idæ anförda formen från Hanaskog (N:o 16) verkligen tillhör denna art kan jag ej afgöra. N:o 17 och 18 äro för fragmentariska för att tillåta någon närmare bestämning.

Ehuru ej tillhörande Spatangidæ, utan Cassidulidæ, må dock äfven här nämnas den intressanta echinid, som Cotteau beskrifvit[1] under namnet Cyrthoma Nilssoni och om hvars svenska ursprung han synts vara något tvifvelaktig. Enligt fullkomligt säker uppgift är exemplaret funnet i en märgelgraf på betydligt djup i märgeln vid Heshult eller Häslehult (se på geol. kartbladet) ungefär 11 kilometer s. om östra Ringsjön. Det tillvaratogs af Major Lilliecrona, öfverlämnades af honom genom numera aflidna Professorskan M. Naumann till fröken Ida Nilsson, som, sedan exemplaret beskrifvits och afbildats af Cotteau, haft godheten skänka detsamma, jämte andra intressanta samlingar, till Lunds Geologiska Museum. Enl. geologiska kartbladet Lund utgöras de lösa jordlagren i trakten kring Häslehult af krosstenslera tillhörande den undre moränen och det fins all anledning att antaga att exemplaret ursprungligen anstått i Kristianstadsområdet. Det inre är, såvidt man af mun och analöppningen samt några lesioner på skalet kan döma, fyldt med en kalkhaltig sandsten rik på gröna korn.

III. Mindre typiska och ej så rikt utvecklade lokaler för såväl Mammillatus- som Mucronatakrita.

13. Gillaruna.

Märgelgrafven härstädes, som 1883 beskrefs af Moberg,[2] var sommaren 1891 ändå mera otydlig. I den nordvestra delen var allt igenrasadt och jordtäckt så att där af kritsystem var så godt som intet att se. SV. delen består af gruskalk liknande den som fins vid Mörby (se nedan) med en eller annan kvartsbit eller urbärgsfragment; spräcklig flinta O. I märgelgrafven, dock ej i själfva gruskalken utan i de lösa jordlagren, lågo block af hårdare kritbärgarter. I gruskalken äro fossilen ganska sällsynta och illa bevarade, dock är Moltkea Isis någorlunda allmän, så ock Ostrea auricularis, Rhynchonella ala och Belemnitella mucronata. Närvaron af de 2 sistnämnda arterna samt frånvaron af Actinocamax mammillatus tyckes antyda att, såsom Moberg sagt, själfva gruskalken tillhör Kb. Bland de i märgelgrafven funna fossilen kunna flera slag urskiljas. *a*) fossil utan vidhängande bärgart sannolikt ursprungligen härrörande från den lösa gruskalken:

[1] Description de quelques espèces d'Echinides de Suède, 1870. Bibliothèque de l'Ecole des Hautes Etudes, Sect. d. Sc. Nat. Tome 2, Art. N:o 6, s. 4, pl. 13 och Ann. des Sciences Géologiques t. 1.

[2] Cephalopoderna I. l. 20.

Terebratulina striata WAHL.	r	Spondylus labiatus WAHL.	x
Terebratula longirostris WAHL.	x	» lamellatus NILSS.	r
Magas Dalmani LGN.	r	Crassatella arcacea ROEM.[1]	rr
» costatus WAHL.	x	Liopistha æquivalvis GOLDF.	r
Ostrea auricularis WAHL.	aaa	Panopæa gurgitis BRGNT.	r
» diluviana L.	x	Belemnitella mucronata SCHL.	a
» laciniata NILSS.	r	Moltkea Isis STP.	
» Hippopodium NILSS.	rr	Bryozoër	
» vesicularis LAM.	r		

β. Fossil ur lösa block från märgelgrafven 1) ur en porös gruskalk, liknande *a* men betydligt hårdare, stundom innehållande bitar af kvarts och fältspat.

Terebratula longirostris WAHL.	r	Lima ovata NILSS.	r
Rhynchonella ala MARKL.	r	Pecten septemplicatus NILSS.	r
Ostrea diluviana L.	r	» subaratus NILSS.	rr
» laciniata NILSS.	r	Vola quinquecostata SOW.	rr
Spondylus labiatus WAHL.	x	Belemnitfragment.	

β 2) block af en hård, tät gulhvit kalksten med grönfärgade partier och urbärgsfragmenter.

Ostrea scaniensis COQ.	r	Actinocamax mammillatus NILSS.	r
» sp. (obestämbar, närmande sig O. MARKLINI.)	x		

Dessa block synas snarast böra räknas till Ka, hvadan således vid Gillaruna, så vidt man af de otydliga geologiska förhållandena och de bristfälliga paleontologiska data får döma, synes, såsom MOBERG påpekat, finnas block tillhörande Mammillatuszonen och Mucronatakrita i fast klyft.

14. Mörby.

Den enda kritlokal, som sommaren 1891 var här tillgänglig utgjordes af två obetydliga och igenrasade märgelgrafvar. De voro belägna i sydligaste delen af Mörby by, vid östra sluttningen af urbärgsåsen Hjärthall invid vägen, sv. om Mjellby kyrka och nv. om Istaby by. Bärgarten här är något olika den från äldre tider från Mörby föreliggande i det att den är mera grå eller grågul och betydligt fattigare på korn af kvarts och glaukonit. Spräcklig flinta anträffades ej. Block liknande bärgartstufferna från äldre tid liksom ock bärgarten från Broeryd (se nedan) funnos i närheten. De vigtigaste i dessa märgelgrafvar funna fossil äro:

Crania spinulosa NILSS.	rr	Ostrea laciniata NILSS.	x
Rhynchonella ala MARKL.	rr	» lateralis NILSS.	r
Magas costatus WAHL.	r	Spondylus labiatus WAHL.	r
Ostrea auricularis WAHL.	aaa	Radiolites pusillus LGN.	rr
» Hippopodium NILSS.	r		

hvarjämte Bryozoër anträffades i stor mängd.

Denna visserligen föga rika fauna, som väl ej är tillräcklig att lösa frågan om åldern, synes dock snarast tyda på Ka, hvaremot de i äldre tider funna formerna bestämdt angifva Kb. Härröra de möjligen från något olika lokaler?

[1] Möjligen ur β 2.

För förhållandena vid Istaby, som jag ej besökt, får jag hänvisa till MOBERGS beskrifning.[1]

Herr kandidat N. BENGTSSON har till museet skänkt en samling bärgarter och fossil från »en grotta vid Broeryd, öster om bärget Hjärthall, vid foten af bärget.» Bärgarten är en täml. hård, oftast tät, mera sällan gruskalkblandad, rent hvit kalksten med sparsamt inströdda korn af urbärg. Block liknande denna bärgart funnos äfven vid Mörby. De vigtigaste härifrån föreliggande fossilen äro:

Rhynchonella Angelini LGN.	r	Anomia cf subtruncata D'ORB.	r
» triangularis WAHL.	r	Spondylus labiatus WAHL.	x
Terebratula ciplyensis v. HANST.	rr	Pecten virgatus NILSS.	r
Ostrea auricularis WAHL.	aa	Lima denticulata NILSS.	a
» diluviana L.	r	» ovata NILSS.	a
» lobata MARKL.	r	Actinocamax mammillatus NILSS.	rr

Ehuru blott ett exemplar af denna senare art föreligger synes dock faunan snarast tyda på Ka.

15. Sissebäck och trakten däromkring.

Enligt DE GEER[2] förekomma härstädes såväl Mammillatuskrita som Mucronatakrita, den senare tydligt öfverlagrande den förra. Mucronatakritan synes också hafva den största utbredningen under de lösa jordlagren härstädes. De härstädes jämförelsevis ganska allmänna Thecidierna tillhöra sannolikt äfven denna zon.

16. Norr om Oppmanna.

Här finnas två lokaler, som på geologiska kartbladet Bäckaskog betecknats såsom Kb. men som, om de ock sannolikt synas höra hit, ej kunna betraktas såsom fullt typiska Mucronatalokaler näml. Stafversvad och Hemmingslycke. *a*) Stafversvad är en märgelgraf[3] belägen på norra sidan om vägen midt emot gården N:o 1 i denna by, Oppmanna socken. Bärgarten är en ganska finkornig gruskalk, dock ej så finkornig som Hanaskogs. Spräcklig flinta finnes ej; i gruskalken äro inströdda smärre fragmenter af urbärg, dock ej i någon betydligare mängd. De vigtigaste här funna fossilen äro:

Crania spinulosa NILSS.	rr	Ostrea diluviana L.	x
Thecidium cf vermiculare SCHL.	aa	» laciniata NILSS.	rr
Magas Schloenbachi LGN.	rr	Spondylus labiatus WAHL.	x
» spathulatus WAHL.	rr	Inoceramus sp.	
Ostrea auricularis WAHL.	aaa	Belemnitella mucronata SCHL.	r

dessutom bryozoër i stor mängd.

Actinocamax mammillatus är ej funnen här och detta jämte det låt vara sällsynta uppträdandet af Belemnitella mucronata tyder på att lokalen tillhör Kb. Å andra sidan är Ostrea auricularis den herrskande arten och jämte denna förekomma Ostrea diluviana

[1] Ö. K. V. Ak. Förhand. 1880 N:o 10, s. 32.

[2] Beskrifning till Kartbladet Karlshamn (Skånedelen) s. 75.

[3] HENNIG: Studier öfver bryozoërna i Sveriges kritsystem. I. Chilostomata. Lunds Universitets Årsskrift t. 28, 1882. l. l.

och Spondylus labiatus ej sällsynt, hvilket snarare tyder på Ka. Thecidium fins i stor mängd, men denna forms stratigrafiska betydelse i Sverige är ej tillräckligt känd, lika litet som den här ej häller sällsynta s. k. »Echinobrissus minimus». Thecidium synes mig dock snarast tala för Kb. De Geer anser Stafversvad möjligen representera en kustbildning inom Kb och så är kanske verkligen förhållandet, ehuru bevis härför på våra kunskapers nuvarande ståndpunkt svårligen kunna åvägabringas. *b*) Hemmingslycke, Vånga socken. Under detta namn innefattas flera vid olika tider upptagna och sedan igenrasade märgelgrafvar. Bärgarten i de 1891 tillgängliga var en ganska finkornig gruskalk utan flinta. Liksom vid Stafversvad äro Thecidier här allmänna, ja ändå allmännare, hvaremot bryozoër äro sällsyntare. De vigtigaste formerna härifrån äro:

Crania craniolaris L.	r	Spondylus labiatus Wahl.	aaa
» parisiensis Defr.	r	» lamellatus Nilss.	x
Thecidium cf vermiculare Schl.	aa	» squamiferus Lgn.	r
» » digitatum Lns.	r	Lima granulata Nilss.	r
Ostrea auricularis Wahl.	a	Pecten cretaceus Nyst.	r
» laciniata Nilss.	a	Inoceramus sp.	a
» lateralis Nilss.	a	Belemnitella mucronata Schl.	aa

De flesta af ofvannämda fossil äro för flera år sedan samlade af skollärare Helin i Kaffatorp och torde väl knappast härröra från en och samma märgelgraf utan från på olika tider upptagna märgelgrafvar i och omkring Hemmingslycke. Den allmänna förekomsten af Belemnitella mucronata och bristen på Actinocamax mammillatus tyder med säkerhet på att denna lokal bör föras till Kb och möjligen såsom De Geer framhållit är en kustbildning däraf.

17. Karstad.

På geologiska kartbladet Bäckaskog finnes krita ej utlagd vid Karstad, n. om Karsholm. Professor A. W. Malm har för länge sedan härifrån samlat några fossil, som nu finnas i Lunds museum och hvaraf de vigtigaste torde vara:

Rhynchonella forma γ.
Ostrea diluviana L.
Liopistha aequivalvis Goldf.
Belemnitella mucronata Schl.

18. Trakten kring Immeln.

Detta område har jag ej besökt utan hvad jag därom kan meddela grundar sig på därifrån tagna stuffer, till största delen tillhörande Sveriges Geol. Undersökning. Angående de geologiska förhållandena får jag hänvisa till Moberg.[1] *a*) Ylsudden; här synas förekomma 2 bärgartsvarieteter, som dock äro genom öfvergångar så nära förbundna med hvarandra att de måste anses såsom sammanhörande. Den ena af dem, som synes vara den allmännare, liknar bärgarten vid Rödmölla i Ystadsområdet, den andra snarare blocken vid Gillaruna. De vigtigaste fossilen härifrån äro:

Rhynchonella ala Markl.
Terebratula longirostris Wahl.
Terebratulina striata Wahl.
Magas spathulatus Wahl.
Ostrea auricularis Wahl.
» cuculus Coq.
» diluviana L.
Anomia cf subtruncata d'Orb.

[1] Cephalopoderna I. l. 40.

Spondylus labiatus WAHL.
» lamellatus WAHL.
Lima granulata NILSS.
» semisulcata NILSS.
Pecten dentatus NILSS.
» septemplicatus NILSS.
Crassatella sp.
Belemnitfragment, obestämbart.

b) Från Filkesboda föreligger en svart eller mörk sandsten med kalk såsom bindemedel, hvari ligga inbäddade större eller mindre stycken af en finkornig hvit sandsten, liknande Holmasandstenen.[1] Stundom är bindemedlet rikligare så att bärgarten snarast är en kalksten med inneslutna kvartskorn, smärre stycken af urbärg och den ofvannämnda hvita sandstenen. Fossilen äro vanligen illa bevarade; följande kunna dock urskiljas.

Terebratula Malmi v. HAG.
Ostrea auricularis WAHL.
» laciniata WAHL.
Pecten dentatus NILSS.
Spondylus labiatus WAHL.
Lima ovata NILSS.
Actinocamax mammillatus NILSS.
Belemnitella mucronata SCHL.

Blocken från bägge dessa fyndorter — och kritsystemet uppgifves ej förekomma i fast klyft härstädes — synas snarast tillhöra Ka.

19. Harastorp.

Denna på kartan såsom Kb betecknade lokal är en numera fullständigt igenrasad märgelgraf. Bärgarten utgöres af en grågul, mjuk kalksten, erinrande om vissa varieteter af Hanaskogskalken eller Saltholmskalkens blötsten; fossil lyckades jag ej finna däri. Huruvida den verkligen funnits i fast klyft eller endast såsom lokalmorän är ej nu möjligt att afgöra. I en nyupptagen märgelgraf mellan Harastorp och Färlöf, helt nära den punkt där en i n. s. riktning gående väg korsar en som går i o. v., anträffades en finkornig eller nästan tät, hvitaktig, lös och mjuk kalksten med lager af spräcklig flinta. Endast helt obetydligt af kalkstenen var blottadt, men den syntes förekomma i fast klyft. Lika litet här som vid Harastorp fann jag några fossil.

20. Roalöf.

I bärgarten från denna lokal, en troligen såsom lokalmorän uppträdande fin ljus kalksten med fåtaliga kvarts- och glaukonitkorn, har docent HENNIG förutom obestämbara exemplar af Ostrea och Spondylus funnit

Belemnitella mucronata.

Pollicipes sp.

Ophiomorpha sp. liknande Saltholmskalkens men något mindre. Kartbladets beteckning Kb. bekräftas af den förstnämda arten och saknaden af Actinocamax mammillatus.

21. Sönnarslöfstrakten.

Tvänne kalkbrott tillhöriga Maltesholm finnas i närheten af Sönnarslöf. Det ena är beläget vid den bäck, som flyter mot Efveröd, ung. 1 kil. n. n. v. om Sönnarslöfs kyrka

[1] HOLST: Geol. För. Förhandl. Bd 10, s. 306. — DE GEER: Beskrifning till kartbladet Karlshamn (Skånedelen) s. 72. — CONVENTZ: Kgl. Svenska Vet. Akad. Handl. Bd 24, N:o 13, 1892.

och är på geol. kartbladet Kristianstad märkt K. och är bekant sedan lång tid tillbaka; det andra har först i senare tider upptagits och ligger på andra sidan skogen ung. 4—500 m. n. v. om det förra. För detta senare kunde kanske lämpligen begagnas namnet Maltesholm, under det att det förra kan kallas Sönnarslöf. Bärgarten vid Maltesholm *a*) liknar Ignabergas, ehuru fastare, äfven däri att den genom horisontela lerränder är delad i bankar. Därjämte finnas äfven andra mera oregelbundna lerränder, som genomsätta kalkstenen i sned riktning och stundom korsa hvarandra. Spräcklig flinta O. Fossil äro just ej sällsynta, men oftast svåra att uttaga ur bärgarten. De vigtigaste äro:

Anomia cf subtruncata D'ORB.
Pecten septemplicatus NILSS.
» virgatus NILSS.
Vola quinquecostata SOW.
Inoceramus Crippsi MANT.
Radiolites sublaevigatus LGN.

af hvilka endast Radioliterna kunna sägas vara någorlunda allmänna. Af landshöfdingen, grefve M. G. DE LA GARDIE har museum härifrån erhållit en tand och åtskilliga benfragment (trol. delar af scapula) af en Mosasaurid.

b. Sönnarslöf. Bärgarten här är betydligt lösare samt fossilen allmännare och lättare att frigöra. De vigtigaste äro:

Crania spinulosa NILSS.	r	Ostrea lateralis NILSS.	r
» antiqua DEFR.	rr	Pecten septemplicatus NILSS.	r
» Ignabergensis var. paucicostata BOQ.	r	Vola quinquecostata SOW.	x
» craniolaris L.	a	Lima ovata NILSS.	r
Terebratula longirostris WAHL.	rr	Radiolites sublaevigatus LGN.	aaa
Ostrea auricularis WAHL.	x	Dentalium l. Ditrupa? sp.	a
» cuculus COQ.	a	Actinocamax mammillatus NILSS.	a
» vesicularis LAM. var.	rr		

Äfven denna lokal utmärker sig, och detta i ändå högre grad än Maltesholm, genom sin rikedom på Radioliter och i detta afseende skilja sig dessa båda fyndorter från flertalet öfriga. Såsom NATHORST angifvit för Sönnarslöf[1] och andra lokaler i trakten böra nog såväl denna lokal som Maltesholm räknas till Ka.

22. Bjernum.

Kritbildningarne i de trakter, som ligga omkr. 90 m. öfver hafvet, hafva ju ett särskildt intresse för frågan om krithafvets utbredning, dess förekomst i skilda bäcken o. d. och en sådan lokal är just Bjernum. Ung. 1,200 m. n. o. om Åkarps kyrka på östra sluttningen af en ås mot slätten kring sjön Bjerlången har vid Bjernum kritsystem i fast klyft anträffats.[2] Den öfre delen af denna ås utgöres af krosstensgrus, hvari jämte urbärg flinta och kritkalkstenar i riklig mängd ingå. Vid foten af åsen träffas endast kritkalksten, med ett lager spräcklig flinta i dess öfversta del. Enligt uppgift af egaren, herr Angelin i Helsingborg, har man med borr nedträngt öfver 20 fot i kalkstenen och detta på ett ej obetydligt område, utan att andra bärgarter än kritkalk, ej ens flinta anträffats, så att det torde få anses säkert, att kritsystemet här anstår i fast klyft. Bärgarten är

[1] Beskrifning till kartbladet Kristianstad s. 15.
[2] Se HENNIG: Bryozoërn I, s. 12.

icke en typisk gruskalk, utan en mycket finkornig gråhvit kalksten, erinrande om Saltholmskalkens blötsten. I det blottade partiet af kalkstenen låg, såsom nämndes, ett lager spräcklig flinta. Bland här funna fossil må nämnas:

Rhynchonella sp.	r	Ostrea vesicularis LAM. typica	aa
Terebratula carnea SOW. (forma elongata)	r	Belemnitella mucronata SCHL.	a

hvadan här säkerligen Mucronatakrita föreligger. Således har otvifvelaktigt krithafvets aflagringar — och detta ej såsom utprägladt grundvattensfacies — sträckt sig minst hit och sammanhanget mellan norra Skånes och södra Hallands kritbildningar synes därmed gifven. Då förfaller ock antagandet af ett Kristianstadbäcken såsom ursprungligen skildt från ett Malmöbäcken. Öfriga lokaler i denna trakt har jag ej besökt utan får för dem hänvisa till MOBERGS framställning.[1]

Rörande kritbildningarne i Halland, såväl de i fast klyft som de i lösa block förekommande, har jag intet att tillägga till hvad jag i uppsatsen om Tormarp därom sagt,[2] utan får jag hänvisa till densamma.

[1] Cephalopoderna I, s. 42.
[2] Geol. För. Förhandl. Bd. 11, n. 2.

Tillägg under tryckningen.

Anmärkning till sid. 10.

Under benämningen Ceriopora cf stellata GOLDF. hafva inbegripits de former, som numera af HENNIG (Studier öfver Bryozoërna i Sveriges Kritsystem II. Cyclostomata, Lunds Universitets Årsskrift, t. 30 1894) beskrifvits och afbildats under namnen *Lichenopora suecica* HG, s. 35, t. 2, f. 33—36 och *Ceriopora uva* HG, s. 37, t. 2, f. 37—39.

Paleontologiska anmärkningar.

Efterföljande anmärkningar afse naturligtvis ingalunda att gifva en fullständig monografi öfver kritfaunan i N. Ö. Skåne, utan endast att meddela upplysningar om några sådana arter, som i det föregående omnämnts och som antingen äro af geologisk vigt eller som nu för första gången anföras från Sverige eller också äro att betrakta såsom ej förut beskrifna former. Jag meddelar därföre ej häller fullständiga synonymlistor utan anför blott de vigtigaste och hänvisar för öfrigt till nyare arbeten, i hvilka dylika finnas. Beträffande ordningen har jag följt den i ZITTELS Handbuch der Paleontologie begagnade.

Cyclolites sp.

1888. »Cyclolites semiglobosa MICHELIN». LUNDGREN: List of fossil faunas af Sweden II. Mesozoic s. 7. och Ö. K. V. Ak. Förhandl. N:o 4, s. 226.

Fastväxt med större eller mindre del af undersidan oftast med formen af ett téfat, mera sällan bägarformig, med tjockt epitek; stundom alldeles platt, då intet epitek synes. Öfre ytan nästan alldeles jämn, utan någon fördjupning i midten, som ligger excentriskt. Septa svagt upphöjda, lakun O. Omkretsen rund eller oval, oftast något oregelbunden. Genomskärning vanl. 15—20 mm; minsta exemplaret 5, största 30 mm.; fragmenter antyda ändå större dimensioner.

Af mig tillgängliga former liknar denna art *C. deformis* (MICHELIN: Iconographie Zoophytologique, s. 8, t. 2, f. 7), som ej häller har någon lakun, men synes vara mera oregelbunden, och då den dessutom fins i Normandiets oolit, kan det ej gärna komma i fråga att identifiera vår form med denna. *C. discoidea* Blainv. (MICHELIN: anf. arb., s. 16, t. 4, fig. 1, *Fungia discoidea* GOLDFUSS: Petrefacta Germaniæ s. 50, t. 14, fig. 9) är mera konvex och har tydligt utpräglad lakun liksom ock *F. polymorpha* GOLDFUSS (anf. arb., s. 48, t. 14, fig. 6). Denna *Cyclolites* har af mig i List, säkerligen med orätt, förts till *C. semiglobosa* MICH. (anf. arb., s. 195 och 348, t. 50, fig. 1). Denna senare art är mindre, regelbundet kretsrund, utan vägg och epitek, med öfre ytan halfrund; den anföres af MICHELIN (och efter honom äfven af SCHLÜTER Neues Jahrbuch etc. 1870, s. 942) från Ignaberga.

Ofvan beskrifna *Cyclolites* form synes ej kunna hänföras till någon bekant art; den är funnen vid Ignaberga (aa) Balsberg (rr) och Barnakälla (r) således endast i Ka, ehuru den endast vid Ignaberga är allmän och saknas på de flesta lokaler.

Stephanophyllia suecica Michelin.

1848. Stephanophyllia suecica Michelin. Milne Edvards et Haime. Ann. d. Sciences Naturelles. Zoologie s. 94.
1870. » » Schlüter: anf. arb., s. 942.
1888. » » Lundgren: List s. 7 och Ö. K. V. Ak. Förhandl. s. 226.

På sistnämnda ställe har jag framhållit att kritsystemets koraller äro i stort behof af en kritisk granskning och bearbetning, äfvensom att *St. clathrata* v. Hagenow och *St. suecica* Mich. möjligen äro identiska. Under namnet *Fungia clathrata* beskref von Hagenow (Neues Jahrbuch etc. 1840 s. 648) en liten korall från Rügen och fäste sig därvid hufvudsakligen vid undersidans beskaffenhet, samt lämnade en dålig figur (t. 9, fig. 3) öfver densamma. Milne Edwards och Haime upptogo 1848 Michelins manuskriptnamn *Stephanophyllia suecica* och beskrefvo noga septas förlopp hos denna form. Sedermera (British Fossil Corals, Del 1, s. 55) karakteriserade de densamma noggrannare mot *St. discoidea* och *St. Bowerbanki*, hvarigenom det är möjligt att med säkerhet identifiera nu föreliggande form med denna art, hvaremot detta ej låter sig göra med v. Hagenows *F. clathrata*. Det förefaller mig ingalunda omöjligt att den form som Michelin afbildat under namnet *Cyclolites semiglobosa* (se under föregående art) i själfva verket är identisk med St. suecica. I fråga varande form har af Moberg anförts under namnet *Micrabacia coronula*.

Den föreligger från Ignaberga (a), Balsberg (x), Barnakälla (a) och möjligen Ugnsmunnarne af lokaler tillhörande Ka; af lokaler för Kb endast från Kjuge (x) men kan svårligen betraktas såsom ledfossil.

Ceriopora sp.

1870. Ceriopora stellatæ Goldf. affinis. Schlüter: N. J. s. 939.
1888. » sp. » » » Lundgren: List s. 10 och Ö. K. V. Ak. Förh. s. 228.

Då denna form har blifvit i literaturen bekant under detta namn, har jag ej här velat ändra detsamma, ehuru den väl svårligen kan hänföras till den af Goldfuss under namnet *Ceriopora stellata* (anf. arb., s. 39, t. 11, fig. 11 och 30 fig. 12) beskrifna arten.

Särdeles allmän vid Balsberg, ej funnen annorstädes, se sid. 32.

Sedan mitt arbete Undersökningar öfver Brachiopoderna i Sveriges Kritsystem (Lunds Universitets Årsskrift t. 20, 1885) utkom, har föga väsentligt nytt material tillkommit, så att jag intet har att tillägga utom beträffande en art näml.

Crania sp.

Trots ett ganska rikligt material har det ej varit mig möjligt att närmare bestämma och begränsa denna art. Endast öfverskal föreligga; de äro tunna och erinra till formen om *Cr. Mülleri* Bosq. ehuru de äro något mindre insvängda; de äro ganska djupa och det inre är fyldt med bärgart, som ej kunnat bortprepareras så att muskelintryck o. d. blifvit blottade.

Höjd 10—12 mm; tvärsnitt 12—14.

Endast funnen vid Barnakälla, men där allmän.

Ostrea.

Arterna af detta slägte äro i Sveriges kritsystem ganska talrika och af stor geologisk vigt, i det att åtminstone ett par arter förekomma i mycket stort antal och kunna anses såsom ganska goda ledfossil. Denna deras egenskap motverkas dock i betydlig mån af formernas stora föränderlighet och den däraf följande svårigheten att skarpt begränsa arterna. Förekomsten af en eller annan mera sällsynt mellanform mellan hvarandra närstående arter, synes mig dock icke böra lägga hinder i vägen för att erkänna hufvudtyperna som egna s. k. arter. Ur rent praktisk synpunkt sedt, synes äfven detta lämpligare än att uppställa en omfattande art med åtskilliga underarter, former och varieteter, i synnerhet som äfven en dylik »art» ej torde helt och hållet sakna alla förbindelselänkar till närstående »arter». De till detta slägte hörande formerna kunna lämpligen fördelas i flera grupper, som hvardera omfattar några närmare förbundna arter.

Grupp α.

Ostrea vesicularis Lamarck.

1827. Ostrea vesicularis Lam. Nilsson: Petr. Suec. Form. Cret. s. 29, t. 7, fig. 3, 4, 5; t. 8, fig. 5, 6.
1837. » » » Goldfuss: Petr. Germ., s. 23, t. 81, fig. 2 a—p.
1869. » » » Coquand: Monographie du genre. Ostrea, s. 35; t. 13, fig. 2—10.
1889. » » » Holzapfel: Die Mollusken der Aachener Kreide, s. 253, t. 29, fig. 1, 2. Paleontographica. Bd 35.

Såsom redan Nilsson anmärkt kan man inom denna i hela öfre kritan allmänna art i Sverige urskilja två former, som dock äro genom talrika mellanformer med hvarandra förbundna, näml. en som jag skulle vilja kalla »typica» (Nilssons var. A. testa libera tab. 7, fig. 5, tab. 8, fig. 6) med mera regelbundet krökt, inböjd umbo, ingen eller obetydlig fastväxningsyta, öfre skalet något konkaveradt med radierande strimmor. Denna mera typiska form föreligger hufvudsakligen från Hanaskog (Kb) hvarest den är täml. allmän. Den fins äfven i den ofvannämnda Hjortsbergska samlingen från Oppmanna i rätt betydligt antal. Huruvida de verkligen härröra från denna lokal (d. v. s. Söndraby) är dock tvifvelaktigt; flere exemplar äro säkert tagna på sekundärt lagerställe i de lösa jordlagren, och äro försedda med stora kiselringar. Andra synas hafva legat i en hvitare bärgart än den vid Söndraby, mera lik Mörbys. Det är hufvudsakligen denna form, som förekommer i Mucronatalagren i södra Skåne äfvensom i den yngre kritan.

Den andra, icke typiska formen (Nilssons var. B. adhærens tab. 7, fig. 3, 4, tab. 8, fig. 5; Goldfuss fig. m och n) växlar högst betydligt, är mindre än den typiska formen, från hvilken den ofta skiljer sig ganska mycket och närmar sig följande. Umbo med stor fastväxningsyta, hvarigenom den regelbundna krökningen saknas; skalet går dock alltid bågböjdt uppåt, ej rakt såsom hos nästa art.

Denna form är allmän i Mammillatuszonen ss. vid Ugnsmunnarna, Barnakälla m. fl. st.

Ostrea Hippopodium Nilss.

1827. Ostrea Hippopodium Nilss: Petr. Suec., s. 30, t. 7, fig. 1.
1834. » » Goldfuss: Petr. Germ., s. 23, t. 81, fig. 1 b.
1869. » » Coquand: Monogr. s. 100, t. 18, fig. 5; t. 20, fig. 1—8.
1889. » » Holzapfel: Aachen, s. 252, t. 29, fig. 3—7.

Utmärkt genom sin stora fastväxningsyta och den därifrån rakt uppstigande, låga kanten är denna art nästan alltid lätt igenkänlig, ehuru det dock ej synes mig säkert, att alla de af Coquand, J. Böhm (Die Kreidebildungen des Führberges etc. s. 92, t. 4, fig. 12; Paleontographica, Bd 38) m. fl. till denna art förda formerna verkligen höra hit.

Hébert (Tableau des fossiles de la Craie de Meudon s. 370, Mém. de la Soc. Géol. de France, 2:e sér., t. 5, Mém. n:o 4) har gjort uppmärksam på att Ostrea vesicularis stundom genom intryck på fastväxningsytan visar tillvaron af fossil, på hvilka den varit fastvuxen, men som annars helt och hållet förstörts. Några dylika exempel föreligga äfven från O. Hippopodium, hvarvid Ostrean antagit egendomliga former, som torde förtjäna omnämnas. Det nedan omnämnda exemplaret af Perna från Karlshamn (S. G. U.) har blifvit bevaradt därigenom, att på innersidan af ett Pernaskal ej långt från låset exemplar af O. Hippopodium fäst sig, vuxit ut och då med sin undre yta afgjutit alla ojämnheterna i skalet såsom låsband o. d. När sedan Pernaskalet upplösts men Ostreaskalet bibehållit sig (se härom Johnstrup: Faxekalkens Dannelse etc. s. 30, Kgl. Danske Vid. Selsk. Skrifter 5:te Række 7:de Bind 1864), visar det senare på sin undersida en fullständig och trogen afgjutning af det förra. Ett annat exemplar af O. Hippopodium från Ignaberga visar undersidan försedd med regelbundet ställda tappformiga utskott och har varit fastväxt på en korall (möjl. en Thamnastraeid) af hvilken numera intet annat fins kvar utom de på Ostreans undersida förekommande tappformiga afgjutningarna af djurhusen.

Ett tredje exemplar från Oppmanna (trol. Söndraby) har varit fastvuxet i nafveln af en Ammonit och har antagit spiralform därefter.

Allmän vid N. Ifö, Ugnsmunnarne, Barnakälla m. fl. Mammillatuslokaler; mera sällsynt på Mucronatalokaler, dock funnen vid Mörby.

Grupp β.

Ostrea diluviana L.

1767. Ostracites diluvianus Linné: Systema Naturae, s. 1148.
1821. » » Wahlenberg: Petrificata Telluris Suecanæ s. 58 (Acta Nova Reg. Soc. Scientt. Ups. t. 8).
1827. Ostrea diluviana Nilsson: Petr. Suec. Form. Cret, s. 32, t. 6, fig. 1, 2.
1837. » » Hisinger: Lethaea Suecica, s. 49, t. 14, fig. 5.
1875. » » Hébert et Munier-Chalmas: Bassin d'Uchaux s. 119 (Annales des Sciences Géologiques).

Såsom sistnämnde författare framhållit, har Linné gifvit detta namn åt en kritart från Sverige, som sedermera afbildats af Nilsson och Hisinger, och de anse denna ej finnas annorstädes utom möjligen vid Maestricht. d'Orbigny anser Hisingers figur fram-

ställa den äkta LINNÉska arten, som han anför från undre och mellersta Turon, hvaremot NILSSONS figur skulle framställa en art från U. Senon, hvars namn skulle vara O. frons Park. HISINGERS och NILSSONS figurer framställa i själfva verket två rätt afvikande former, den förra en bredare, den senare en smalare, hvilka dock på grund af talrika öfvergångar ej synas mig kunna föras till skilda arter. Att LINNÉS namn bör tillkomma denna art är otvifvelaktigt. Huruvida härunder ock bör inbegripas de under detta namn af GOLDFUSS och GEINITZ anförda kan jag ej i brist på jämförelsematerial med bestämdhet afgöra.

Denna art, som af förbiseende ej upptagits i List of fossil faunas: Mesozoic, finnes såväl i Mammillatuskritan vid Balsberg (x) Oppmanna (x), Ugnsmunnarne (r) Blaksudden (x), Barnakälla (a), Karlshamn (aa) (saknas dock vid Ignaberga) som Mucronatalagren Kjuge (a) Mörby (r).

Ostrea larva LAM.

1834. Ostrea larva. GOLDFUSS: Petr. Germ., s. 10, t. 75, fig. 1.

Någon med den fullt utbildade *O. larva* (GOLDFUSS fig. 1 c och d) öfverensstämmande form har jag ej sett från Sverige, men väl föreligger ett par exemplar från Balsberg, som fullkomligt öfverensstämma med GOLDFUSS bilder a och b, och som jag därför anser böra räknas till denna art.

Ostrea cuculus COQ.

1827. Ostrea pusilla NILSSON (non BROCCHI) Petr. Suec., s. 32, t. 7, fig. 11 a, b, c.
1869. » cuculus COQUAND: Mongr. du genre Ostrea, s. 52.
1870. » » SCHLÜTER: Neues Jahrbuch s. 951.

Då det af NILSSON för denna art använda namnet redan förut af BROCCHI tillagts en annan art, ändrade COQUAND detsamma till cuculus. Denna art är tämligen allmän i Sverige och det såväl i Ka som Kb., hvaremot jag ej funnit någon af de i senare tid särskilda arter, som stå i närheten af O. cuculus, såsom O. subelmina GRIEPENKERL, O. Bronni MÜLLER, O. Goldfussi HOLZAPFEL och O. Merceyi COQUAND.

Ostrea semiplana SOW.

1803. Ostracites sulcatus BLUMENBACH fide HOLZAPFEL.
1825. Ostrea semiplana SOW. Min. Conch. Tom. 5, s. 144, t. 489, fig. 3.
1827. » flabelliformis NILSSON; Petr. Suec., s. 31, t. 6, fig. 4.
1889. » semiplana HOLZAPFEL; Aachen, s. 256, t. 28, fig. 5, 6.

Det älsta namnet för denna art, som väl beskrefs och afbildades från Sverige af NILSSON, är otvifvelaktigt BLUMENBACHS O. sulcata. Detta artnamn är dock, såsom BRAUNS och HOLZAPFEL påpekat, förut af GMELIN (Systema Naturae 13:de Upplagan 1791, s. 3325 och 3326) användt för en lefvande Ostreaart från kusten af Malabar, hvadan således det näst älsta namnet är O. semiplana.

I såväl Ka som Kb, kanske allmännare i sistnämnda nivå.

Grupp γ.

Ostrea auricularis Wahlenberg.

1821. Ostracites auricularis Wahlenberg: Petr. Tell. Suec. s. 58.
1827. Chama haliotoidea Nilsson: Petr. Suec., s. 28, t. 8, fig. 3.
1870. Exogyra auricularis Schlüter: N. J. s. 938.
1872—75. » » Geinitz: Elbthalgeb. I, s. 184, t. 41, fig. 1—13.
1875. Ostrea » Hébert et Munier-Chalmas: Uchaux s. 119.

Ofvan har jag endast anfört de synonymer, som med full säkerhet kunna hänföras till denna art, en af de allmännaste och mest karakteristiska inom nordöstra Skånes kritbildningar. Såsom Hébert och Munier-Chalmas, utredt är det säkert denna Wahlenbergs art, som af Nilsson identifierades med Chama haliotoidea Sow, från hvilken den ehuru närstående dock bör hållas skild. Namnet O. haliotidæa har för öfrigt af Lamarck användts för en lefvande art från Nya Holland se t. ex. Hist. Nat. des Animaux sans Vertèbres t. 6, 1, s. 209. Hur stora variationer olika exemplar af O. auricularis än visa, synes det mig dock omöjligt att bland dem urskilja olika arter, utan sammanfattar jag alla de svenska formerna under en art med ofvanstående namn. Huru denna svenska art förhåller sig till annorstädes förekommande kan jag på grund af otillräckligt jämförelsematerial ej afgöra. Schröder (Ueber Senone Kreidegeschiebe der Prov. O. und W. Preussen, Zeitschr. d. d. geol. Gesellschaft Bd. 34, s. 260, t. 15, fig. 4 och 5) har från Preussen anfört och afbildat 2 arter, som han kallar O. auricularis Wahl. och O. haliotidea Sow. och som han vill hålla skilda. Alldeles liknande former förekomma ock i Sverige men med så talrika öfvergångar dem emellan, att det synes mig omöjligt att betrakta extremerna såsom skilda arter. Holzapfel (Moll. Aach. Kreide s. 255) har med O. auricularis velat förena O. cornu arietis Nilss, som dock synes mig därifrån väl skild genom djupare underskal, fastväxt med en obetydlig del, mera inböjd hvirfvel, hög, väl utpräglad sida med tydlig köl och betydligt tunnare öfverskal. Storleken växlar mycket och exemplar af 50 mm. längd och därutöfver förekomma, ehuru mindre äro vida vanligare. Finnes på så godt som alla kritlokaler och ofta i stor mängd, särskildt i Mammillatuszonen. Ehuru den äfven finnes i Mucronatazonen, kan dock dess massvisa uppträdande snarast anses beteckna Mammillatus.

Ostrea cornu arietis Nilss.

1827. Chama cornu arietis Nilsson: Petr. Suec. s. 28, t. 8, fig. 1.
1870. Exogyra » » Schlüter: N. J. s. 938.
1889. Ostrea » » Griepenkerl: Die Versteinerungen der senonen Kreide von Königslutter s. 35 (Dames und Kayser: Paläontologische Abhandlungen, Bd 4).

Först beskrifven såsom egen art af Nilsson och af Schlüter erkänd såsom sadan, har O. cornu arietis i senare tider af flere författare förenats med närstående arter så af Holzapfel med O. auricularis och af Griepenkerl med O. laciniata. För de karakterer hvarigenom O. cornu arietis kan skiljas från O. auricularis har under denna art redogjorts

och ej häller synes mig O. laciniata böra inbefattas under O. cornu arietis, om ock mellanformen mellan de typiskt utbildade ej helt och hållet saknas. O. laciniata har vanligen det upprätta partiet större, försedt med vågiga tillväxtstrimmor, som oftast äro utdragna i platta taggar, saknar de hos O. cornu arietis förekommande och i synnerhet vid hvirflarne utpräglade långsgående ribborna; tillväxtstrimmorna hos O. cornu arietis äro ej vågiga och stå tätare. O. laciniata har vanligen betydligt större fastväxningsyta. Öfverskalen äro däremot så lika att de knappt kunna skiljas.

O. cornu arietis är allmän vid Kjuge och saknas, såsom SCHLÜTER påpekat, på de mest utpräglade Mammillatuslokalerna t. ex. Ignaberga och Balsberg, och är väl snarast att anse såsom karakteristisk för Mucronatazonen.

Ostrea laciniata NILSS.

1827. Chama laciniata NILSS: Petr. Suec., s. 28, t. 8, fig. 2.
» Ostrea incurva » » » , s. 30, t. 7, fig. 6.
1870. Exogyra laciniata SCHLÜTER: N. J. s. 938.
189 . Ostrea » HOLZAPFEL: Moll. Aach. Kreide, s. 254.

Om dess förhållande till O. cornu arietis är under denna art redogjordt. SCHLÜTER var den förste, som påpekade denna arts stratigrafiska vigt och dess förekomst i Ignabergakalkstenen och i Tyskland Quadratenkreide såsom ett bevis för bägge dessa bildningars ekvivalens. I Sverige förekommer dock O. laciniata, dit ock O. incurva NILSS. hör, äfven, om ock sällsyntare, i Mucronatakritan såsom vid Kjuge och Mörby, hvaremot den är funnen på nästan alla Mammillatus lokaler och tydligen har sin hufvudutbredning inom denna zon.

Grupp δ.

Ostrea acutirostris NILSS.

1827. Ostrea acutirostris NILSSON: Petr. Suec. s. 31, t. 6, fig. 6.

Tillsammans med de två följande arterna bildar denna en sammanhängande serie, inom hvilken 3 »arter» kunna urskiljas, hvilka dock äro med hvarandra nära förbundna genom ej alltför sällsynta mellanformer, så att det stundom är omöjligt att afgöra, till hvilkendera af dem ett eller annat exemplar rätteligen bör föras. Det synes dock lämpligast att bibehålla dessa 3 arter, hvilka med samma allmänna byggnad — långsträckta, spad- eller tungformiga, vanl. ej mycket olikstora skal, med inga eller helt svaga ribbor och ingen eller obetydlig fastväxningsyta — hufvudsakligen skiljas från hvarandra genom ligamentbandets riktning och form, som hos O. acutirostris är rakt och spetsigt, hos O. curvirostris bågböjdt, under det att O. scaniensis är fastväxt med en större del af umbonalpartiet och har rak men åt sidan riktad ligamentgrop. Detta i deras typiska former, mellan hvilka dock såsom ofvan nämdes, mellanformer finnas. Huruvida de såsom O. acutirostris och O. curvirostris från Maestricht och mediterrana kritbildningar anförda formerna verkligen äro identiska med de svenska, synes mig ingalunda afgjordt.

I Mammillatuslagren på Ifö och i Oppmannatrakten tämligen allmän; ej funnen i Mucronatalagren.

Ostrea curvirostris Nilsson.

1827. Ostrea curvirostris Nilsson: Petr. Suec., s. 30, t. 6, fig. 5.

Samma utbredning som föregående.

Ostrea scaniensis Coquand.

1869. Ostrea scanensis Coquand: Mon. du genre Ostrea s. 44, t. 17, fig. 14—16.

Sällsyntare än de bägge föregående, tillsammans med hvilka den är funnen i Oppmannatrakten; vanligen något större än dessa.

Grupp ε.

Ostrea lobata Marklin.

Tafl. 1, fig. 5.

Med detta namn har Marklin betecknat en form, som nu här för första gången afbildas och beskrifves. Skalen föga djupa, nästan plana, med något förtjockade kanter, som äro krenulerade. Såsom genom namnet antydes, visar omkretsen flera mer eller mindre djupa inbugtningar med mellanliggande framskjutande partier. Längd 100 mm. bredd. 105 mm.

En något liknande, ehuru svagare utpräglad byggnad visar O. crenulimargo F. Roemer: Kreidebildungen von Texas, s. 76, t. 9, fig. 6, med hvilken dock vår art ej kan förväxlas.

Sällsynt i Mammillatuszonen vid Ignaberga och Balsberg, ej så sällsynt och bättre utvecklad vid Karlshamn.

Ostrea Marklini n. sp.

Tafl. 1, fig. 1 och 4.

Det kan synas djärft och obefogadt att uppställa en ny form af Ostrea, i synnerhet då den, såsom just nu i fråga varande, utmärker sig genom sin brist på framträdande karakterer. Denna form skiljer sig dock bestämdt från öfriga i Kristianstadsområdet funna och har ej kunnat identifieras med någon annan förut beskrifven art.

Rundad, platt, fastväxt med hela underskalets undre sida, med stort ligamentparti och muskelintryck; nära kanten löper en något upphöjd valk, som väl utgjort gränsen för själfva djuret och därutanför ett något vågigt bräm.

Längd 115 mm., bredd 100 mm.

Endast funnen vid Karlshamn och Blaksudden. Ka.

Anomia.

Af detta slägte förekomma inom Kristianstadsområdet flera arter, som dock på grund af exemplarens mindre tillfredsställande bevaringssätt för närvarande ej kunna med full säkerhet begränsas och bestämmas. Följande 3 arter torde säkert vara skilda, om ock de båda förstas identitet med de arter, med hvilka de jämförts, ej kan anses såsom fullt säker.

Anomia cf subtruncata D'ORB.

1842. Anomia truncata GEINITZ: Charakt. etc. andra uppl. 1852. s. 87, t. 19, fig. 4, 5.
1850. » subtruncata D'ORBIGNY: Prodrome t. 2, s. 171, n:o 526.
1872. » » GEINITZ: Elbthalgebirge II, s. 30, t. 8, fig. 22, 23.

Med denna art ganska nära öfverensstämmande skal af en Anomia förekomma ej just sällsynt vid Barnakällegrottan. Ka. annars sällsynt på flere lokaler.

Anomia cf semiglobosa GEINITZ.

1850. Anomia semiglobosa GEINITZ: Quadersandsteinsgebirge sh. s. 206, t. 11, fig. 6—9.

Sällsyntare än föregående finnas vid Barnakälla exemplar af en annan Anomia-art, som nära öfverensstämma med denna art.

Anomia? sp.

Troligen hör till detta slägte ännu en tredje vid Barnakälla, täml. sällsynt förekommande art. Det ena skalet, ogenomborradt, ung. 35 mm. genomskärning täml. platt, tjockt, med en liten sned hvirfvel, ung. som hos A. EWALDI FRECH (Zeitschr. d. deutsch. geol. Ges., Bd 39, s. 154, t. 11, fig. 4, t. 12, fig. 20—23. 1887. Det genomborrade skalet ej säkert kändt; dock torde möjligen såsom sådant böra tolkas ett starkt, tjockt, konvext, nästan Cranie likt skal, af ung. samma storlek som det förra; den trubbiga spetsen ligger ett stycke från kanten, som synes visa en liten urnupning. Materialet för ofullständigt och illa bevaradt för att tillåta en närmare beskrifning och bestämning.

Plicatula cf nodosa DUJ.

1872. Plicatula nodosa. GEINITZ: Elbthalgeb. II, s. 32, t. 9, fig. 5.

2 exemplar med talrika fina, något vågiga, radierande ribbor öfverensstämma med afseende på storlek och ornamentering så med GEINITZ' anförda beskrifning och figurer, att de säkerligen böra föras hit. Möjligen höra ock hit tre något större exemplar med färre och gröfre ribbor, ehuru de dock kanske snarare böra räknas till Plicatula inflata GOLDFUSS: Petr. Germ. s. 102, t. 107, fig. 6 a, enär antydan till taggar finnas på ett par af ribborna.

Alla exemplaren från Balsberg. Professor A. W. MALM.

Lima granulata Nilss.

1827. Plagiostoma granulatum Nilss: Petr. Suec., s. 26, t. 9, fig. 4.

Denna i både Ka och Kb utbredda art föres af Brauns (Die senonen Mergel des Salzberges bei Quedlinburg s. 396, Zeitschrift f. d. gesammt Naturwissenschaften, Bd 36, 1876) till slägtet Limaea, hvars karakterer jag dock ej kunnat konstatera på svenska exemplar.

Lima Hoperi Mant.

1822. Plagiostoma Hoperi Mantell: Fossils of the South Downs etc. s. 201, t. 26, fig. 2, 3, 15.
1827. » punctatum (non Sow.) Nilsson: s. 24, t. 9, fig. 1.
1841. Lima Nilssoni Roemer: Verstein. d. Norddeutsche Kreidegebirges, s. 57.

Denna art, som först beskrefs af Mantell, identifierades med orätt af Nilsson med Sowerbys Pl. punctatum, en juraart. Hisinger kopierade Goldfuss afbildning (t. 101, fig. 2) af Lima punctata så att Hisingers bild ej representerar exemplar från Sverige; hans beskrifning är en kopia af Nilssons. Till den utförliga utredning af Lima Hoperi Mant. och dess förhållande till L. Mantelli Brgt, som Strombeck gifvit (Zeitschr. d. deutsch. Geol. Gesell., Bd 15, s. 148; 1863) har jag intet att tillägga.

Inom Kristianstadsområdet mig endast bekant från Mammillatuszonen, ss. Ignaberga, Balsberg, V. Olinge, Barnakälla, öfverallt sällsynt.

Lima muricata Goldf.

1834—40. Lima muricata Goldf. s. 89, t. 103, fig. 4.

På grund af likheten med Goldfuss ofvan anförda figurer böra nog till denna art räknas några ej särdeles väl bevarade exemplar, som funnits vid Ignaberga, Balsberg, Barnakälla och Oppmanna, öfverallt mycket sällsynt och hittills endast anträffad i Ka.

Lima ovata Nilss.

1827. Plagiostoma ovatum Nilsson: Petr. Suec., s. 25, t. 9, fig. 2.

Med denna art förenade d'Orbigny äfven den af Matheron beskrifna L. marticensis (Pal. Franc. t. 3, s. 553, t. 421, fig. 16—20) som visserligen står den svenska arten täml. nära men som dock kan och bör hållas därifrån skild, såsom Zittel påpekat (Gosau Bivalven. Denkschriften d. K. Akad. d. Wissenschaften Wien Bd 25, 1866).

Funnen såväl i Ka som Kb; i den förra zonen särskildt allmän vid Barnakälla, äfvensom vid Blaksudden.

Lima semisulcata Nilss.

1821. Ostracites decussatus Wahlenberg: Petr. Tell. Suec., s. 59, t. 4, fig. 7—9.
1827. Plagiostoma semisulcatum Nilsson: Petr. Suec., s. 25, t. 9, fig. 3.

Visserligen är Wahlenbergs artnamn äldre än Nilssons men då dels detta senare allmänt användts, dels namnet decussata tillagts en närstående, men skild art, skulle det

åstadkomma stor förvirring, om man härvidlag ville strängt tillämpa prioritetsprincipen. HISINGER har med afsende på denna art meddelat NILSSONS beskrifning, men kopierat GOLDFUSS afbildning af L. decussata.

Såväl i Ka som Kb.

Lima tecta GOLDFUSS.

1834—40. Lima tecta GOLDFUSS: Petr. Germ., s. 91, t. 104, fig. 7.
18 . » » GEINITZ: Elbthalgebirge I, s. 206, t. 43, fig. 3.

Säkert till denna art hörande exemplar äro funna vid Ignaberga, Balsberg, Barnakälla och Karlshamn; således endast i Ka och är öfverallt mycket sällsynt.

Pecten subaratus NILSSON.

1827. Pecten subaratus NILSSON: Petr. Suec., s. 21, t. 9, fig. 11.

Denna art, som genom förbiseende ej blifvit upptagen i List, synes förekomma i N. Ö. Skåne såväl i Ka, hvarest den på de flesta ställen är täml. allmän och vid Barnakälla mycket allmän, som i Kb. Någon stratigrafisk vigt synes ej tillkomma densamma.

Pecten septemplicatus NILSSON.

1827. Pecten septemplicatus NILSSON: Petr. Suec., s. 20, t. 10, fig. 8.

Denna art saknas visserligen icke helt och hållet i Kb, men är så mycket allmännare i Ka, att den kan anses nästan såsom kännetecknande för denna zon.

Pecten sublaminosus FAVRE.

1836. Pecten laminosus GOLDFUSS: Petr. Germ., s. 76, t. 99, fig. 9.
1869. » sublaminosus FAVRE: Lemberg, s. 143, t. 13, fig. 1.

Det synes mig vara bäst att för denna art använda det af FAVRE begagnade namnet, oaktadt HOLZAPFEL brukar benämningen P. laminosus GOLDF. (non Mant.)

Denna art är i Sverige mycket sällsynt och endast anträffad vid Ignaberga och Balsberg.

Pecten Ignabergensis n. f.

Tafl. 1, fig. 3.

1888. List. s. 13, n:o 63.

Rund, platt, tjockskalig. Radierande ribbor mycket talrika med fina, skarpa mellanrum, koncentriska linier O; öronen små.

Endast funnen vid Ignaberga och där mycket sällsynt.

Vola quadricostata Sow.

1812. Pecten quadricostatus Sow.: I, s. 121, t. 56, fig. 1, 2.
1834—40. » » Goldfuss: Petr. Germ., s. 54, t. 102, fig. 7.

Denna form uppnår i Sverige ej så betydlig storlek som V. quinquecostata och är äfven sällsyntare och hittills endast funnen i Ka.

Vola striatocostata Goldf.

1834. Pecten striatocostatus Goldfuss: Petr. Germ., s. 55, t. 93, fig. 2.
1843—47. Janira » d'Orbigny: Pal. Franc. t. 3, s. 650, t. 449, fig. 5—9.

Fullkomligt öfverensstämmande med de anförda beskrifningarne och figurerna. Hittills endast funnen vid Karlshamn (Ka) och där sällsynt.

Avicula Ignabergensis n. f.

Tafl. 1, fig. 2.

Då det material af denna form, som står mig till buds, är så ringa, skulle jag ej inlåtit mig på beskrifning däraf, om densamma ej förut i literaturen anförts af de Morgan (Mém. sur les terrains crét. de la Scandinavie d. 27 i Mém. Soc. de France. Sér. 3, tome 2. 1882). Utom det af de Morgan funna exemplaret föreligger ännu ett ur framl. Professor A. W. Malms samlingar. Skalet bevaradt. I afseende på formen står denna art nära A. anomala Briart och Cornet (Description de la Meule de Bracquegnies, s. 52, t. 4, fig. 7 i Mém. Couronnés etc. de l'Acad. Roy. de Belgique t. 34. 1868) men är mindre och har endast främre partiet försedt med knöliga ribbor, i hvilket afseende den liknar A. coerulescens Nilss., men är större och mera böjd än denna art. Från A. raricostata Reuss (se Zittel: die Bivalven den Gosaugebilde, t. 2, s. 90, t. 13, fig. 6; Denkschr. d. K. Ak. Wiss. Wien Bd 25, 1866) skiljer den sig genom något olika form och mindre afskildt främre parti samt mindre vinge och synes den tillhöra en egen art, utmärkt genom skalets krökta form, den lilla vingen och den fina ornamenteringen på skalets främre del.

Endast funnen vid Ignaberga rr.

Avicula pectinoides Reuss.

1845—46. Avicula pectinoides Reuss: Verst. Böhm. Kreidef., s. 23, t. 32, fig. 8, 9.
1887. » » » Frech: Zeit. d. d. geol. Ges. Bd 39, s. 156, t. 14, fig. 6—9.
1889. » » » Holzapfel: Aachener Moll. II, s. 226, t. 25, fig. 20.

Fyra stenkärnor med obetydliga skallämningar, 2 från hvardera sidan, föreligga och af mig i literaturen tillgängliga arter öfverensstämma de bäst med A. pectinoides, särskildt så som denna art beskrifvits och afbildats af Frech. Arten tyckes vara ganska variabel, men då emellertid våra exemplar stämma väl med Frechs framställning, anser jag mig kunna hänföra dem till A. pectinoides Reuss.

Balsberg (rr) Malm.

Gervillea solenoides Defr.

1889. Gervillea solenoides Defr. Holzapfel: Aachen. Moll., II, s. 223, t. 24, fig. 11—13.

Ehuru hvarken fullständiga eller väl bibehållna exemplar föreligga, kunna dock åtskilliga fragmenter med ganska stor säkerhet hänföras till denna art.

Endast funnen i (Ka) Blaksudden, Barnakälla och i block vid Ljungasanden.

Af slägtet Inoceramus finnas sannolikt flera arter, som dock på grund af det dåliga bevaringssättet ej kunna närmare bestämmas. Följande tre arter torde dock säkert kunna urskiljas.

Inoceramus Crippsi Mant.

1872. Inoceramus Crippsi Mant. Geinitz: Elbthalgebirge II, s. 49, t. 13, fig. 11—15.
1876. » » » Schlüter: Inoceramus s. 29. Palaeontographica.
1877. » » » Lundgren: Geol. För. Förhandl. Bd 3, s. 94, t. 5, fig. 1.

Stenkärnor, som med full säkerhet böra hänföras till denna art och framställa dess typiska form, föreligga från såväl Barnakälla som Blaksudden.

Inoceramus planus Goldf.

1834—40. Inoceramus planus Goldf.: Petr. Germ., s. 117, t. 113, fig. 1 b (non 1 a).
1872. » » » Geinitz: Elbthalgeb. II, s. 49.
1876. » cf planus » Lundgren: Geol. För. Förhandl. s. 96, t. 5, fig. 2.
1877. » Crippsi Schlüter: Inoceramus s. 29.

Goldfuss I. planus är enl. Schlüter endast en form af I. Crippsi och enl. Geinitz bildar den en mellanform mellan denna art och I. Cuvieri. Det från N. Ö. Skåne föreliggande materialet är alldeles för dåligt och otillräckligt att lösa frågan om I. planus Goldf. sammanhang med och ställning till öfriga arter. Då emellertid några exemplar, öfverensstämmande med Goldfuss ofvan anförda figur, blifvit funna och de synas täml. väl skilja sig från I. Crippsi, har jag ansett bäst att, åtminstone tills vidare, uppföra dem under benämningen I. planus. Utom vid Ignaberga äfven i lösa block vid Ljungasanden.

Inoceramus sp.

Af denna art föreligga endast skalfragmenter, så att den allmänna formen o. d. ej kunnat iakttagas. De tillhöra dock säkert en från de föregående skild art, utmärkt genom skalets betydliga tjocklek (ända till 17 mm.) hvaremot dessa äro mycket tunnskaliga.

Oretorp (Ka), Hemmingslycke (Kb).

Perna sp.

Utom det under Ostrea Hippopodium nämda exemplaret af en Perna är från nu i fråga varande kritbildningar intet annat bekant och är detta tydligen för obetydligt för att därpå grunda någon bestämning.

Karlshamn.

Mytilus ornatus Münst.

1834—40. Mytilus ornatus Münst. Goldfuss: Petr. Germ. s. 171, t. 129, fig. 8.

Två exemplar med bibehållet skal stämma med afseende på storlek, form och skalets ornamentering så väl med Goldfuss beskrifning och afbildning af denna art från Haldem, att de säkerligen böra föras dit. Ett tredje något mindre exemplar torde representera ett yngre stadium.

Balsberg (Ka, rr) A. W. Malm.

Cucullaea Matheroniana d'Orb.

1827. Arca rhombea Nilsson (non Bruguière): Petr. Suec., s. 15, t. 5, fig. 2.
1843—47. » Matheroniana d'Orbigny: Pal. Franc., t. 3, s. 238, t. 325.
1889. Cucullaea » Holzapfel: Aachener Moll., t. 2, s. 208, t. 22, fig. 2, 4, 8.

För så vidt man efter ej synnerligen väl bevarade stenkärnor kan döma, tillhör den svenska form, som af Nilsson kallades A. rhombea, d'Orbignys A. Matheroniana, som dock bör föras till slägtet Cucullaea. Nilssons artnamn är visserligen äldre än d'Orbignys, men kan dock ej för denna art bibehållas, enär det redan förut af Bruguière användts för en lefvande Arca (se Lamarck: Hist. Nat. d. Animaux sans Vertèbres t. 6, 1, s. 43). För den närmare karakteristiken af Cucullaea Matheroniana och dess förhållande till C. subglabra får jag hänvisa till Holzapfel. Hittills endast i Ka; Balsberg, Barnakälla, Blaksudden.

Cucullaea exaltata Nilss.

Tafl. 2, fig. 14.

1827. Arca exaltata Nilsson: Petr. Suec., s. 15, t. 5, fig. 1.

Mellan denna och föregående art tyckas i Sverige inga mellanformer förekomma, utan synas dessa arter vara väl skilda. Från föregående skiljer sig C. exaltata, utom genom betydligare storlek, genom formen, som är kortare och betydligt bukigare, genom större umbones och färre tänder i låset. Det synes mig föga sannolikt, att Goldfuss' A. exaltata (Petr. Germ., s. 142, t. 122, fig. 1) är samma art som den från Sverige. Nilsson kände af denna art blott ett ofullständigt exemplar från Karlshamn. Sedermera hafva visserligen flera andra exemplar, som öfverensstämma med originalet, funnits, men endast stenkärnor.

Karlshamn, Barnakälla, Blaksudden. Ka.

Arca pharelloides n. f.

Tafl. 2, fig. 8.

Då det material, som föreligger af denna form, är ganska dåligt, skulle den ej förtjänt att närmare omtalas, om det ej vore för den stora habituella likhet den företer med den i geol. afseende så vigtiga s. k. Pharella De Geeri. Hela stenkärnans form stämmer så nära med den hos denna art, att man lätt kan förväxla ofullständiga eller mindre väl

bevarade exemplar, hur olika systematisk ställning än dessa former intaga. Muskelintryck, mantelbugtlinie och låsets byggnad, då dessa kunna iakttagas, skilja dem naturligtvis lätt åt. Från andra i n. ö. Skåne förekommande Arcaarter skiljer sig A. pharelloides genom sin långsträckta form, sin tunnhet, sina små och talrika låständer, som äro föga snedställda.

Endast 2 exemplar från Blaksudden.

Pectunculus.

Af detta slägte föreligga endast stenkärnor, som ej äro nog väl bevarade för att tillåta en fullt säker artbestämning. Den öfre kritans Pectunculusarter stå hvarandra nämligen så nära att det fordras ett godt material för att kunna säkert urskilja de olika arterna. Jag anser det därföre bäst att för närvarande endast påpeka förekomsten af slägtet och öfverlämna den närmare bestämningen af arterna till fyndet af bättre bevaradt material. Nilsson anför P. lens från Balsberg och jag P. decussatus Roem från Barnakälla. Den förstnämda arten är ej väl begränsad och det är möjligt, ja troligt, att det är den senare arten, som finnes vid Barnakälla, men med full säkerhet kan det på grund af det föreliggande materialets beskaffenhet ej utsägas. Slägtet har representanter vid Balsberg, Blaksudden, Barnakälla, Karlshamn.

Trigonia cf Buchi Gein.

Tafl. 1, fig. 6, 7.

1850. Trigonia Buchi Geinitz: Charakt. ect. s. 54, t. 21, fig. 1, 2.
1876. » » » Elbthalgebirge I, s. 225, t. 49, fig. 15, 16.
1888. » sp. Lundgren: List. s. 15, n:o 106.

Endast stenkärnor och intryck af skalets yttersidor föreligga, hvaremot skalet, som synes hafva varit ganska tjockt, helt och hållet förstörts. Främre delen rundad, den bakre ganska långt utdragen i en smal del; umbones nära främre randen. Främre delen försedd med knölar, som äro ordnade i såväl radierande som koncentriska rader; bakre delen endast med radierande, skarpt framträdande, ribbor, utan eller med högst få knölar.

Denna form, som bestämdt skiljer sig från såväl Tr. Vaalsiensis som aliformis och limbata, synes snarast öfverensstämma med den af Geinitz beskrifna och, ehuru ingalunda väl, afbildade Tr. Buchi. Då emellertid äfven det material, som stått mig till buds, är långt ifrån godt, kan identiteten mellan vår form och Geinitz Tr. Buchi ej anses fullt säker, om ock mycket sannolik.

Endast funnen i Ka Balsberg, Barnakälla, Blaksudden, block från Ljungasanden och trol. Ylsudden.

Astarte cf similis Goldf.

1889. Astarte similis Goldf. Holzapfel: Aachen Moll. II, s. 194, t. 19, fig. 11—15.

Såvidt man efter stenkärnor och intryck kan döma, förekommer denna art vid Barnakälla.

Eriphyla lenticularis Goldf.

1889. Eriphyla lenticularis Goldf. Holzapfel: Aachener Moll; II, s. 195, t. 14, fig. 5—7.
1891. » » » Langenhahn und Grundey: Das Kieslingswalder Gestein und seine Versteinerungen s. 12, t. 3, fig. 31.

Några stenkärnor äro så väl bevarade, att deras bestämning såsom hörande till denna art kan anses fullt säker och troligen hör äfven hit ett rätt stort antal, som dock äro för illa bevarade för att säkert bestämmas.

Balsberg (Fissurellabärgarten), Blaksudden, Ljungasanden, Barnakälla; i Kristianstadsområdet således endast i Ka.

Opis bicornis Gein.

1876. Opis bicornis Gein: Elbthal I, s. 227, t. 50, fig. 1—3.

Med Geinitz beskrifning och afbildning fullkomligt öfverensstämmande stenkärnor äro funna vid Karlshamn, sällsynt.

Crassatella arcacea Roem.

1889. Crassatella arcacea Roem. Holzapfel: Aachen II, s. 191, t. 20, fig. 1—5.

En utmärkt väl bevarad stenkärna från Gillaruna tillhör säkert denna art, liksom ock några andra stenkärnor från Blaksudden, Barnakälla och Karlshamn, möjligen finnes arten ock vid Ylsudden. I Kristianstadsområdet är den således hittills endast funnen i Ka och äfven där mycket sällsynt.

Rudister.

I öfverensstämmelse med G. Müllers utredning af hithörande former (Die Rudisten der Oberen Kreide am nördlichen Harzrande i Jahrbuch d. k. preussischen geol. Landesanstalt f. 1889) anser jag det nu lämpligast att såsom »arter» uppföra de af mig förut (Om Rudister i Kritformationen i Sverige. Lunds Universitets Årsskrift, t. 6, 1870) såsom varieteter af en omfattande och varierande art beskrifna formerna. Härtill kommer då en ny och sannolikt finnas flera, ehuru det befintliga materialet ej är så godt, att det tillåter en närmare bestämning och beskrifning.

Radiolites suecicus Ldgrn.

1870. Radiolites suecicus Lundgren: Rudister, s. 8, t. 1, fig. 1—8.
1889. » » Müller: Rudisten s. 144, t, 18, fig. 2.

Ignaberga, Balsberg, Ugnsmunnarna, Barnakälla, Karup i Halland, möjl. ock vid Blaksudden och i Fissurellabärgarten vid Balsberg, således endast i Ka.

Radiolites pusillus LDGN.

1870. Radiolites suecicus β pusillus LDGN: Rudister, s. 9, t. 1, fig. 8—15.
1889. » pusillus LGN. MÜLLER: Rudisten, s. 142, t. 18, fig. 5—11.

Balsberg, Oppmanna, Barnakälla, Båstad och V. Karup i Ka; Mörby (Kb) här rr.

Radiolites sublaevigatus LDGN.

1870. Radiolites suecicus γ sublaevigatus LGN; s. 10, t. 1, fig. 16—24.
1889. » sublaevigatus LGN. MÜLLER: Rudisten, s. 143, t. 18, fig. 12.

Sönnarslöf allmän, Ljungasanden, således endast i Ka.

Radiolites hercynius EWALD.

1856. Biradiolites hercynius EWALD: Monatsberichte d. K. Akad. d. Wissenschaften zu Berlin s. 3.
1887. Radiolites suecicus δ costatus DE GEER: Barnakällegrottan s. 301. Geol. För. Förhandl.
1889. » hercynius EWALD; MÜLLER Rudisten, s. 140, t. 18, fig 3, 4.

Såsom MÜLLER påpekat är den af DE GEER från Barnakälla beskrifna varieteten costatus af R. suecicus säkerligen identisk med den af EWALD förut beskrifna, men ej afbildade R. hercynius; ej sällsynt vid Barnakälla.

Med undantag af den mycket sällsynta förekomsten af R. pusillus i Kb vid Mörby, äro i Kristianstadsområdet Radioliterna annars endast funna i Ka.

Cardium productum SOW.

1889. Granocardium productum SOW. HOLZAPFEL: Aachener Moll, II, s. 179, t. 17, fig. 1—5.

Genom förekomsten af såväl goda stenkärnor som skarpa intryck af skalets yttersida har det varit möjligt att med full säkerhet konstatera förekomsten af denna art, för hvilken vidare hänvisas till HOLZAPFEL.

Tämligen allmän vid Blaksudden, förekommer denna art troligen ock vid Barnakälla. Ka.

Tapes faba SOW.

1889. Tapes faba SOWERBY, HOLZAPFEL: Aachener Moll, II, s. 165, t. 13, fig. 7—10.

Ehuru endast 3 stenkärnor föreligga, äro dock dessa så skarpt och väl bevarade och öfverensstämma så fullkomligt med HOLZAPFELS beskrifningar och afbildning, att det är fullt säkert att denna art föreligger från Blaksudden, möjl. också från Barnakälla. Ka.

Cytherea ovalis Goldf.

1889. Cytherea ovalis Goldfuss, Holzapfel: Aachener Moll, II, s. 169, t. 13, fig. 11—15.

Äfven af denna art äro några stenkärnor så väl bevarade, att bestämningen kan anses såsom fullt säker.

Blaksudden, mindre sällsynt än föregående.

Icanotia? grosseplicata n. f.

Tafl. 2, fig. 12, 13.

Utom ett par fragmentariska intryck af skalets yttersida föreligga endast stenkärnor och hos ingen af dessa är låspartiet o. d. bevaradt, så att, med det nu till buds stående materialet, någon säker slägtbestämning icke är möjlig, hur skarpt och väl utpräglad än själfva arten må vara. Formen är långsträckt, bortåt 3 gånger mera lång än hög; tämligen tunn och platt; framtill afsmalnande, bakåt något bredare; framkanten rundad, pallealkanten likaså, bakkanten snedt afskuren med rundade hörn, låskanten något konkaverad. Umbones föga framstående belägna framför den tredje fjerdedelen, låsets beskaffenhet obekant likaså mantellinjen; främre muskelintrycket stort, triangulärt, bakre obekant. Den främre och den kring umbones liggande delen af stenkärnan är glatt; bakom umbones uppträda 5—8 breda grofva ribbor, som med tilltagande styrka fortsätta till bakkanten; de äro gröfst närmare pallealkanten och aftaga i styrka mot låskanten.

På grund af ofvan beskrifna habitus och skulptur företer denna form likhet med 2 vidt skilda grupper näml. å ena sidan med Solenomya, å den andra med de former, som gruppera sig kring den art, som Zittel kallat Psammobia impar (Gosaubivalven, s. 120, t. 2, fig. 14. Denkschrift d. Ak. Wiss. Wien. Bd 24, 1864 och Matheron: Recherches Paléont. dans le Midi de la France, 7 ème Partie, pl. G. 10 fig. 9). Vår form liknar visserligen denna senare, men har gröfre ribbor och kan ej med densamma identifieras lika litet som med Solemya subplicata Meek och Hayden.

På grund af det dåliga bevaringssättet, framför allt saknaden af lås och mantellinje, kan det ej afgöras om ifrågavarande form hör till Solenomya eller till Veneridae. Jag har hänfört den till slägtet Icanotia bland Veneridae, som just har denna skulptur (se Zittel: Palaentologie II, s. 110), emedan Solemyidae äro djupvattensinnevånare, under det att Veneridae finnas äfven på grundare vatten och den bärgart, hvari Icanotia grosseplicata förekommer, liksom den densamma beledsagande faunan, tydligen visar sig vara en grundvattensbildning.

Blaksudden, ej sällsynt, Barnakälla (rr), block vid Ljungasanden endast i Ka.

Pharella? De Geeri n. f.

Tafl. 2, fig. 9, 10, 11.

1887. Pharella? sp. De Geer: Geol. För. Förhandl. s. 299.
1888. » » Lundgren: List s. 15, N:o 127.

Såsom Pharella? sp. uppförde jag i De Geers förteckning öfver Barnakällegrottans fossil, en därstädes ingalunda sällsynt form, som då var mig obekant annorstädes ifrån.

Ehuru den säkerligen ej med rätta kan föras till slägtet Pharella behåller jag den likväl tillsvidare under detta slägte, enär jag ej med bestämdhet kan för närvarande hänföra densamma till något annat.

Stenkärnan är långsträckt, ungefär jämnbred, framtill rundad, baktill snedt afskuren; skalen hafva ej varit slutna baktill. Umbones anteriediana; från desamma går bakåt nedåt en tämligen skarp kant; mantellinjen med djup bugt, som nästan når till under umbones. Främre muskelintrycket dubbelt, d. v. s. ett litet sådant, tydligt framträdande, närmare umbo och ett större nedanför liggande, genom en skarp fåra på stenkärnan (d. v. s. genom en valk på skalets innersida) skildt från det förra. Låsets byggnad kan ej utrönas, dock synas låständer sannolikt hafva funnits, liksom ock bakre sidotänder. Efter ett intryck att döma har skalets yttersida varit försedd med tättstående fina koncentriska strimmor.

Längd 50—80 m., höjd 20—35 m.

Till följd af det dubbla främre muskelintrycket, den djupt inskurna mantellinjen och den sannolika förekomsten af låständer och bakre sidotänder, kan denna form svårligen tillhöra Pharella liksom ej häller Solen eller Panopæa. Förrän exemplar med bättre bibehållet låsparti anträffas, torde det knappt vara möjligt att säkert bestämma denna arts generiska plats.

Af mig i literaturen bekanta arter företer nu i fråga varande likhet med Panopaea sinuata Reuss. (Böhmische Kreide, t. II, s. 17, t. 36, fig. 4) och Solen Guerangeri d'Orb. (Pal. Franc. t. III, s. 321, t. 351, fig. 1, 2, enl. Stoliczka tillhörande Pharella eller Azor) utan att dock kunna med någondera identifieras. Genom främre muskelintryckets byggnad liknar den Mactromya mactroides Agassiz (Myes, s. 190, t. 9 b, fig. 10 hvilken art af Zittel (Palaeontologie s. 117) föres till Quenstedtia nära Gari bland Tellinidae, af Stoliczka till Vanganella bland Mactridae. För att kunna säkert bestämma denna forms generiska plats, måste bättre material afvaktas.

Barnakälla och Blaksudden allmän, Oppmanna och Balsberg sällsynt; från det senare stället äfven ett intryck af skalets yttersida; således endast funnen i Ka.

Panopaea regularis d'Orb.

1843— . Panopaea regularis d'Orbigny: Pal. Franc. t. 111, s. 343, t. 360, fig. 1, 2.
1875. » » » Geinitz: Elbthalgeb. t. II, s. 69, t. 19, f. 3, 4.

Holzapfel klagar med rätta öfver det tillstånd hvari kännedomen om arterna af slägtet Panopaea befinner sig; detta beror väsentligen på materialets beskaffenhet, endast stenkärnor, som därtill ofta äro mer eller mindre förtryckta.

I Sverige funna exemplar, som jag hänför till denna art, uppnå en längd af omkr. 80 mm. och en höjd af omkr. 55 mm. och variera något i afseende på form; mantellinjen är väl utpräglad med tämligen djup sinus; stenkärnan nästan glatt endast med svaga koncentriska valkar. Skalets yttersida har, att döma efter ett intryck, varit försedd med fina, ej skarpa, koncentriska linjer.

Bland våra exemplar finnas några, som närma sig fig. 4 hos Geinitz, ehuru ej fullt så höga; andra likna mera d'Orbignys afbildning samt fig. 3 hos Geinitz. Denna senare

anses af HOLZAPFEL (Aach. Moll II, s. 157) tillhöra P. glycimeris, så att GEINITZ P. regularis skulle omfatta 2 arter. Ehuru detta ingalunda synes osannolikt, har jag dock för närvarande slutit mig till GEINITZ åsigt och uppför dessa former såsom Panopaea regularis, då det från Sveriges nu föreliggande materialet ej tillåter en noggrannare begränsning.

Blaksudden (Ka) ej sällsynt.

Pholadomya elliptica GOLDF.

1834—40. Pholadomya elliptica GOLDFUSS: Petr. Germ., s. 273, t. 158, fig. 1.

Ett par sannolikt hithörande stenkärnor föreligga från Barnakälla (Ka).

Pholadomya Gurgitis BRONGT.

1827. Lutraria Gurgitis BRNGT, NILSSON: Petr. Suec., s. 18, t. 5, fig. 9.

Ett troligen hithörande exemplar från Barnakälla (Ka); i Ystadsområdet äfven i Kb och där mera allmän.

Goniomya designata GOLDF.

1834—40. Goniomya designata GOLDFUSS: Petr. Germ., s. 264, t. 154, fig. 13.
1875. » » GEINITZ: Elbthalgeb., II, s. 71, t. 19, fig. 8.

En stenkärna från Barnakälla.

Liopistha æquivalvis GOLDF.

1889. Liopistha æquivalvis GOLDF. HOLZAPFEL: Aach. Moll, II, s. 150, t. 9, fig. 4—6.

Ehuru endast stenkärnor föreligga är dock bestämningen af denna art, som först af GEINITZ anfördes från Sverige (Quadersandsteinsgebirge s. 149, enl. VON HAGENOW fr. Köpinge), fullkomligt säker. Blaksudden (r) Barnakälla (a) i Ka. Gillaruna r.

Gastrochaena Ostreae GEIN.

1875. Gastrochaena Ostreae GEINITZ: Elbthalgeb., I, s. 234, t. 51, fig. 11—18 och t. 525. fig. 4—7.

I Ostrea Marklini finnas stundom hål efter en borrmussla, som fullkomligt öfverensstämma med de af GEINITZ under ofvanstående namn afbildade. Borrhålet är fyldt med lös gruskalk och musslan själf är ej funnen. Karlshamn Ka.

Haliotis cretacea n. f.

Tafl. 2, fig. 1.

Visserligen föreligger blott en enda stenkärna, som dock tydligen visar sig tillhöra detta slägte. Spiran är kort och nedtryckt, kanten mot den vidöppna mynningen genomborrad af hål, af hvilka 4 kunna iakttagas genom på stenkärnan framträdande tappar.

BINKHORST beskref (Monographie d. Gastéropodes et d. Céphalopodes de la craie sup. du Limbourg 1861, s. 81, t. V a [2], fig. 4) under namnet Haliotis? antiqua en form från Maestricht, från hvilken vår skiljer sig genom mera nedtryckt spira, talrikare och tydligare framträdande perforationer. Hos BINKHORSTS form synes det egentligen vara knölar, af hvilka de 2 yttersta blifvit bortrifna. KAUNHOVEN (Die Gastropoden der Maestrichter Kreide s. 35, 1887) anser BINKHORSTS Haliotis? antiqua ej tillhöra detta slägte, utan uppför densamma i förteckningen (N:o 58) såsom Trochus limburgensis.

Ehuru det föreliggande materialet af ofvan beskrifna form är dåligt, har jag likväl ansett mig böra omnämna densamma, enär den representerar ett från vår krita ej förut kändt slägte. Barnakälla.

Nerita.

Af detta slägte finnas inom Kristianstadsområdet 3 eller möjligen 4 arter, som alla, i motsats mot det bland gastropoderna i vår krita vanliga förhållandet, utmärka sig därigenom att skalet är bevaradt, om ock vid mynningens innersida så skadadt, att slägtbestämningen ej är fullt säker utan möjligen Neritopsis vore rättare. I List of fossil Faunas of Sweden III har jag från Sveriges krita anfört tre arter nämligen N:o 17 N. nodosa GEIN, N:o 18. N. plebeja REUSS och N:o 19 N. RETZII NILSSON. Med det materiel, som nu står mig till buds, anser jag de hos oss funna Neritaarterna böra sålunda fördelas.

Nerita Malmi n. f.

Tafl. 2, fig. 2, 3.

1888. Nerita nodosa ex parte. LUNDGREN: List etc. s. 16.

Stor, tjockskalig; spiran nedtryckt, vindningarne skilda genom en täml. skarpt utpräglad fåra; yttre vindningen ej jämnt rundad, utan försedd med en trubbig kant, längs hvilken finnes en rad af starkt framträdande ehuru ej skarpt begränsade knölar; vindningens yttersida utan några dylika; tillväxtstrimmorna tydligt framträdande. Under namnet N. nodosa sammanförde jag denna och följande art, men anser det nu lämpligast att hålla dem skilda, enär alldeles inga mellanformer emellan dem anträffats. Endast funnen vid Oretorp (Ka) enl. exemplar i Riksmuseum och Marklinska Samlingen.

Nerita nodosa GEIN.

Tafl. 2, fig. 5, 7.

1843 (1852) Natica nodosa GEINITZ: Charakteristik, s. 47, t. 15, fig. 27, 28.
1845. » » » REUSS: Böhm. Kreide, I, s. 50, t. 11, fig. 2.
1863. Nerita plebeja » GOSSELMAN: Zool. och Geol. Iakttagelser inom Blekinge s. 40.
1875. Neritopsis nodosa » Elbthalgeb. I, s. 246, t. 54, fig. 19—23.
1888. Nerita nodosa GEIN: ex parte LUNDGREN: List. s. 16.
1888. » plebeja » » » s. 16.

Då, såsom ofvan nämnts, inga mellanformer mellan denna och föregående art äro funna och äfven en bestämd skilnad i ornamenteringen kan iakttagas, har det synts rik-

tigast att nu hålla dem skilda, ehuru det dock ingalunda är omöjligt, att N. Malmi är stora och utvuxna exemplar af N. nodosa. Det material, som föreligger af denna senare art, lämnar visserligen mycket öfrigt att önska, men den synes dock böra hänföras till N. nodosa GEIN., med hvars yngre former särskildt den visar god öfverensstämmelse. Skalet rundadt, med nedtryckt spira och trubbigt kantig yttre vindning. Spiran försedd med radierande ribbor, som på den yttre vindningen vanligen öfvergå till en rad af knölar, af hvilka den största ligger just vid vindningens kant och de på vindningens yttre sida blifva nedåt mindre och otydligare. Stundom synes denna knölrad sammanflyta till en lamell, utan att det varit mig möjligt att skarpt skilja dessa former, huru mycket än ytterligheterna afvika från hvarandra.

Ignaberga, Balsberg, Istaby, Karlshamn, trol. Tormarp i Ka och endast där; öfverallt mycket sällsynt.

Nerita RETZII NILSSON.

Tafl. 2, fig. 4, 6.

1827. Natica? RETZII NILSSON: Petr. Suec., s. 13, t. 3, fig. 7.

Då NILSSON uppställde denna art, kände han endast ett exemplar däraf. Utom detta har jag haft tillfälle att undersöka 4 andra, nämligen, ett tillhörande Riksmuseum och tre tillhörande MARKLINSKA samlingen i Upsala Geologiska Museum.

Snedt oval, ej klotformigt uppblåst; spiran tämligen platt, dess 3—4 vindningar skilda genom en skarpt utpräglad, krenelerad söm; yttersta vindningen stor, rundadt nedtryckt, utan kant eller knölig ornamentering; tillväxtstrimmor svagt utpräglade. Mynningen ej fullt tydlig, inre läppen kallös, dock troligen utan tänder. Färgstrimmor tydliga, bildande 2 sammanhängande långsgående, bruna band på den gula skalytan.

Denna art, som tydligt beskrefs och drägligt afbildades af NILSSON, har af flera författare, såsom BINKHORST och KAUNHOVEN, sammanslagits med N. rugosa HOEN. från Mastricht, från hvilken den dock är tydligen skild. N. rugosa är nästan klotformig, N. RETZII oval; den förra har skarpa tillväxtstrimmor, den senare svaga. Båda visa färgspår, men helt olika, hos N. RETZII 2 sammanhängande band; hos N. rugosa äro däremot färgbanden ej sammanhängande utan bildade af ziczacformiga figurer. Skalet är tjockt hos N. RETZII, tunt hos N. rugosa; så att någon förväxling eller sammanslagning af dessa arter ej gärna kan komma i fråga. Hittills endast funnen vid Balsberg.

Patella ovalis NILSS.

1827. Patella ovalis NILSSON: Petr. Suec., s. 14, t. 3, fig. 8.

Oaktadt NILSSON uppgifver denna art förekomma »haud raro» vid Balsberg, har jag dock ej haft tillgång till nytt eller bättre material däraf än det som stått NILSSON till buds och kan därför ej meddela några ytterligare upplysningar om densamma utan blott konstatera dess närvaro. Balsberg (Ka).

Emarginula.

Af detta slägte förekomma i N. Ö. Skåne åtminstone 2 arter, som dock på grund af bevaringssättet — stenkärnor hvilkas öfre del visserligen är ganska väl bibehållen, men basaldel alltid ofullständig — ej tillåta någon fullt säker artbestämning med det material, som för närvarande står mig till buds. Såsom skett vid De Geers uppräkning af Barnakällegrottans fossil, kunna de dock provisoriskt uppföras såsom:

Emaginula cf Buchi Gein.

1842. Fissurella de Buchi. Geinitz: Charakt., s. 48, t. 16, fig. 5.
1875. Emarginula Buchi » : Elbthal, I, s. 259, t. 58, fig. 1.

Genom sin höga, nästan raka form öfverensstämma de svenska exemplaren, visserligen med Geinitz beskrifning och afbildningar, men äro knappast nog väl bevarade för att artbestämningen skall kunna anses såsom fullt säker. Barnakällegrottan, täml. allmän (Ka).

Emarginula cf pelagica Passy.

1875. Emarginula pelagica Passy, Geinitz: Elbthalgeb., I, s. 259, t. 57, fig. 15, 16.

Tydligen skild från föregående, mera nedtryckt och med antydan till radierande strimmor, liknar denna form E. pelagica hos Geinitz, särskildt fig. 15, ehuru större, och kan provisoriskt föras till denna art, om det ock, vid tillgång till bättre material, skall komma att visa sig att den bör därifrån skiljas.

Barnakällegrottan, betydligt sällsyntare än föregående.

Fissurella.

Af detta slägte finnas, hufvudsakligen i den ofvan s. k. Fissurellabärgarten vid Balsberg, men äfven annorstädes, flera arter antagligen 4. Ingenstädes hafva dock så goda exemplar anträffats att de kunna med förut bekanta arter identifieras ej häller såsom nya beskrifvas, hvarför det för närvarande synes mig bäst att endast påpeka förekomsten af detta slägte.

Actæconella doliolum Müll?

1888. Actæconella doliolum Müll. Holzapfel: Aachen Moll, I, s. 77, t. 6, fig. 15, 16.

Ett sannolikt hithörande exemplar från Barnakälla.

Utom nu nämnda gastropoder förekomma flera andra, hvilkas bevaringssätt dock alldeles icke tillåter någon säker bestämning och då de i stratigrafiskt geologiskt afseende ej synas spela någon vigtigare rol, är det för närvarande bäst att ej ens nämna dem.

Då Cefalopoderna så nyligen af Moberg gjorts till föremål för en monografisk bearbetning (Cephalopoderna i Sveriges Kritsystem, II. Artbeskrifning. Sveriges Geologiska Undersökning Ser. C, N:o 73; 4:de. Stockholm 1885) skulle det varit tillräckligt att helt

enkelt hänvisa till detta arbete, om jag kunnat gilla den af MOBERG för Belemniterna antagna nomenklaturen, hvilket dock icke är fallet. De i Sverige något mera allmänt förekommande Belemniterna skulle enligt vanligt bruk benämnas: Actinocamax verus MILLER. A. westphalicus SCHLÜTER, A. quadratus BLAIN., A. mammillatus NILSS. och Belemnitella mucronata SCHLOTH., af hvilka blott de tre sistnämnda äro funna i Kristianstadsområdet och således äro de enda som här komma i betraktande. Visserligen anför DE GEER (Bäckaskog s. 36) A. westphalicus fr. Flackarp, men den är här mycket sällsynt och ej funnen annorstädes. MOBERG vill ej erkänna A. westphalicus och A. quadratus såsom skilda arter utan såsom former af en mycket varierande art, som han anser sig böra kalla A. granulatus Bl. sp. emend. Han anser nämligen artnamnet granulatus bättre än quadratus uttrycka artens karakter, hvarför han ock utbytt detta senare i literaturen allmänna namn mot det mera sällan använda granulatus. SCHLÜTER har utredt (Cephalopoden der Oberer deutschen Kreide II, s. 199. Palaeontographica 1876) att det älsta artnamnet för hvad som vanligen kallas A. quadratus egentligen vore A. Osterfeldi Bl; men tillägger »doch möchte es nicht rathsam sein den allgemein angenommenen und viel gebrauchten Namen (quadratus) fallen zu lassen,» hvari äfven jag instämmer. Äfven STOLLEY (Die Kreide Schleswig Holsteins s. 231 i Mittheilungen aus dem Mineral. Institut der Universität Kiel 1892) begagnar namnet quadratus och anser A. westphalicus som en därifrån skild art. Bland de växlande formerna af A. quadratus urskiljer han 3 varieteter, men vill ej använda den af MOBERG föreslagna indelningen i formerna ovata och quadrata. I stället således för att med MOBERG för den i N. Ö. Skåne sällsyntaste Belemniten använda benämningen Actinocamax granulatus Bl. sp. emend *α*) forma quadrata MOBERG kallar jag den, såsom vanligt, helt enkelt

Actinocamax quadratus BLAIN.

och hänvisar för öfrigt till SCHLÜTERS, MOBERGS och STOLLEYS ofvan anförda arbeten. I n. ö. Skåne är denna art hittills endast funnen på v. sidan af Ifö, norr om Ugnsmunnarna (se DE GEER i Geol. För. Förhandl. t. 7, s. 478), hvarest DE GEER först fann 2 exemplar och jag sedan anträffat ett, alla tillhörande den typiska formen.

Actinocamax mammillatus NILSS.

Se vidare SCHLÜTER, MOBERG och STOLLEY. Allmänt utbredd i Mammillatuszonen (Ka) och dennas mest karakteristiska fossil saknas denna art helt och hållet i Mucronatazonen Kb.

Belemnitella mucronata SCHLOTH.

Se vidare SCHLÜTER och MOBERG. Den enda i Mucronatazonen (Kb) förekommande Belemniten och karakteristisk för denna zon, fins dock B. mucronata, ehuru sällsyntare tillsamman med A. mammillatus i Ka och äfven med A. quadratus.

Ammonites sp.

Ett par exemplar af en från A. Stobæi skild, troligen obeskrifven art, tillhöra underslägtet Pachydiscus och stå i närheten af A. Dülmenensis Schl. och A. colligatus Binkh.

Blaksudden. Ka.

Nautilus sp.

Ej närmare bestämbara fragmenter af en till detta slägte hörande art föreligga från Barnakälla (Ka).

Pollicipes Nilssoni Stenstr.

1827. Maxilla superior et inferior Belemnites mammillati. Nilsson; Petr. Suec., s. 9, t. 2, och 2 C och D
1838. Pollicipes Nilssoni Steenstrup: Naturhistorisk Tidskrift, udgivet af Kröyer 2:dre Bind, s. 401, t. 4, fig. 20, 23.
1851. » » Darwin: Monograph of the fossil Lepadidae, s. 52, t. 3, fig. 11.

Carina af denna art förekommer så allmänt vid V. Olinge att den kan sägas vara för denna lokal karakteristisk; alla mig tillgängliga exemplar äro dock något skadade i nedre kanten så att genom dem ej kan afgöras huruvida Nilssons eller Steenstrups figurer, som något afvika från hvarandra, äro riktigast; dock synes den senare likast. Subcarina och rostrum förekomma på flera lokaler.

Figurförklaringar:

Tafl. I.

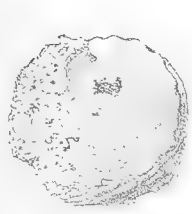
Fig. 1, 4. Ostrea Marklini n. f., s. 40.
» 2. Avicula Ignabergensis n. f., s. 44.
» 3. Pecten Ignabergensis n. f., s. 43.
» 5. Ostrea lobata MARKLIN, s. 40.
» 6, 7. Trigonia cf BUCHI GEINITZ, s. 47.

Tafl. II.

Fig. 1. Haliotis cretacea n. f., s. 52.
» 2, 3. Nerita Malmi n. f., s. 53.
» 4, 6. » Retzii NILSSON, s. 54.
» 5, 7. » nodosa GEIN., s. 53.
» 8. Arca pharelloides n. f., s. 46.
» 9, 10, 11. Pharella? De Geeri n. f., s. 50,
» 12, 13. Icanotia? grosseplicata n. f., s. 54.
» 14. Cucullæa exaltata NILSSON, s. 46.

Krebs & Jensen del

Lith. W. Stollachter, Stockholm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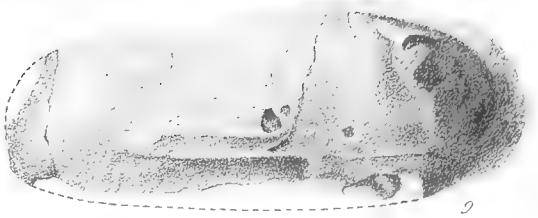
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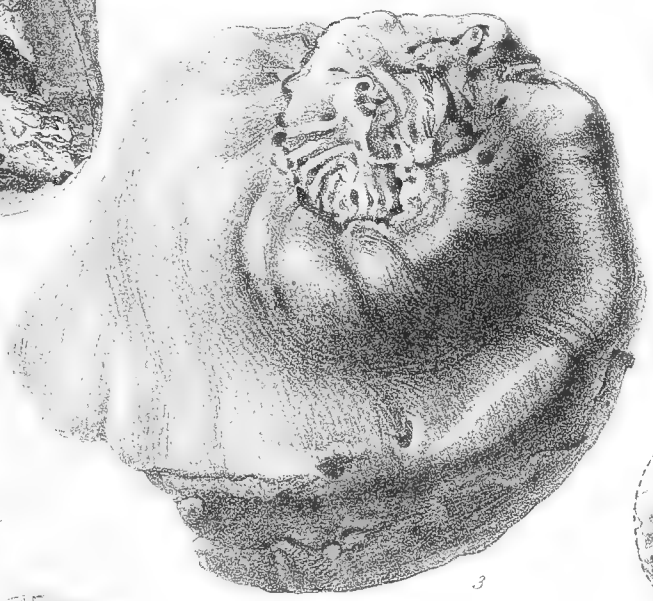
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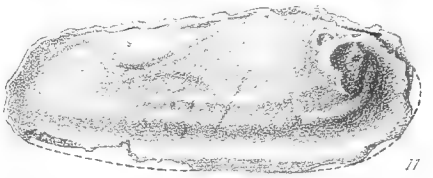
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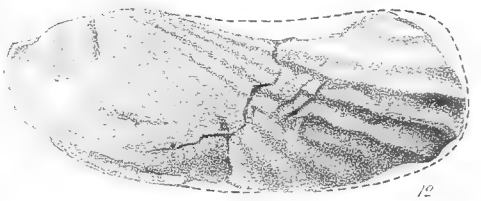
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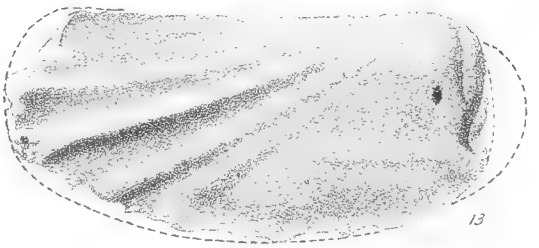
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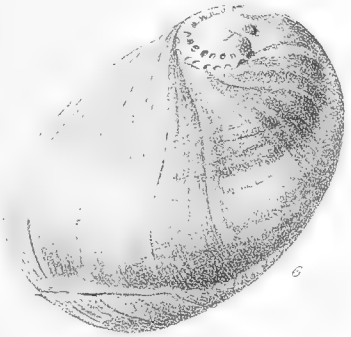
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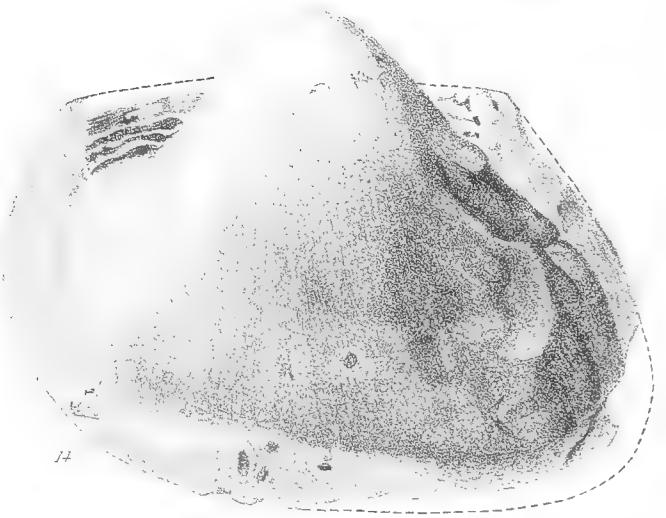
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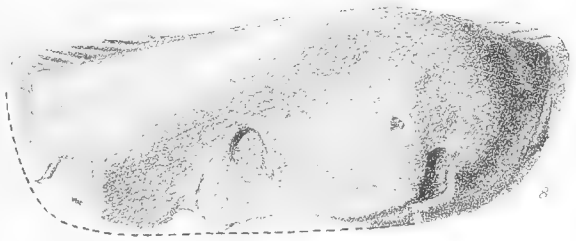
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KONGL. SVENSKA VETENSKAPS-AKADEMIENS HANDLINGAR. Bandet 26. N.o 7

STUDIEN ÜBER CIRRIPEDEN

VON

CARL W. S. AURIVILLIUS.

MIT 9 TAFELN.

DER KÖNIGL. SCHWED. AKADEMIE DER WISSENSCHAFTEN VORGELEGT DEN 7 JUNI 1893.

STOCKHOLM 1894.
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER.

I.

MORPHOLOGIE UND SYSTEMATIK NEUER ODER WENIG BEKANNTER CIRRIPEDEN.

Die der folgenden Darstellung zu Grunde liegenden Cirripeden stammen, wie eine im vorigen Jahre gelieferte vorläufige Mittheilung angiebt, aus den Weltmeeren, und zwar aus dem nördlichen Eismeere, dem Atlantischen, Indischen und Stillen Ocean. Mit nur wenigen Ausnahmen sind sie während früherer oder späterer schwedischer See-Expeditionen — der Weltumseglung der Fregatte Eugenie in den Jahren 1851—53, der Grönländischen Ingegerd-Gladan-Expedition 1871, der Novaja-Semlja-Expeditionen 1875 und 1876, der Vega-Expedition 1878—80, der Gunhild-Expedition in der Nordsee 1879, der Grönländischen Sofia-Expedition 1883 — eingesammelt oder von einzelnen Forschern, wie Ingen. J. A. Wahlberg und Doctor A. Goës bezw. aus Süd-Afrika und dem Antillenmeere, oder auch von Schiffskapitänen, wie Kapit. G. C. Eckman aus dem Atlanten und Kapit. E. Svensson aus dem Stillen Ocean, heimgebracht worden. Einige, in dem Indo-Malayischen Archipel heimisch, sind vom Verfasser während einer im Jahre 1891 gemachten Reise angetroffen.

Sämmtliche Arten sind entweder im Reichsmuseum zu Stockholm oder im Universitätsmuseum zu Upsala aufbewahrt; und zwar bin ich den Prefekten dieser Museen, den Herren Prof. S. Lovén und T. Tullberg zum besten Dank verpflichtet wegen ihres Wohlwollens, die freie Verfügung des werthvollen Materials während längerer Zeit zu gestatten.

Von den früher bekannten Formen ist besonders die Gattung *Alcippe* berücksichtigt und zugleich mit der neuen, in Korallen bohrenden Gattung *Lithoglyptes* — gleichwie jene der Unterordnung *Abdominalia* angehörig — anatomisch und biologisch verglichen worden. Das Material zu den Untersuchungen über Alcippe stammt von der schwedischen Westküste, wo das Thier auf geeignetem Boden in Buccinum-, Fusus- oder Littorina-Schalen sich findet, und zwar immer in solchen die von Paguren bewohnt sind, während dass in von den Krebsen nicht eingenommenen oder verlassenen Schalen höchstens nur leere Alcippe-Höhlen zu sehen sind.

Der postembryonalen Entwicklung der Tiefsee-Scalpellen ist besondere Aufmerksamkeit gewidmet und zwar in Vergleich mit derjenigen anderer, in der Meeresoberfläche oder in geringen Tiefen lebender Lepadiden.

Insofern das Studium der Morphologie oder Beobachtungen über das Leben der Thiere dazu Anleitung gegeben, sind die biologischen Verhältnisse den morphologischen gegenüber gestellt, und zwar zunächst in der Absicht, den muthmasslichen Grund der grösseren morphologischen Abänderungen darzulegen, welche als Unterscheidungsmerkmale der Gattungen gelten. Was die Arten betrifft, wird ihre Verwandtschaft innerhalb der Gattung jedesmal besonders besprochen, es sei dass eine solche im Bau des deckenden Mantels, in demjenigen der appendikulären Organe oder anderswo sich kundgiebt, um daraus Schlüsse nach der einen oder anderen Richtung zu ziehen, je nachdem die Ähnlichkeit wesentlicher oder geringfügiger Art zu sein scheint.

Upsala im März 1893.

A. PEDUNCULATA.

Lepas testudinata C. W. Auriv.

(Taf. I, Fig. 1—3; Taf. VIII, Fig. 4.)

Diagn. Capitulum valvulis 5 subtiliter striatis. Carina a ceteris valvulis distans, solum $^2/_7$ inter terga extensa; umbone pone marginem anteriorem carinæ scutorumque sito; parte præumbonali contra postumbonalem angulum obtusum formante, antice vix latiore. Margo occludens scutorum fere rectus, contra marginem basalem angulum obtusum formans.

Pedunculus cylindricus, $^2/_5$ latitudinis capituli æquans.

Capitulum mit 5 feingestreiften Schalen. Carina von den übrigen Schalen entfernt, nur mit $^2/_7$ ihrer Länge zwischen den Terga hineinreichend; der Umbo hinter dem Vorderrand der Carina und Scuta belegen; der præumbonale Theil gegen den postumbonalen einen stumpfen Winkel bildend, nach vorne zu kaum breiter. Der Schliessrand der Scuta fast gerade, gegen den Basalrand einen stumpfen Winkel bildend.

Farbe. Wegen des dunklen Pigments der unterliegenden chitinogenen Zellen sind die ziemlich dünnen Kalkplatten bläulich, die zwischenliegende Haut, bei Spiritus-Exemplaren, bräunlich dunkelblau, ebenso der Pedunkel mit Ausnahme des vordersten Theils, dem das dunkle Pigment fehlt. Bei jungen Exemplaren fehlt dasselbe in grösserer Ausdehnung.

Masse. Grösste Länge des Körpers 39 Mm.
» » » Capitulum 24 Mm.
» Breite » » 15 »
» » » Pedunkels 6 »

Fundorte und Vorkommen. 1) Süd-Afrika, Taffelbay; eine Menge Exemplare auf im Meere herumtreibenden Gegenständen am 6. Febr. 1873 angetroffen (G. De Vylder). RM.[1]

2) Süd-Afrika, Port Natal; 2 Exemplare (Wahlberg). RM.

[1] Die jeder Art beigefügten RM. oder UM. bezeichnen den Ort, wo die Originalexemplare aufbewahrt sind, und zwar jenes das Reichsmuseum zu Stockholm, dieses das Universitätsmuseum zu Upsala. Die unmittelbar voranstehenden Personennamen geben deren Einsammler an.

Nach unserer bisherigen Kenntniss scheint also *Lepas testudinata* um die Südspitze Afrikas die um Patagonien, v. Diemens Land und Neu Zeeland vorkommende Art *Lepas australis* DARWIN zu vertreten.

Syn. 1892. *Lepas testudinata* C. W. AURIVILLIUS, Neue Cirripeden aus dem Atlantischen, Indischen und Stillen Ocean. Öfversigt af Kgl. Svenska Vet. Akad. Förh. 1892, N:o 3, p. 123. Stockholm.

Descr. *Capitulum.* In dem Verhältniss der unverkalkten Partieen zu den Kalkplatten kommt nur *Lepas Hillii* LEACH dieser Art nahe. Es sind nämlich Scuta und Terga einerseits von der Carina andrerseits durch weiche Haut getrennt, die auf der Capitulumseite bis zu $^1/_5$ der ganzen Capitulumbreite aufnimmt und auf dem Rücken — zwischen der hinteren Carinaspitze und der Mündung — eine $^5/_6$ der grössten Tergallänge entsprechende Strecke ausmacht. In Bezug auf Carina (Taf. I, Fig. 2—3) bietet diese nur mit *Lepas fascicularis* ELLIS & SOL. einige Ähnlichkeit, indem nur bei dieser Art Umbo nicht in der Höhe des vorderen Scutalrandes, sondern hinter diesem liegt; der Winkel zwischen dem præumbonalen und postumbonalen Abschnitt ist zugleich stumpf, nicht spitz oder gerade, wie bei den übrigen Arten. Was aber die Form des præumbonalen Theils betrifft, macht er höchstens $^1/_3$ der grössten Breite des postumbonalen aus, anstatt dass bei *L. fascicularis* jener 2—4-mal breiter als dieser ist. Die kleine Scheibe ist ein wenig in der Haut versteckt. Scuta und Terga erinnern durch die glatte, sehr fein gestreifte Oberfläche an *L. Hillii.* Tergum hat auch eine ähnliche Form wie bei dieser Art, aber seine Lage ist, wie aus der Fig. 1, Taf. I erhellt, eigenthümlich, indem es nicht zwischen Scutum und Carina eingekeilt, sondern bauchwärts geschoben ist. Der Basalrand des Scutum ist, wie bei *L. Hillii*, am häufigsten konvex, der Schliessrand dagegen meistens gerade, gegen jenen einen stumpfen Winkel bildend; der neben diesem Rande laufende Längenkiel ist, wie bei *L. Hillii*, schwach.

Der *Pedunkel* ist dünner als bei den anderen Arten.

Mundtheile. Die Maxillen des ersten Paares (Taf. VIII, Fig. 4) weichen von denjenigen des *Lepas anatifera* L. dadurch ab, dass sie *drei* triangulăre Höcker zwischen der Aussen- und Innerecke haben, die auf der inneren Seite je eine Menge steifer Stacheln tragen.

Cirren. Der längere Ast des ersten Paares (= Mundcirren mihi) macht nur $^3/_4$ des kürzeren Astes des zweiten Paares aus.

Schwanzanhänge. Etwas schlanker als bei *Lepas anatifera* — vergl. Pl. X, Fig. 18 bei DARWIN — und mit winzigen kammähnlichen Stachelreihen versehen. Sie reichen nicht völlig zum Ende des proximalen Segmentes des sechsten Cirrenstiels.

Fadenähnliche Anhänge (= Filamentary appendages DARWIN). Finden sich zwei jederseits — wie bei Lepas anatifera und Lepas australis — und zwar auf ähnliche Weise, der eine von einer Anschwellung unter der Basis des sechsten Cirrenpaares, der andere, längere unter jenem von der Körperseite ausgehend.

Verwandtschaft. Gleichwie die Carina das beste Unterscheidungsmerkmal der Art bildet, zeugt sie auch von einer näheren Verwandtschaft derselben mit *Lepas fascicularis*

als mit den übrigen Arten. Es zeigt aber zugleich diese Platte durch ihre Kürze und ihr Verhältniss zu den Terga gegen die Gattung *Poecilasma* hin. Bei der Art *P. eburnea* HINDS hat der Umbo sogar eine ähnliche Lage wie bei *L. testudinata*. Die Art bietet also ein gewisses Interesse, da nämlich andererseits die inneren Organe für ihre Einreihung in die Gattung *Lepas* sprechen.

Poecilasma vagans C. W. AURIV.

(Taf. I, Fig. 9—12; Taf. VIII, Fig. 10, 16, 22.)

Diagn. Capitulum valvulis 7, scilicet scutis e segmentis duobus adjacentibus formatis. Terga parte postumbonali carinæ duplo latiora, margine occludenti os capituli non attingente. Pars præumbonalis carinæ in discum parte postumbonali triplo latiorem expansa, margine antico leviter concavo.

Pedunculus mollis, rugosus, pæne $^2/_3$ longitudinis capituli æquans.

Capitulum mit 7 Schalen, indem die Scuta je aus 2 dicht anliegenden Segmenten bestehen. Die Terga doppelt breiter als der postumbonale Theil der Carina, deren Schliessrand die Mantelöffnung nicht erreichend. Der præumbonale Theil der Carina ist in eine Scheibe, dreimal breiter als der postumbonale Theil, verbreitet, mit schwach konkavem Vorderrand.

Der Pedunkel ist weich, runzelig,[1] fast $^2/_3$ der Capitulumlänge messend.

Farbe. Die grösseren Exemplare sind bräunlich, die jungen heller gefärbt; sämmtlich in Spiritus aufbewahrt.

Masse. Grösste Länge des Körpers 12 Mm.
» » » Capitulum 7 »
» Breite » » 6,5 »
» » » Pedunkels 4 »

Fundort unbekannt. **Vorkommen.** Die Exemplare stecken im Nabel eines *Nautilus umbilicatus*, der wahrscheinlich aus Ostindien stammt. UM.

Syn. 1892. *Poecilasma vagans* C. W. AURIVILLIUS.[2]

Descr. *Capitulum* besonders bauchwärts und vorne stark aufgetrieben, hinten dünner. Die Scuta also stark konvex, deren Margo basalis mehr ausgeschnitten als bei den früher bekannten Arten und deren vordere Enden nicht immer gerade gegenüber einander belegen. Die beiden Segmente der Scuta durch eine Furche von den Umbones an getrennt; es werden diese auch von besonderen Primordialplatten — bei jungen Exemplaren deutlich — bedeckt, von denen diejenige des Schliesssegmentes ein wenig länger als die andere ist. Margo occludens ist mehr bogenförmig ausgeschweift als die trennende Furche und zwar besonders nach hinten, wo er vom Mündungsrande sich ausbiegt. In der Fortsetzung des

[1] Es wird hiermit ein Fehler, der sich in der ursprünglichen Diagnose eingeschlichen hat, verbessert.

[2] l. c.

Bogens, also von der Mündung entfernt, liegt der Margo occludens tergorum. Die Capitulumenden nebst einer Strecke um den Mündungsrand sind also unverkalkt. Die Terga sind triangulär; deren Margo occludens entweder konkav oder konvex; die Breite vom Umbo zum Scutalrand ist die doppelte der hinteren Carinabreite. Carina reicht ein wenig zwischen die Terga hinauf, der præumbonale Theil steht geradwinklig gegen den postumbonalen und ist dreimal so breit wie dieser, am Basalrand der Scuta im Mantel eingegraben; seine Länge beträgt kaum $^1/_4$ des Hintertheiles und der Vorderrand ist schwach konkav. Die Innerfläche ist entweder flach oder ein wenig konvex. Der Pedunkel ist kurz und dick, von einem derben gerunzelten Chitin bedeckt.

Mundtheile. Die Mandibeln haben wie gewöhnlich bei Poecilasma vier Zähne; der äusserste ist von den übrigen weit getrennt; die Innerecke ist mit zwei kurzen Stacheln und die Innerkante sowie die Seitenflächen mit Haaren versehen. Die vorderen Maxillen (Taf. VIII, Fig. 10) weichen von denjenigen bei P. eburnea dadurch ab, dass sie sich nach aussen weniger verbreiten und der Einschnitt der Kaufläche sehr tief und im Boden ohne Stacheln ist; nach aussen von demselben findet sich ein grosser und zwei kleinere Stacheln, nach innen davon stecken sieben Stacheln und auf dem Innenrand und den Seitenflächen Haare. Die hinteren Maxillen sind breit, stumpf konisch, nach aussen sowie nach innen mit langen Haaren ausgestattet.

Cirren. Das 1. Paar ist durch eine Strecke von der Länge des die übrigen Cirren tragenden Körpertheils vom 2. Paare getrennt und nur halb so lang wie dieses; der Hinterast reicht mit den 2 Endsegmenten über den Vorderast hinauf. Auch zwischen den Ästen der übrigen Cirren findet sich ein kleiner Längenunterschied. Bei dem 2.—6. Paare stecken in der Ventralseite der Segmente je 4—5 Börstchenpaare, dorsalwärts finden sich nur in den Suturen selbst einige kurze Börstchen (Taf. VIII, Fig. 22).

Die *Schwanzanhänge* (Taf. VIII, Fig. 16) sind gestreckt mit einseitig gerundetem Ende. In dieser gerundeten Seite stecken bis zur Mitte des Anhanges herab lange Börstchen. Es reichen die Anhänge ein wenig höher als das proximale Segment des 6. Protopoditen.

Fadenähnliche Anhänge fehlen wie bei den früher bekannten Arten.

Verwandtschaft. Durch die aus zwei Segmenten bestehenden Scuta kommt die Art ohne Zweifel der *Poecilasma fissum* Darwin am nächsten; es weichen aber die Cirrenbewaffnung, die Lage der Terga und der Pedunkel bedeutend ab. Durch die Carina nimmt sie unter den bisher bekannten Poecilasma-Arten eine vereinzelte Stellung ein; es erinnert nämlich diese Platte — mit Ausnahme der Innerfläche und der Stellung zu den Terga — an die Form und Verhältnisse derjenigen der Gattung *Lepas*, z. B. der *L. anatifera* L.

Poecilasma amygdalum n. sp.

(Taf. I, Fig. 4—6; Taf. VIII, Fig. 14.)

Diagn. Capitulum valvulis 7, scilicet scutis e segmentis duobus adjacentibus formatis. Margo basalis segmenti majoris margine tergali brevior, intus dente

armatus. Terga carina duplo latiora, margine occludenti os capituli attingente. Pars præumbonalis carinæ discum parvum infossum retro spectantem parte postumbonali non latiorem formans. Cirri non nisi in suturis ipsis setis instructi.

Pedunculus granulis creberrimis, seriebus laminarum et annulis chitinosis ornatus, longitudinem dimidiam capituli superans.

Capitulum mit 7 Platten, indem die Scuta aus 2 anliegenden Segmenten bestehen; der Basalrand des grösseren Segmentes kürzer als der Tergalrand, nach innen zahnähnlich hervorstehend. Die Terga doppelt breiter als die Carina; deren Margo occludens die Mantelöffnung erreichend. Der præumbonale Theil der Carina bildet eine kleine nach hinten gerichtete eingesenkte Scheibe, nicht breiter als der postumbonale Theil. Die Cirren nur in den Suturen börstchentragend. Pedunkel dicht mit Körnern, sowie mit Querreihen von Chitinstäbchen oder -Täfelchen versehen, länger als die Hälfte des Capitulum.

Farbe. Der Pedunkel und die Carina schmutzgelb, die Ränder der Terga, besonders die Margines occludentes, sowie die Cirren, rothgelb. Alles nach Beobachtung auf dem lebenden Thiere.

Masse. Grösste Länge des Körpers — bei gestrecktem Pedunkel — 15 Mm.
» » » Capitulum 7 Mm.
» Breite » » 5 »
» » » Pedunkels 2 »

Fundort und Vorkommen. In der Javasee bei der Insel Nordwachter unter den Tausendinseln. In der Nähe des Mundfeldes eines ans Land geworfenen *Palinurus* sp. befestigt. 5 Ex. (der Verfasser). RM.

Descr. *Capitulum* mandelähnlich, also viel weniger als bei *Poecilasma vagans* aufgetrieben. Die beiden Scutalsegmente sind durch eine Furche von den Umbones an, die mit besonderen Primordialplatten bedeckt sind, getrennt. Es sind die Segmente zusammengenommen fast elliptisch; der Margo basalis des grösseren Segmentes ist kürzer als der Margo tergalis, der Margo carinalis weniger und der Margo occludens mehr konvex als bei *P. fissum* Darwin, wodurch die ganze Form des Capitulum mehr elliptisch als bei dieser wird. Das Segmentum occludens der Scuta, sowie der Margo occludens des Tergum und der Carina sind von einer gelben Haut überzogen. Die Terga sind bei älteren Exemplaren vierseitig, indem der Margo carinalis sich winklig theilt. Der Margo occludens tergorum reicht bis an den Mündungsrand hin und die Breite der Terga quer über dem Umbo ist doppelt so gross wie diejenige der Carina. Die Carina reicht ein wenig zwischen die Vorderenden der Terga hinauf und ist besonders nach vorne stark konvex; die Umbonalgegend sowohl als der kurze præumbonale Theil, welcher nicht breiter als der hintere ist und dessen Spitze sich nach hinten richtet, sind in der Haut versteckt. Die Innerseite ist platt, nur nach hinten zu seicht gefurcht.

Der *Pedunkel* ist quer geringelt, die Ringel durch mit dem Alter tiefe Furchen getrennt, alle mit dicht steckenden Chitinkörnchen, die älteren in der Mitte mit einer Reihe

von Stäbchen, die jüngeren mit 2 Stäbchenreihen versehen. Wenn ganz ausgespannt hat er die Länge des Capitulum; wenn zusammengezogen, ist er ein wenig länger als die Hälfte desselben.

Mundtheile. Die Mandibeln haben 4 Zähne, von denen der innerste ebenso lang wie die spitzauslaufende Innerecke ist; die Innerkante ist haarbesetzt, die Seiten kurzstachelig. Die Maxillen erinnern sehr nahe an diejenigen des *P. vagans* (vergl. Taf. VIII, Fig. 10); es steht nur der Innerzipfel mehr hervor und drei äussere Stacheln sind grösser als die übrigen.

Cirren. Das 1. Paar ist von den übrigen entfernt; der hintere Ast ist um 4 Segmente länger als der vordere und fast ebenso lang wie die kürzeren Äste der anderen Paare. Das 2. und 6. Paar sind, wie *P. fissum* — vergl. Pl. X, Fig. 29 bei Darwin — nur in den Suturen mit einigen Börstchen ausgestattet und zwar sowohl rück- als ventralwärts; in den äusseren Segmenten treten unter den Börstchen Dörnchen auf.

Die *Schwanzanhänge* reichen fast bis zum Ende des distalen 6. Protopoditsegmentes, sind dick, am Ende mit zahlreichen längeren Börstchen, nach hinten bis zur Mitte hinab mit zerstreuten Börstchen versehen.

Verwandtschaft. Gleichwie *P. vagans* schliesst sich auch diese Art der *P. fissum* Darwin nahe an und zwar sowohl durch die Lage der Terga als durch die Form der Carina näher als jene. Es giebt aber die kürzere Basis des grösseren Scutalsegmentes, sein stärker ausgeschweifter Margo occludens und sein weniger ausgeschweifter Margo carinalis dem ganzen Capitulum eine fast elliptische Form, anstatt der ovalen — mit breiter Basis — bei P. fissum.

Es weichen auch der Pedunkel durch Form und Bewaffnung sowie die Appendices caudæ durch den Börstchenbesatz ab. Die eigenthümliche Anordnung der Cirrenbörstchen der P. fissum findet sich bei dieser Art wieder.

Poecilasma lenticula n. sp.

(Taf. I, Fig. 7—8; Taf. VIII, Fig. 15 und 28.)

Diagn. Capitulum valvulis 7, scilicet scutis e segmentis duobus adjacentibus formatis; margo basalis segmenti majoris margine tergali brevior. Terga carina triplo latiora; margo occludens os capituli attingens. Pars præumbonalis carinæ discum parvum infossum deorsum spectantem, parte postumbonali non latiorem formans. Cirri præter in suturis ipsis etiam in latere antico setis instructi.

Pedunculus annulis chitinosis granulisque creberrimis ornatus, longitudinem dimidiam capituli æquans.

Capitulum mit 7 Platten, indem die Scuta aus 2 anliegenden Segmenten bestehen; der Basalrand des grösseren Segmentes kürzer als der Tergalrand. Die Terga dreimal breiter als die Carina, deren Margo occludens die Mantelöffnung erreichend. Der

præumbonale Theil der Carina bildet eine kleine ventralwärts eingesenkte Scheibe, nicht breiter als der postumbonale Theil. Die Cirren ausser in den Suturen auch in der Vorderfläche der Segmente Börstchen tragend. Der Pedunkel mit Chitinringeln und dichten Körnern ausgestattet, halb so lang wie das Capitulum.

Farbe. Der Pedunkel rothgelblich; die vordere Hälfte der Carina, die Ränder des Tergum und des kleineren Scutumsegmentes — ausser am Vorderende — rothgelb; die Cirren weisslich. Alles nach Beobachtungen auf lebenden Exemplaren.

Masse. Grösste Länge des Körpers 6 Mm.
» » » Capitulum 4,5 »
» Breite » » 3 »
» » » Pedunkels 1 »

Fundort und Vorkommen. In der Javasee, bei der Insel Nordwachter unter den Tausendinseln. Auf den äusseren Theilen — den äusseren Antennen, den Schreitfüssen, den Mundtheilen und dem Abdomen, sowie um das Mundfeld und die Augen — eines ans Land geworfenen *Palinurus* sp. befestigt. Eine grosse Menge Exemplare (der Verfasser). RM.

Descr. *Capitulum* aus 7 Platten, nach vorne demjenigen der P. amygdalum ähnlich, aber nach hinten spitziger; seine grösste Dicke macht nur $^2/_7$ der Länge aus — bei P. amygdalum beträgt die Dicke $^2/_5$ der Länge. Der Margo basalis des grösseren Scutalsegments ist kürzer als der Margo tergalis. Terga um dreimal breiter als Carina. Diese reicht ein wenig zwischen die Vorderenden der Terga hinauf, ist ebenso konvex wie bei P. amygdalum, aber der præumbonale Theil richtet sich nicht nach hinten sondern bauchwärts vom Umbo; die Innerseite ist platt. Der Pedunkel ist quergeringelt mit Ringeln aus hartem gelben Chitin und überall mit Chitinkörnchen versehen.

Mundtheile. Die Mandibeln desselben Exemplares haben je 3 und 4 Zähne, in jenem Falle bilden die Zahnspitzen — wenn vereint — mit der Innerecke einen sehr schwachen Bogen — also alle fast gleich ausstehend —; in diesem Falle tritt die Innerecke weniger hervor. Bei den Maxillen ist der Einschnitt seichter als bei P. vagans, die Bewaffnung dieselbe.

Cirren. Das 1. Paar ist fast um $^1/_3$ kürzer als das 2. Das 2.—6. Paar trägt ventralwärts in den Suturen zwei lange Börstchen und ein wenig distal von der Mitte jedes Segmentes zwei kurze Börstchen (Taf. VIII, Fig. 28), dorsalwärts nur in den Suturen.

Die *Schwanzanhänge* (Taf. VIII, Fig. 15) sind schlank, länger als der 6. Protopodit. Im Ende steckt ein Büschel von Börstchen und im Aussenrand bis unter der Mitte mehrere Börstchenreihen.

Verwandtschaft. Von der geringeren Grösse abgesehen, kommt die Art in ihrer äusseren Erscheinung der vorhergehenden sehr nahe. Auch war ich anfangs geneigt sie nur als die Jungen jener anzusehen; es lehren aber vor Allem die Cirren durch ihre ganz abweichende Verhältnisse, besonders aber durch ihren Börstchenbesatz, sowie auch die Schwanzanhänge, dass hier eine selbständige Art vorliegt, welche von P. fissum sich mehr als P. amygdalum entfernt.

Poecilasma tridens n. sp.

(Taf. I, Fig. 13; Taf. VI, Fig. 12; Taf. VIII, Fig. 13 und 29.)

Diagn. Capitulum valvulis 7, scilicet scutis e segmentis duobus adjacentibus formatis. Terga antice tridentata, dente medio inter segmenta scutorum interjecto. Margo tergalis segmenti scutorum majoris undulatus. Circa $^1/_6$ carinæ inter terga porrecta; pars præumbonalis in discum parte postumbonali vix duplo latiorem expansa, margine antico leviter concavo, angulum fere rectum contra hanc formans.

Pedunculus mollis, creberrime transversim rugosus, longitudinem capituli vix superans.

Capitulum mit 7 Platten, indem die Scuta je aus 2 dicht anliegenden Segmenten bestehen. Die Terga nach vorne dreizipfelig, indem ein medianer Zipfel zwischen die Enden der Scutalsegmente hineingeht; der Tergalrand des grösseren Scutalsegmentes wogenförmig gebogen. Carina geht mit $^1/_6$ ihrer Länge zwischen die Terga hinein; ihr præumbonaler Theil ist in eine längliche Scheibe mit schwach konkavem Vorderrand, kaum doppelt breiter als der postumbonale Theil verbreitet.

Der Pedunkel ist weich, dicht querrunzelig, kaum länger als das Capitulum.

Farbe unbekannt.

Masse.

Grösste	Länge	des	Körpers	7 Mm.
»	»	»	Capitulum	3 »
»	Breite	»	»	2 »
»	«	»	Pedunkels	1 »

Fundort und Vorkommen. Vier Exemplare wurden auf einem Spiritus-Exemplare von *Macrophthalmus tomentosus* Eydoux angetroffen, wo sie am vorderen Seitenrande des Rückenschildes hafteten. Die Krabbe stammt aus den Philippinen. RM.

Descr. Das *Capitulum* hat einen schief ovalen Umriss, ist ziemlich geplattet, die grösste Dicke vor der Mitte. Die Platten — besonders aber der hintere Theil der Carina — sind unter sich durch unverkalkte Hautstreifen getrennt. Auch findet sich weiche Haut jederseits vom Umbo der Terga. Das Schliesssegment der Scuta ist — wo am breitesten — um $^1/_4$ schmäler als das innere; es läuft mehr nach hinten aus, gegen das Ende dieses eine unverkalkte Spalte offen lassend. Den Enden beider und der zwischenliegenden Spalte entsprechen je zwei Einbuchtungen und ein medianer Zipfel am Scutalrand der Terga. Die præumbonale Scheibe der Carina geht in geraden Winkel gegen den hinteren Theil mit den Vorderenden der Scuta parallel bis zur Mitte der Capitulumbasis.

Mundtheile. Die Palpen sind stumpf-konisch, von der Basis bis zur Spitze mit einigen Börstchenreihen versehen. Die Mandibeln tragen 4 Zähne, ausser der zahnähnlichen inneren Ecke; die vorderen Maxillen sind ganzrandig — d. h. ohne Einschnitt — mit zehn steifen Börstchen (Stachelchen) versehen. Die hinteren Maxillen sind breit, stumpf konisch mit nach aussen längeren Börstchen.

Cirren. Das 1. Paar ist nur halb so lang wie das 6.; die 5-gliedrigen Äste sind gleichlang. Von den Ästen des 2. Paares ist der eine um das Endsegment länger als der andere. Das 2.—6. Paar trägt bauchwärts den Segmenten entlang 5—6 Börstchenpaare, rückwärts nur in den Suturen einen Büschel von 4—5 Börstchen ein wenig kürzer als die längsten bauchständigen, die ihrerseits entweder länger oder gleich lang als die entsprechenden Segmente sind (Taf. VIII, Fig. 29).

Die *Schwanzanhänge* (Taf. VIII, Fig. 13) reichen nur bis zum distalen Segmente des 6. Protopoditen hinauf; sie tragen in dem einseitig abgerundeten Ende eine Reihe Börstchen von ihrer eigenen Länge und distal von der Mitte wenige in zwei Gruppen stehende Börstchen.

Das äussere $^1/_3$ des *Penis* (Taf. VI, Fig. 12) ist um viel dünner als der proximale Theil, übrigens wie diese quergeringelt und mit zerstreuten feinen Haaren besetzt.

Verwandtschaft. Es gehört diese Art durch die Spaltung der Scuta zu der P. fissum-Gruppe, und zwar erinnert sie durch den Umriss des Capitulum am meisten an *P. lenticula*. Die Form der Terga, sowie die auseinander gehenden distalen Enden der Scutalsegmente zeichnen sie aber sogleich den anderen Arten gegenüber aus, während dass die Cirrenbewaffnung dem Verhältnisse bei *P. vagans* entschieden ähnlich ist. Es bekommt dieser Umstand ein um so grösseres Gewicht, da die Richtung der Carina-Scheibe ganz dieselbe wie bei dieser Art ist.

Dichelaspis Warwicki J. E. Gray.

(Taf. VIII, Fig. 26—27.)

Es liegen von dieser Art Exemplare aus drei verschiedenen Fundorten vor und zwar haben einige auf Limulus moluccanus bei Java gefundene den nächsten Anlass zu deren Vergleichung gegeben. Es stellte sich dabei zuerst heraus, dass die aus Borneo stammenden mit jenen völlig identisch sind, sowie dass beide im Ganzen mit der von Darwin gelieferten Beschreibung stimmen. Freilich sind die Schwanzanhänge ebenso lang als der 6. Cirren-Protopodit — nach Darwin sind sie nur halb so lang — es dürfte aber dies als Altersunterschied gelten. Zufälligerweise fand sich nämlich auf einem der Borneo-Exemplare ein kleines, nur 1,5 Mm. langes Individ aufsitzend, deren Anhänge nur $^1/_3$ des proximalen Protopoditensegmentes ausmachen und nur im abgestutzten Ende mit Börstchen — und zwar 2 — versehen sind. Bei anderen, 3—4 Mm. langen Exemplaren — aus dem Indischen Ocean — messen die Anhänge an Länge die Hälfte desselben Segmentes und tragen in der Spitze 3 Börstchen. *Es scheint also durch die Häutungen nicht nur die relative Länge, sondern auch die Bewaffnung der Abdominalabhänge verändert zu werden.* Dasselbe gilt auch von der *Cirrenbewaffnung.* Während dass nämlich bei den erstgenannten 15 Mm. langen Exemplaren *fünf* Börstchenpaare ventralwärts in den Segmenten stecken (Taf. VIII, Fig. 27), sind bei den Exemplaren von 3—4 Mm. Länge deren nur *drei* (Taf. VIII, Fig. 26), und bei dem 1,5 Mm. langen Individ nur *zwei* vorhanden. Als Altersunterschiede seien übrigens bemerkt: die Schärfe des zwischen dem Aussenzahn

und dem 2. Zahn eingehenden Winkels bei den Mandibeln der Jungen, die Abrundung derselben bei den erwachsenen; sowie dass die ovale Kante der hinteren Maxillen bei den Jungen abgerundet, bei den erwachsenen fast gerade ist.

Ob die verschiedene Form des Basalsegmentes der Scuta ebenso vom Alter abhängt oder als Variation zu betrachten ist, stelle ich bis auf Weiteres dahin. Für jenes spricht indessen, dass sämmtliche vorliegende kleinere Exemplare — bis auf wenigstens 6 Mm. Länge — von der China- sowohl als von der Java-See und dem Indischen Ocean herstammend, ein nach hinten ganzrandiges Basalsegment, die grösseren dagegen ein eingebuchtetes haben. Bei Allen ist Tergum nur zweizipfelig.

Das oben erwähnte, nur 1,5 Mm. lange Exemplar ist ohnedies auch dadurch bemerkenswerth, dass es *die Entstehung der Schalen der fraglichen Art ins Licht setzt.*

Wie überall bei den Lepadiden, liegt bei Carina und Tergum die Primordialschale gerade im Umbo der bleibenden. Bei Scutum stellt dieselbe ein sehr ausgedehntes Feld dem Margo occludens entlang dar, reicht jedoch nach hinten nicht bis zum Ende des bleibenden Schliesssegmentes. Bei dieser Längenausdehnung findet sich aber kaum eine Spur — höchstens eine sehr geringe Ausbuchtung als Anlage — eines basalen Segmentes vor, welches also, *ohne selbstständigen Umbo, vom unteren Ende jenes hervorwächst.*

Fundorte und Vorkommen.

1) China-See, bei Labuan an der Westküste Borneo's. Mehrere Exemplare. (Die Vega-Expedition). RM.

2) Java-See, bei Batavia, auf der Unterseite des Kopfbrustschildes zweier *Limulus moluccanus.* 3 Ex. (der Verfasser). RM.

3) Indischer Ocean, weil mit *Platylepas* zusammen, vielleicht auf einer Seeschlange angetroffen. UM.

Dichelaspis alata n. sp.

(Taf. II, Fig. 6—7.)

Diagn. Capitulum oblique ovatum, valvulis 5. Terga antice 3-laciniata (vel 2-sinuata). Segmenta scutorum lata, antice adjacentia; segmentum occludens versus sinum ventralem tergi spectans, segmentum basale laciniis duabus, altera postice, altera carinam versus spectanti, sinu lato interjecto. Carina postice in medium tergi porrecta, æqualiter curvata, ramis furcæ brevibus, a basi divergentibus.

Pedunculus antice crassior, longitudine capitulum æquans.

Capitulum schief oval, mit 5 Schalen. Terga nach vorne durch zwei tiefe Einbuchtungen 3-zipfelig. Die Scutalsegmente sind breit, im vordersten Drittel an einander liegend. Das Ende des Segmentum occludens ist gegen den ventralen Sinus des Tergum gerichtet. Das Basalsegment ist zweizipfelig; die Zipfel, von denen der eine gegen den dorsalen Sinus des Tergum, der andere rückwärts gerichtet ist, sind durch eine breite seichte Einbuchtung getrennt. Carina bis in die Höhe der Mitte der Terga

hinauf reichend, ist ebenmässig und stärker als der Ventralrand gebogen; die Furcaläste sind kurz, von der Basis divergirend.

Pedunkel nach vorne dicker, von der Länge des Capitulum.

Farbe unbekannt.

Masse. Länge des Körpers 3,5 Mm.
» » Capitulum 2 »
Breite » » 1,5 »

Fundort und Vorkommen. Javasee, die Tausendinseln, auf den Kiemen eines ans Land geworfenen *Palinurus* sp. angetroffen. 1 Ex. (Der Verfasser). RM.

Descr. *Capitulum.* Der Mündungsrand ragt ventral unbedeutend über den vorderen hervor, der im Ganzen viel weniger als der hintere gekrümmt ist. Von oben (Fig. 7) hat das Capitulum die Form einer von der Kante aus gesehenen Mandel, kaum dicker als der Pedunkel. Die Rückenkontur distal von Carina ist ein wenig zugeschärft.

Mundtheile. Die Mandibeln haben 4 Zähne und deren Innerecke ist 3-spitzig.

Cirren. Das 1. Paar ist grösser als das halbe zweite. Das 2.—6. Paar trägt ventralwärts den Segmenten entlang 5—7 lange Börstchenpaare, dorsalwärts in den Suturen 4—5 Börstchen ein wenig kürzer als die ventralen.

Schwanzanhänge. Diese reichen nur wenig über das proximale 6. Protopoditsegment hinauf und sind ungef. $^1/_4$ so breit wie das distale Protopoditsegment. Sie tragen nur in der Spitze einen Büschel von Börstchen, um viel länger als die Anhänge selbst.

Verwandtschaft. Es erinnert diese Art durch den Umriss des Capitulum mehr an *Dichelaspis Warwicki* als an eine der im folgenden als neu beschriebenen Arten. Wiewohl stärker ausgebildet und nach vorne mehr zusammenhängend als bei D. Warwicki zeigen die Scutalsegmente dieselbe Wachsthumstendenz als bei dieser, auch können die Terga der D. Warwicki mitunter 3-zipfelig sein — vergl. Pl. 2, Fig. 66 bei Darwin —; die Insertion und Form der Carina-Furca sowie die Bewaffnung der Schwanzanhänge sind aber ganz verschieden.

Dichelaspis sinuata n. sp.

(Taf. II, Fig. 3—5.)

Diagn. Capitulum valvulis 5. Terga late ovata, sinu antico fere mediano, magno, segmento occludenti scutorum fere contrario. Segmentum basale a basi capituli divergens, contra segmentum occludens angulum acutum formans. Carina vix ad medium scutorum porrecta, parte dimidia postica margini orificii fere parallela, antice curvata, furca magna in basi capituli inserta, ramis cum basi parallelis.

Pedunculus antice crassior, capitulo plus minusve longior.

Capitulum mit 5 Schalen. Terga breit oval, nach vorne zu durch einen tiefen Einschnitt, der dem Schliesssegment des Scutum fast gegenüber liegt, zweizipfelig. Die Scuta-Segmente, das eine vom Schliessrande, das andere von der Basis divergirend, bilden gegen einander einen spitzen Winkel von ungefähr 55°. Carina nach hinten kaum bis zur Mitte der Terga hinaufreichend, ist in der vorderen Hälfte stärker als in der hinteren gekrümmt; die hintere Hälfte dem Öffnungsrand fast parallel. Die breite Furca, deren Äste mit der Capitulum-Basis parallel verlaufen, ist in dieser eingesenkt.

Pedunkel nach vorne dicker, mehr oder weniger das Capitulum in Länge übergehend. (Ist bei dem abgebildeten Exemplare zusammengezogen).

Farbe unbekannt. Die bei den Spiritus-Exemplaren sichtbaren schwarzen Punkte sind die durchscheinenden Nauplius-Augen der Embryonen.

Masse. Länge des Körpers 5 Mm.
» » Capitulum 2,5 »
Breite » » 1,5 »

Fundort und Vorkommen. Javasee, die Tausendinseln; auf den Kiemen eines ans Land geworfenen *Palinurus* angetroffen. Zahlreiche Exemplare. (Der Verfasser.) RM.

Descr. Bauch- und dorsalwärts gesehen ist das *Capitulum* oval, nach hinten zugespitzt; die Mittellinie des Rückens tritt sogar im äussersten Theile kielförmig hervor. In Seitenansicht ist es demjenigen der D. cuneata und D. aperta ähnlich durch die ventral hervorragenden Mündungsränder. Die Zipfel der Terga variiren; sie sind entweder gleichbreit — vergl. die Figur! — oder der eine breiter als der andere. Die Dorsalkontur ist der Basis am nächsten stärker als in der Mitte gekrümmt. Im Mantel stecken sehr feine und kurze Börstchen.

Mundtheile. Die *Palpen* sind stumpf konisch, von der Länge der Mandibeln, mit Fiederbörstchen, etwas kürzer als der Palp selbst, in dem Ende und in der Seite steckend. *Mandibel* mit 5 Zähnen — ausser der zahnähnlichen Innerecke —, deren wenigstens die inneren Nebenzähne an der Basis haben; übrigens finden sich in den Seiten und den Rändern Börstchen. Die *vorderen Maxillen* haben einen Einschnitt in der ovalen Kante. Die *hinteren Maxillen* tragen in dem gerundeten Aussenrand längere Börstchen als in dem inneren.

Cirri. Das 1. Paar macht mehr als die Hälfte des 2. aus. Das 2.—6. Paar ist ventralwärts mit 7—9 Börstchenpaaren, dorsalwärts in den Suturen mit je einem Büschel von 4—5 fast gleich-langen Börstchen ausgestattet.

Die *Schwanzanhänge* reichen beinahe zum distalen Ende des Protopoditen hinauf und ihre Breite macht ungef. $^1/_4$ der Breite des distalen Protopoditsegmentes aus. Das distale $^1/_4$ der Hinterseite — nicht aber das Ende — ist mit schlanken Börstchen, deren einige doppelt so lang wie der Appendix selbst sind, versehen.

Verwandtschaft. Unter den für DARWIN bekannten Arten der Gattung steht *D. Lowei* DARWIN der fraglichen Art näher als die übrigen und zwar durch die annähernd ähnliche Form der Terga, sowie durch die Grösse der Scutalsegmente im Verhältniss zu einander. Die Richtung des Basalsegmentes ist aber eine andere und die verschiedene

Form des Capitulum beider Arten bedingt die ganz verschiedene Lage der Carina im Verhältniss zu den Terga. Die Cirrenbewaffnung und die Appendices beider scheinen ähnlich zu sein.

Unter den nach DARWIN, d. i. seit 1851, beschriebenen Arten erinnern *D. Darwini* FILIPPI[1] und *D. Neptuni* MAC DONALD[2] durch ihre Platten an die fragliche Art. Mit dieser hat sie die gegenseitige Richtung der Scutalsegmente zu einander gemeinsam — sie bilden bei beiden einen spitzen Winkel, indem die Basalsegmente von der Capitulumbasis weit divergiren —; die ganze Form des Capitulum und die Lage der Carina ist aber verschieden. Jene, von welcher leider keine Abbildung da ist, scheint zwar durch den Habitus der D. sinuata näher zu kommen, jedoch soll das Basalsegment wie bei *D. Lowei* d. i. mit der Basis parallel verlaufen und dem Schliesssegment in Länge sowie in Breite fast gleich sein, Kennzeichen, welche nicht gut hier zutreffen. In Betracht der Artverschiedenheit der Wohnthiere — es ist D. Darwini bei Palinurus vulgaris angetroffen — und die weit entlegenen Fundorte, kann ich also nicht umhin die fragliche Dichelaspis-Form bis auf Weiteres als besondere Art aufzunehmen.

Dichelaspis trigona n. sp.

(Taf. II, Fig. 8.)

Diagn. Capitulum fere trigonum, valvulis 5. Terga fere trapezoidea, sinu brevi antico-ventrali, segmento occludenti scutorum contrario. Segmentum basale scutorum a basi divergens, versus apicem curvatum, contra segmentum occludens angulum acutum sicut in D. sinuata formans. Carina usque ad partem posticam tertiam tergorum porrecta sicut margo dorsalis capituli fere a basi versus apicem cum margine ventrali valde convergens antice valde curvata; furca magna, ramis a basi paullo divergentibus.

Pedunculus antice crassior, longitudine capitulum æquans.

Capitulum fast 3-seitig, mit 5 Schalen. Terga fast trapezoidisch mit geradem Dorsalrand, nach vorne dem Ventralrand näher mit einem seichten Einschnitt, der dem Segmentum occludens gegenüber liegt. Das Basalsegment der Scuta von der Capitulumbasis divergirend, nach aussen dorsalwärts gekrümmt, bildet gegen das Schliesssegment einen spitzen Winkel von derselben Grösse wie bei D. sinuata. Carina reicht bis in die Höhe des hintersten Drittels der Terga, ihre hintere Hälfte, sowie die Dorsalkontur, gegen den Ventralrand des Capitulum stark und ebenmässig konvergirend; nach vorne ist sie stark gekrümmt; die grossen Furcaläste von der Basis ein wenig divergirend.

Pedunkel nach vorne dicker, von der Länge des Capitulum.

Farbe unbekannt.

Masse. Länge des Körpers 4,5 Mm.
» » Capitulum 2,5 »
Breite » » 1,75 »

[1] Archivio per la Zoologia. Genova 1861. — [2] Proceed. Zool. Soc. of London. 1869.

Fundort und Vorkommen. Javasee, die Tausendinseln, auf den Kiemen eines ans Land geworfenen *Palinurus* sp. angetroffen. 1 Ex. (Der Verfasser). RM.

Descr. Der Mündungsrand des *Capitulum* ragt kaum vor dem übrigen Ventralrande hervor, und der Dorsalrand läuft nur schwach gebogen von der Basis ab ebenmässig zur Spitze des Capitulum. Es bekommt hierdurch das Capitulum den Umriss eines Dreiecks.

Mundtheile. Palpen stumpf-konisch, ebenso lang wie die Mandibeln. Im Ende und in der hinteren Seite stecken Fiederbörstchen. Die *Mandibeln* haben 5 Zähne; auf dem vorliegenden Exemplare sind alle Zähne einfach und besonders die zwei innersten stumpf. Dass dies indessen nur von Abnutzung abhängt, zeigt der im Innern des Kiefers schon fertig gebildete neue Mandibel, dessen Zähne sämmtlich scharf sind, die drei inneren dazu zweispitzig und ausserdem mit Nebenzahn oder -Zähnen an der Basis. Die Seiten und Kanten der Kiefer tragen steife Börstchen. Die vorderen *Maxillen* haben einen eingebuchteten Kaurand, der 7 längere und einige kürzere Stacheln trägt, durch Abnutzung stumpf und kurz. Bei den *hinteren Maxillen* ist der innere, fast gerade Rand mit kürzeren Börstchen als der äussere versehen.

Cirren. Das 1. Paar ist halb so lang wie das 2. Das 2.—6. Paar trägt ventralwärts 7—9 Börstchenpaare, dorsalwärts in den Suturen 4—6 Börstchen, ein wenig kürzer als die ventralen.

Die *Schwanzanhänge* reichen kaum bis zur Mitte des distalen Segmentes des 6. Protopoditen hinauf und sind nur $^1/_4$ so breit wie dasselbe Segment. In dem schiefen Ende selbst stecken lange Börstchen.

Verwandtschaft. Die ausgeprägt dreieckige Form des Capitulum, die davon abhängige starke Konvergenz der Carina und des Schliesssegmentes des Scutum nach hinten, sowie die stärkere Krümmung der Carina im Ganzen, die Form des Tergum, die Länge und Bewaffnung der Schwanzanhänge unterscheiden diese Art von D. sinuata, mit welcher sie den Bau der Cirren, die Lage der Scutalsegmente zu einander und des Schliesssegmentes zu den Terga gemeinsam hat.

Dichelaspis cor C. W. Auriv.

(Taf. II, fig. 1—2).

Diagn. Capitulum forma cordis, valvulis 3, scilicet carina scutisque. Segmenta scutorum valvula primordiali inter se conjuncta; segmentum basale pone furcam carinæ situm. Terga desunt. Carina capitulo dimidio brevior.

Pedunculus antice crassior, capitulo sæpe duplo longior.

Corpus ubique tuberculis chitinosis minutis rotundatis dense ornatum.

Capitulum herzförmig, die Spitze nach aussen. Nur drei Platten sind entwickelt, und zwar Carina und Scuta; Terga fehlen; jedoch ist ihr Gebiet — wie z. B. bei

Paradolepas (= *Dichelaspis*) *Neptuni* Mac Donald [1] — sowohl gegen Scuta als gegen Carina durch einen Chitinwulst, sowie durch mit diesem parallele Anwachsstreifen, deutlich abgegrenzt. Die beiden Scutalsegmente sind durch die Primordialplatte verbunden und bilden unter sich einen spitzen Winkel, indem der Basalrand des Basalsegmentes von der Capitulumbasis divergirt. Carina ist nur halb so lang wie Capitulum. Furca verhältnissmässig gross.

Pedunkel oft doppelt länger als das Capitulum, nach vorne doppelt dicker als an der Capitulumbasis. Das ganze Thier — die Kalkplatten ausgenommen — ist mit winzigen gerundeten Chitinhöckern dicht besetzt.

Farbe unbekannt.

Masse. Länge des Körpers 5 Mm.
» » Capitulum 2 »
Breite » » 2 »

Fundort und Vorkommen. Süd-Afrika, bei Port Natal, auf den Kiemenblättern eines brachyuren Dekapoden massenhaft befestigt. (Wahlberg). RM.

Synon. 1892. Dichelaspis cor C. W. Aurivillius. [2]

Descr. Von der Rücken- oder Bauchseite gesehen ist *Capitulum* plattelliptisch, nach hinten gespitzt. Das Basalsegment der Scuta variirt — vom Alter unabhängig — a) an Form, indem es entweder gleichbreit oder rückwärts höher, dadurch triangulär ist; b) an Breite im Verhältniss zum Schliesssegment, indem es entweder ebenso schmal wie dieses oder bis 4-mal breiter ist; c) an Richtung, indem sein Aussenrand entweder gegen die Mitte des Capitulum hin zeigt oder der Basis desselben näher verläuft — jedoch immer nach hinten von der Carinafurca. Die Schliesssegmente sind lanzettförmig, mit dem Bauchrande parallel; ihren Vorderenden schiesst je ein Zäpfchen des Basalsegmentes entgegen. Die Furcaläste der Carina richten sich entweder nach hinten oder mehr bauchwärts.

Mundtheile. Die Mandibeln haben 4 Zähne, deren wenigstens 2 mit je einem Basalzähnchen versehen sind. Dem Kaurande der vorderen Maxillen fehlt ein Einschnitt.

Cirren. Das erste Paar ist ungef. halb so lang wie das zweite, mit gleichlangen 5-gliedrigen Ästchen. Das 2.—6. Paar trägt ventralwärts in jedem Segmente 6—8 Börstchenpaare, dorsalwärts in den Suturen 3—4 kurze Börstchen.

Die *Schwanzanhänge* sind 1-gliederig, ebenso lang wie das 6. Protopodit und ebenso breit wie die proximalen Segmente der Äste derselben Cirren. Zahlreiche Börstchen stehen in der Spitze — diese sind so lang wie die Anhänge selbst — bis zur Mitte der konvexen Seite.

Verwandtschaft. Die Art theilt nur mit den hier als neu beschriebenen Dichelaspis bullata, angulata, aperta und cuneata das Fehlen der Terga, aber durch die Form des Capitulum erinnert sie einigermassen nur an diejenige des D. angulata. Was wiederum die Form der Platten betrifft, so findet sich das winklig gebogene Basalsegment der Scuta

[1] Proceed. Zool. Soc. of London 1869, P. 2: J. D. Mac Donald, on an apparently new genus of minute parasitic Cirripeds, between Lepas and Dichelaspis.
[2] l. c.

bei *D. cuneata* wieder, und zwar wird die Ähnlichkeit mit dieser noch grösser bei solchen Exemplaren von *D. cor*, deren Basalsegment niedrig ist. Die Schliesssegmente liegen aber mit den Vorderenden nicht so unmittelbar an den Basalsegmenten wie bei *D. cuneata*. Durch die Bewaffnung der Cirren ist die Art zwar der *D. bullata* sehr ähnlich, weicht aber von dieser durch die Länge und Dicke der Schwanzanhänge ab. Von *D. angulata* unterscheidet sie sich durch die Länge derselben Anhänge sowie durch die Cirrenbewaffnung.

Dichelaspis angulata n. sp.

(Taf. II, Fig. 9—11; Taf. VIII, Fig. 18, 24.)

Diagn. Capitulum oblique cordatum, apice sinistrorsum verso. Valvulis 3, carina scutisque; scutorum segmenta occludentia antice obtuse angulata, valvula primordiali in angulo sita; segmenta basalia nulla. Terga desunt. Carina aut scutis brevior aut longitudinem scutorum æquans, ramis furcæ brevibus. Pedunculus antice crassior, aut longitudinem capituli æquans aut brevior.

Capitulum schief herzförmig, die Spitze links gebogen. Nur drei Platten vorhanden — nämlich Carina und Scuta. Terga fehlen; jedoch geben concentrische Anwachsstreifen der Haut ihren Platz den anderen Platten gegenüber an. Von den Scuta finden sich nur die Segmenta occludentia, deren vorderstes Viertel einen stumpfen Winkel gegen den übrigen Theil bildet; von der im Winkel selbst gelegenen Primordialvalvel wächst die Platte nach vorne und hinten zu. Carina entweder kürzer als die Scuta — bei grösseren Exemplaren, vergl. die Figur! — oder gleich lang als diese — bei kleineren Exemplaren; die Furcaläste kurz, dick.

Pedunkel nach vorne dicker, entweder von der Länge des Capitulum oder kürzer.

Farbe unbekannt.

Masse. Länge des Körpers 5 Mm. (= das abgebildete Exemplar).
» » Capitulum 2,5 » (= » » »).
Breite » » 2 » (= » » »).

Fundort und Vorkommen. Javasee, die Tausendinseln; in der Kiemenhöhle eines ans Land geworfenen *Palinurus* sp. (Ein 1,5 Mm. langes Exemplar sass der Bauchseite einer *Dichelaspis bullata* nahe bei der Mantelöffnung auf.) 4 Ex. (Der Verfasser). RM.

Descr. Von der Rücken- (Fig. 11) oder Bauchseite (Fig. 10) gesehen ist das *Capitulum* eiförmig, nach hinten zusammengedrückt mit scharfen Rändern — besonders scharfem Bauchrande. Es folgen die Scuta diesem Rande nach, der folglich, und zwar vor der Mündung, winklig ist. Die Carina ist von der Seite aus gesehen (Fig. 9) gerade, nur in der Furcalgegend bauchwärts gebogen; die Furcaläste liegen fast in derselben Linie.

Mundtheile. Die Mandibeln haben 3 Zähne, von denen der 2. und 3. Nebenzähne an der Basis tragen. Die Innerecke ist dreispitzig. Die *vordern Maxillen* haben einen geraden Kaurand — ohne Einschnitt —, dessen Stacheln von aussen nach innen in Länge abnehmen. In den Seitenflächen stecken Börstchen. Die *hinteren Maxillen* sind kurz, breit gerundet mit dicht stehenden langen Börstchen.

Cirren. Das 1. Paar, vom 2. entfernt, macht $^2/_3$ der Länge desselben aus; die Äste sind gleichlang, 5-gliederig, dicht behaart. Die übrigen Paare nehmen in Länge nach hinten zu; ihre Segmente sind bauchwärts mit 7—9 Börstchenpaaren versehen, rückwärts finden sich nur in den Suturen 6 lange Börstchen; sie sind im Allgemeinen gleich lang als die Segmente. In den letzten und vorletzten Segmenten des 6. Cirrenpaares stecken hie und da winzige, fadenähnliche Bildungen, welche mit dem weichen Innern der Segmente in Verbindung stehen. Es kommt ihnen, aller Wahrscheinlichkeit nach, eine sensitive Funktion zu.

Die *Schwanzanhänge* reichen nur wenig über das proximale Segment des 6. Protopoditen hinauf, und sind nur $^1/_3$ so breit wie dieses. Von der Spitze an kaum bis zur Mitte der äusseren konvexen Seite stecken Börstchen, deren die distalen eben so lang wie die Anhänge selbst sind.

Generationsorgane. Die Schuppen des Penis sind nicht so dicht wie bei D. bullata geordnet. Von Eiern fanden sich innerhalb des Mantels eines 5 Mm. langen Exemplares um 500, deren Embryonen — 2 Mm. lang — offenbar der Entschlüpfung nahe waren.

Verwandtschaft. Durch den allgemeinen Umriss des Capitulum und die Zahl der Platten nähert sich diese Art zwar am meisten zu *Dichelaspis cor*, jedoch mit dem wesentlichen Unterschiede, dass von den Scuta nur ein Segmentum occludens da ist, ein Segmentum basale im eigentlichen Sinne dagegen fehlt. Wenn aber der Unterschied zweier Scutalsegmente nach der Lage der Valvula primordialis abgemacht wird, dann sollte — nach dem oben gesagten — die vor dem Winkel gelegene Partie der fraglichen Platte als ein rudimentäres Segmentum basale betrachtet werden, dessen eigentlicher Basaltheil fehlt. Dass die Richtung dieser Partie kein Hinderniss für eine solche Deutung sein darf, lehrt das Beispiel einer andern unten als neu erwähnten Dichelaspis-Art, *D. cuneata*, bei welcher das vor der Primordialvalvel gelegene Scutalsegment rechtwinklig gebogen ist, und zwar so, dass der eine längere Schenkel mit der Capitulumbasis parallel läuft, der andere kurze fast in der Fortsetzung des Scutum occludens liegt,[1] von dem er durch eine Sutur getrennt ist.

Obgleich nur bei Dichelaspis angulata unter der Primordialplatte kein unverkalktes Stück sich findet, scheint doch eine Identificirung mit dem Befunde bei D. cuneata ebenso zulässig zu sein als zwischen *D. orthogonia* und den vier übrigen von Darwin erwähnten Dichelaspis-Arten in Betreff der Verbindung der Scutalsegmente. Dieselbe Bildung der Scuta wie bei D. cuneata findet sich auch bei D. bullata wieder, indem auch dort die Primordialplatte gerade an dem Punkte sich findet, wo die Scuta vor der Mantelöffnung sich begegnen. Die nach vorne von diesem Punkte liegenden Stücke entsprechen also einander in beiden Fällen. Am öftesten sind sie bei D. bullata — vergl. Taf. II, Fig. 13 — nicht mehr entwickelt als bei D. angulata, also nur $^1/_5$—$^1/_6$ der Länge der hinteren Scutalstücke messend, bei grossen Exemplaren jener Art laufen sie jedoch bisweilen doppelt so weit nach vorne um sodann in geraden Winkel sich dorsalwärts umzubiegen. Es spricht

[1] Der Winkel bei der Primordialplatte ist sehr stumpf.

dieser Umstand wiederum für die Deutung der vor dem Winkel gelegenen Zäpfchen als Rudimente der Segmenta basalia. Durch das Fehlen einer Carina sowie durch die Form des Capitulum steht aber D. bullata entfernter von der fraglichen Art als D. cor.

Die Schwanzanhänge sind zwar von derselben Länge wie bei D. bullata aber dicker und mit längeren Börstchen versehen, dadurch an diejenige des D. cor erinnernd. Durch die Bewaffnung der Cirren und zwar durch die dorsalwärts in den Suturen steckenden sehr langen Börstchen unterscheidet sich die Art sowohl von D. cor als von D. bullata.

Dichelaspis aperta n. sp.

(Taf. I, Fig. 14—16.)

Diagn. Capitulum valvulis 3, carina scutisque. Terga desunt. Orificium magnum, postice latius. Segmenta scutorum occludentia a medio orificio versus basin capituli antice convergentia ibique contra segmenta basalia angulum fere rectum formantia. Carina scutis longior, æqualiter curvata, furca in basi capituli inserta.

Pedunculus antice crassior, aut longitudine capitulum æquans aut duplo longior.

Capitulum mit 3 Schalen, nämlich Carina und Scuta. Terga fehlen. Die Mantelöffnung gross, oval, nach hinten breiter. Die schwach sich schlängelnden Schliesssegmente der Scuta erstrecken sich von der Mitte der Öffnung konvergirend gegen die Basis des Capitulum, wo die Basalsegmente, kürzer als jene, unter geradem Winkel nach hinten ausgehen. Carina länger als die Scuta, ebenmässig gebogen; die Furca in der Capitulumbasis eingesenkt.

Pedunkel nach vorne dicker, entweder von der Länge des Capitulum oder doppelt länger.

Farbe unbekannt.

Masse. Länge des Körpers 8 Mm.
» » Capitulum 2,5 »
Breite » » 2 »

Fundort und Vorkommen. Javasee, die Tausendinseln, auf den Kiemen eines ans Land geworfenen *Palinurus* angetroffen. 6 Ex. (Der Verfasser). RM.

Descr. Durch den nach den Seiten ausstehenden Mündungsrand der Mantelöffnung hat das *Capitulum* vom Rücken aus eine nach hinten breite gerundete Form (Fig. 15). In Seitenansicht (Fig. 14) biegt sich die hintere Hälfte des Ventralrandes ein wenig mehr ventralwärts als die vordere und die Dorsalkontur bildet einen ebenmässigen Bogen von der Basis bis zur Mantelöffnung.

Mundtheile. Palpen stumpf konisch mit zahlreichen Börstchen. *Mandibeln* mit 5 Zähnen und einer zahnähnlichen Innerecke, jedoch feiner als die übrigen. Die *vorderen Maxillen* sind ganzrandig mit nach innen kaum in Grösse abnehmenden Stacheln sowie

darunter gemischten kleineren. Die *hinteren Maxillen* sind rhombisch mit gerundeten Ecken, die Innerkante hat besonders lange Börstchen.

Cirren. Das 1. Paar ist nur halb so lang wie das 2. Das 2.—6. Paar trägt ventralwärts 7—9 lange Börstchenpaare, dorsalwärts in den Suturen 7—8 Börstchen, wenigstens in den proximalen Suturen von derselben Länge wie die ventralen.

Die *Schwanzanhänge* reichen nur bis zur Mitte des distalen Segmentes des 6. Protopoditen; sie tragen im Ende und im distalen Drittel Börstchen die im allgemeinen um die Hälfte länger als die Anhänge selbst sind.

Penis gestreckt-konisch, spitziger auslaufend als bei D. bullata. Die Spitze ist ohne Einschnitt; die Börstchen ragen also, weil in der Spitze selbst steckend, frei hinaus.

Verwandtschaft. Während dass die Art eine ähnliche Seitenansicht des Capitulum wie Dichelaspis cuneata und D. sinuata darstellt, erinnert sie in Bezug auf die Cirrenbewaffnung an D. angulata und D. cuneata, steht aber durch die Bewaffnung der Schwanzanhänge vereinzelt da.

Dichelaspis cuneata n. sp.

(Taf. I, Fig. 17—19.)

Diagn. Capitulum valvulis 3, carina scutisque. Terga desunt. Orificium ovatum, postice latius. Segmenta scutorum occludentia a medio orificio antice convergentia, pone basin capituli acute desinentia. Segmenta basalia angulata, parte ventrali segmentis occludentibus breviore in apice excavata. Carina æqualiter curvata partes ventrales scutorum longitudine æquans; ramis furcæ cum basi capituli parallelis.

Pedunculus antice crassior, capitulo aut brevior aut duplo longior.

Capitulum mit 3 Schalen, nämlich Carina und Scuta. Terga fehlen. Die Mantelöffnung oval, nach hinten breiter. Die Schliesssegmente der Scuta von der Mitte der Mantelöffnung nach vorne zu konvergirend, hinter der Capitulum-Basis spitz endigend. Die Basal-Segmente geradwinkelig, der ventrale Schenkel kürzer mit ausgeschnittenem hinterem Ende, in welchem die Spitzen der Schliesssegmente wie eingekeilt sind. Carina ebenmässig gebogen, gleich lang wie die ventralen Theile der Scuta. Die Furcaläste laufen mit der Capitulumbasis parallel.

Pedunkel nach vorne dicker, entweder kürzer oder doppelt länger als das Capitulum.

Farbe unbekannt.

Masse. Länge des Körpers 6,5 Mm.
» » Capitulum 3 »
Breite » » 2,5 »

Fundort und Vorkommen. Javasee, die Tausendinseln; auf den Kiemen eines ans Land geworfenen *Palinurus* angetroffen. 2 Ex. (Der Verfasser). RM.

Descr. Das *Capitulum* stellt bauch- wie dorsalwärts einen regelmässigen Oval dar, jedoch ist der Mantel jederseits von den Enden der Scuta an schief gegen den Mündungsrand eingedrückt, beinahe wie gefurcht. In Seitenansicht bietet das Capitulum dieselbe Form wie D. aperta dar, indem die hintere, die Mündung umgebende Hälfte des Mantels ventralwärts ein wenig über die vordere hervorragt. Die Dorsalkontur ist von der Basis bis zur Mantelöffnung regelmässig gekrümmt.

Mundtheile. Palpen stumpf konisch, die Börstchen von der Spitze, wo sie halb so lang wie die Palpen selbst sind, an Grösse nach unten abnehmend. Ausser dem schlanken spitzigen Zahn der Innerecke tragen die *Mandibeln* 5 Zähne. Die Seitenflächen und Kanten sind mit Börstchen besetzt. Die *vorderen Maxillen* ganzrandig — ohne Einschnitt — mit ungefähr 6 gleichgrossen längeren und einigen kürzeren, mit jenen abwechselnden Stacheln. Börstchen stecken in den Seiten und um die innere Ecke. Die *hinteren Maxillen* rektangulär mit abgerundeter innerer Ecke; die Innerkante hat längere Börstchen als die äussere.

Cirren. Das 1. Paar ungefähr halb so lang wie das 2. Das 2.—6. Paar ventralwärts mit 7—9 Börstchenpaaren, dorsalwärts in den Suturen mit 5—7 Börstchen, im allgemeinen etwa $^1/_4$ kürzer als die ventralen.

Die *Schwanzanhänge* sind schmal — etwa $^1/_5$ so breit als das proximale Segment des 6. Protopoditen — und kurz — von der Länge desselben Segments. Nur im Ende stecken schlanke Börstchen, deren einige doppelt so lang wie der Anhang selbst sind.

Verwandtschaft. Durch die Form des Capitulum sowie durch die Zahl und allgemeine Ausdehnung der Platten steht diese Art ohne Zweifel der *Dichelaspis aperta* am nächsten, hat aber dieser gegenüber die eigenthümliche Segmentirungsart der Scuta sowie die Einschiebung der Segmente in einander aufzuweisen. Während dass ferner die Börstchenausstattung der Cirren an dieselbe Art erinnert, weichen die Schwanzanhänge durch Form und Bewaffnung ab.

Dichelaspis bullata C. W. Auriv.

(Taf. II, Fig. 12—13; Taf. VI, Fig. 10—11; Taf. VIII, Fig. 19, 25.)

Diagn. Capitulum inflatum, valvulis 2 — scutis —, scilicet segmentis occludentibus curvatis, ante aperturam convergentibus, dein paullo divergentibus. Segmenta basalia scutorum, terga et carina desunt.

Pedunculus pæne cylindricus, aut longitudine capitulum æquans aut longior.

Capitulum aufgeblasen, mit nur 2 Schalen, den Scuta, deren Schliesssegmente um die vordere Hälfte der Mündung verlaufend nach vorne konvergiren um sodann kurz zu divergiren. Segmenta basalia scutorum sowie Terga und Carina fehlen.

Der Pedunkel ist beinahe cylindrisch, entweder ebenso lang wie oder länger als das Capitulum.

Farbe. Capitulum, sowie Pedunkel, glashell; jenes doch oft wegen des durchscheinenden Körpers und des Darminhaltes schmutzgrau.

Masse. Länge des Körpers bis zu 7 Mm.
» » Capitulum 3 »
Breite » » 2,5 »

Fundort und Vorkommen. Javasee, die Tausendinseln; auf den Kiemen und auf der Innerwand der Kiemenhöhle eines ans Land geworfenen *Palinurus* sp. angetroffen. Zahlreiche Exemplare. (Der Verfasser). RM.

Syn. 1892. Dichelaspis bullata C. W. Aurivillius.[1]

Descr. Von der Rücken- oder der Bauchseite gesehen ist das *Capitulum* eiförmig, nach hinten spitz. In Seitenansicht ist die hintere Hälfte der Bauchseite — um die Mündung — ausgeschnitten. Die Mündung ist nach vorne breiter. Zu beiden Seiten von der vorderen Hälfte derselben laufen die Scuta, welche nur $^1/_5$—$^1/_6$ der grössten Mündungsbreite messen; sie sind schwach S-förmig gebogen und hören in der Mitte zwischen der Mündung und der Capitulumbasis auf.

Mundtheile. Die *Palpen* sind stumpf konisch mit zahlreichen Endbörstchen. Die *Mandibeln* haben 4 Zähne, die Innerecke läuft in 3 feine zahnähnliche Spitzen aus. Die *vorderen Maxillen* haben einen nicht eingeschnittenen Kaurand, mit 9—10 Stacheln, deren die äussersten am längsten sind, besetzt. Die *hinteren Maxillen* sind breit, mit schwach konkaver Innerkante, deren Börstchen kürzer als die äusseren sind.

Cirren. Das 1. Paar, vom 2. entfernt, ist nur halb so lang wie dieses; die Äste haben je 5 dicke Segmente. Das 2.—6. Paar trägt bauchwärts 10 Börstchenpaare, rückwärts finden sich nur in den Suturen 3—4 Börstchen.

Die *Schwanzanhänge* sind einfach, schlank — etwa $^1/_4$ schmäler als der 6. Protopodit; reichen kaum über das proximale Segment desselben Protopodits hinauf. Von der Spitze bis zur Mitte der konvexen Seite hinab sind sie mit an Grösse abnehmenden Börstchen versehen.

Verwandtschaft. Wenn der Name Dichelaspis als solcher berücksichtigt wird, könnte zwar mit Recht in Frage gestellt werden, ob der fragliche Lepadide, dem ein zwei-segmentirtes Scutum abgeht, in diese Gattung einzureihen sei oder nicht. Aber auch übrigens trifft die Gattungsdiagnose, sowie dieselbe von Darwin begrenzt ist, offenbar auf die fragliche Form nicht ein. Dass ich indessen keinen neuen Gattungsnamen für sie in Anspruch genommen habe, hängt davon ab, dass der Bau des Thieres und zwar besonders der appendikulären Organe hauptsächlich mit demjenigen der Dichelaspis cor stimmt, eine Art die durch segmentirte Scuta und die Anwesenheit einer Carina ohne Zweifel als eine Dichelaspis-Art sich bewährt, obschon auch ihr Terga abgehen. Statt also, wo ein alter Gattungsname bei erweiterter Formenkenntniss auf eine oder mehrere neue Formen in gewisser Hinsicht nicht einpasse, denselben bei Seite zu lassen um einen neuen zu schaffen, halte ich es zweckmässiger, wo der Körperbau im wesentlichen ähnlich ist, mit Beibehalten des alten Namens seinen Umfang demgemäss zu erweitern, dass er die neuen Formen mit umfassen kann. Es geht also dieses Verfahren von der Ansicht aus, dass wo nur

[1] l. c.

wenige Formen einer Gattung bekannt sind der Unterschied zwischen wesentliche und unwesentliche Gattungsmerkmale viel schwieriger ist als wo eine grössere Artenreihe vorliegt. Solch ein unwesentliches Merkmal scheint mir aber in diesem Falle gerade die Zahl der Kalkplatten des Mantels zu sein. Denn — wie oben bemerkt — kann die der Gattung kennzeichnende Vertheilung des Mantels in fünf Anwachscentren — von wo aus das Capitulum an Grösse zunimmt und welche durch mehr weniger regelmässige concentrische Anwachsstreifen sich als solche bewähren — auch bei Arten verfolgt werden, bei denen in dem einen oder anderen desselben keine Verkalkung Statt findet. Während dass also — meiner Meinung nach — die Anwesenheit jener Centra, welche niemals wie bei Lepas von einer vollständigen Verkalkung begriffen werden, als Hauptmerkmal des Mantels der *Gattung* Dichelaspis aufgefasst sein muss, bieten sich der verschiedene Grad und Weise der Verkalkung als gute *Arts*kennzeichen dar. So wie aber also Dichelaspis bullata nur scheinbar gegen die Fünftheilung des Mantels dieser Gattung spricht, so fällt auch bei genauer Prüfung der Einwurf bezüglich der mangelnden Segmentirung der Scuta weg. Denn wie bei den bisher bekannten und auch bei den hier beschriebenen Arten die Grenzen zwischen den zwei Scutalsegmenten durch die Lage der Primordialplatte angezeigt wird, so kann auch bei D. bullata von zweien Segmenten die Rede sein. In dem Punkte nämlich, wo die beiderseitigen Scuta vor der Mantelöffnung sich am meisten nähern, sind Primordialplatten vorhanden; und zwar sollte demnach die nach vorne divergirenden Enden der Scuta — die übrigens verschieden lang, wenigstens länger als in der Figur, sein können — den Basalsegmenten anderer Arten entsprechen. Auch stimmt hiermit völlig das bei D. angulata obwaltende Verhältniss.

So weit unsre Kenntniss hieher gehöriger Formen gegenwärtig sich streckt, könnte folglich, sogar was diesen Karakter betrifft, die ursprüngliche Darwin'sche Diagnose, wenn auch ein wenig modificirt, beibehalten werden; und zwar trifft der Gattungsname auch bis jetzt auf alle bekannte Formen ein.

Über die von Seite der Cirrenbewaffnung bestehende nähere Verwandtschaft der Art mit D. cor, verweise ich auf das oben gesagte.

Alepas japonica C. W. Auriv.

(Taf. II, Fig. 14—15; Taf. VIII, Fig. 3, 7; Taf. IX, Fig. 3.)

Diagn. Capitulum a latere fere semisphericum, solidum, transverse rugosum, valvulis nullis. Apertura brevis, non tubulosa, simul cum margine antico impendens, angulum obtusum contra pedunculum formans. Crista mediana dorsalis 3—4 gibbosa.

Pedunculus $^2/_3$ longitudinis capituli æquans pæne cylindricus, solidus, rugosus.

Capitulum von der Seite gesehen fast halbspherisch — der Diameter ventral —, aus derbem querrunzeligen Chitin. Platten fehlen. Mantelöffnung kurz, nicht tubenförmig, gleichwie der übrige Bauchrand überhangend, dadurch einen stumpfen Winkel

gegen den Pedunkel bildend. Ein median verlaufender Rückenkiel trägt 3—4 kleine Höcker.

Der Pedunkel, $^2/_3$ der Capitulumlänge messend, ist fast cylindrisch, aus derbem runzeligen Chitin.

Farbe. Die in Spiritus aufbewahrten Exemplare sind von dem durch den dicken wie hyaliner Knorpel aussehenden Chitin durchscheinenden Mantelepithel bräunlich (braungelb).

Masse.

Länge	des	Körpers	30 Mm.
»	»	Capitulum	18 »
Breite	»	»	14 »
Dicke	»	»	12 »

Fundort und Vorkommen. Japanisches Meer, Hirado-Strasse — in 33° 10′ N. Lat., 129° 18′ O. Long. — in 80 Meter Tiefe bei einer Bodentemperatur von 10°,5 Cels., auf Algenstücken befestigt. 8 Ex. (Kapitän E. Svensson). UM.

Syn. 1892. Alepas japonica C. W. Aurivillius.[1]

Descr. Von der Bauch- oder Rückenseite gesehen hat das *Capitulum* einen ovalen Umriss, das dickere Ende nach vorne, die grösste Dicke ein wenig vor der Mitte gelegen. Der Rückenkiel, nach hinten am schärfsten, setzt sich nach vorne, niedriger und abgestutzt, über den Pedunkel fort, wo auch der vorderste Höcker sich findet. Die bauchwärts überhangende Stellung des Capitulum hängt nicht von einer etwa durch den Spiritus erzeugten Kontraktion ab, sondern steht mit der bedeutenden Länge und Richtung der Cirren im nächsten Zusammenhang. Der durch Querfurchen krausenförmige Mündungsrand — siehe Fig. 15 — macht nur $^2/_5$ des ganzen Ventralrandes des Capitulum aus. Der Mantel im Ganzen ist fest, von knorpelartiger Konsistenz, besonders im Rücken sehr dick — bis auf 2 Mm. Die Runzeln sind besonders in der ventralen Hälfte des Capitulum und über dem Pedunkel stark ausgeprägt.

Mundtheile. Die *Oberlippe* helmförmig gewölbt, der freie Rand zwischen den Palpen stumpf-gerundet; jederseits von ihr streckt sich eine Reihe winziger Zähnchen. Die *Palpen* konisch, in der hinteren Seite mit zahlreichen kurz gefiederten Börstchen versehen. Die *Mandibeln* sind 4-gezähnt; die Innerecke trägt einen oder keinen Zahn bei demselben Exemplare. Die Spitze des zweiten Zahnes — von aussen gerechnet — findet sich ungefähr in der Mitte des Kaurandes. Der konvexe Aussenrand ist bis zur Mitte feinstachelig, die Seitenflächen im distalen Theile und zwar besonders gegen den Innenrand zu mit gröberen Stacheln besetzt, welche an der Basis der Zähne kürzer und breiter werden. Der Kaurand der *vorderen Maxillen* ist mit einem durch den hervorstehenden inneren Theil vertieften Ausschnitt versehen; nach aussen davon stecken drei gröbere Stacheln, nach innen eine Menge kleinere. Die *hinteren Maxillen* sind fast rektangulär.

Cirren. Das 1. Paar steht weit vom 2. ab und ist etwa halb so lang wie dieses. Der aus 20—21 Segmenten bestehende Hinterast ist um 4 Segmente länger als der vordere, der 11 Segmente enthält. Die Äste des 2.—4. Paares sind gleich entwickelt. Beim

[1] l. c.

5. und 6. ist der Innerast verkümmert, nur $^1/_3$ der Länge und $^1/_2$ der Breite des äusseren messend, aus 16 Segmenten bestehend. Der Aussenast hat 50—52 Segmente, in deren Bauchseite je 2 sehr lange und 3—4 winzige Börstchenpaare, in deren Rückenseite aber nur 2—3 schwache Börstchen in den Suturen stecken. Die Inneräste sind nur auf der Rückenseite mit einem Büschel sehr dünnwändiger Börstchen versehen; es haben diese vielleicht eine sensitive Funktion, deren Art aber jedenfalls bei Spiritus-Exemplaren sich nicht ermitteln lässt. Ohne Zweifel steht die eigenthümliche Verkümmerung dieser Äste mit einer besonderen Funktion in Zusammenhang und zwar lässt ihre Lage unmittelbar zu den Seiten des Penis vermuthen, sie stehen etwa im Dienste der Fortpflanzung; auch im Penisende stecken übrigens dergleichen feine, dünnwandige Börstchen.

Die *Schwanzanhänge* sind 9-segmentirt, nach aussen schmächtig; ihre zwei proximalen Segmente sind aber ebenso breit wie der 6. Innenast. Sie reichen zum Anfang des distalen Segmentes des 6. Protopodits hinauf und tragen am Ende einige Börstchen.

Von den »*Fadenähnlichen Anhängen*» findet sich nur ein Paar und zwar bei dem 1. Cirrenpaar; sie sind länglich gespitzt und wie gewöhnlich findet sich in ihrem Inneren ein Zweig des Testis.

Verwandtschaft. Das Äussere erinnert am meisten an *A. cornuta* DARWIN, zumal als bei dieser auch ein Rückenkamm mit Erhebungen sich findet und die Scuta ganz fehlen. Jedoch ist schon dabei die auch bei jungen Exemplaren vorwärts gebogene Stellung des Capitulum, die bei allen Exemplaren nur schwach hervorragenden Rückenerhebungen und der lange cylindrische Pedunkel zu bemerken. Die Cirren beider Arten und auch der A. quadrata stimmen in so fern mit einander, dass der Innerast des 5. und 6. Cirrus verkümmert ist, jedoch weichen sie in dem Verhältniss der Segmentzahl ab, indem bei der fraglichen Art der Innerast aus 16, bei A. cornuta und A. quadrata aus 11 Segmenten besteht, während dass der Aussenast bei jener 50—52 Segmente, bei A. cornuta 63 und bei A. quadrata 20 Segmente hat. In Bezug auf die Schwanzanhänge ist zu bemerken, dass obgleich sie bei A. japonica 9-segmentirt, bei A. cornuta 8-segmentirt sind, machen sie bei jener nur die Hälfte des 6. Innerastes aus und reichen nur bis zum distalen Segment des 6. Protopodits, bei dieser kommen sie dagegen dem Inneraste fast, und dem Protopodit völlig in Länge gleich.

Alepas quadrata n. sp.

(Taf. II, Fig. 16—17; Taf. VIII, Fig. 2, 6, 12.)

Diagn. Capitulum forma quadrati, angulis antico-ventrali et postico-dorsali rotundatis; apertura prominente capituli longitudinis $^2/_5$ æquante. Scuta cornea pæne triangularia aperturæ proxima. Margo carinalis compressa, sine eminentiis.

Pedunculus crassus, transversim rugosus, $^1/_2$ longitudinis capituli æquans.

Capitulum quadratisch mit gerundeten vorderen-ventralen und hinteren-dorsalen Ecken. Mantelöffnung hervorstehend, $^2/_5$ der Capitulumlänge entsprechend.

Scuta chitinös, fast dreiseitig, unmittelbar vor der Mantelöffnung belegen. Der Carinalrand zusammengedrückt, ohne Erhebungen.

Pedunkel dick, querrunzelig, macht die Hälfte der Capitulumlänge aus.

Farbe. Mantel weisslich mit einem bräunlichen der Rückenseite des Capitulum und des Pedunkels entlang verlaufenden Streifen. Mündungsränder, sowie die durchscheinenden Cirren rothgelb. Alles nach Beobachtungen auf dem lebenden Exemplare.

Masse. Länge des Körpers 6 Mm.
» » Capitulum 4 »
Breite » » 4 »

Fundort und Vorkommen. Javasee, die Tausendinseln, unter dem ersten Abdominalsegmente eines ans Land geworfenen *Palinurus* befestigt. 1 Ex. (Der Verfasser.) RM.

Descr. *Capitulum.* Vom Bauche oder vom Rücken aus gesehen hat das Thier einen fast elliptischen Umriss. Die Mündungsränder sind dicht und fein eingekerbt; nach vorne ist die Mündung durch je eine seitliche Einschnürung von dem bauchig aufgetriebenen vorderen-unteren Theil des Capitulum getrennt. Unmittelbar vor diesen Einschnürungen liegen die als Scuta zu deutenden Bildungen; sie sind fast dreiseitig, die kürzeste Seite bauchwärts, die längste nach vorne belegen; sie sind zwar fester als der umgebende Mantel, doch keineswegs verkalkt. Dass sie indessen den Kalkplatten anderer Lepadiden entsprechen, leuchtet von dem Umstand ein, dass, ganz wie bei jenen, concentrische Zuwachsstreifen im Umkreise sich finden, ihre successive Verdickung und Vergrösserung angebend; ihre Lage im Verhältniss zur Mündung erinnert sehr genau an diejenige der Scuta bei Conchoderma auritum. Ich kann also nicht umhin sie als solche zu betrachten. Ob die winzigen, länglich schief gestellten Chitinverdickungen im Dache der Mündung — bis zu deren Rand verlaufend — als Terga zu deuten sind oder nicht, muss ich aus Mangel an Material dahingestellt sein lassen. Jedenfalls sprechen dafür die Beobachtungen, welche ich bei dem Fundorte über das lebende Thier machte.

Mundtheile. Im Vorderrande der helmförmigen *Oberlippe* stecken Reihen kurzer Zähnchen neben feinen Haaren. Die *Palpen* sind kurz, oval, mit Börstchen im Ende und in der Hinterseite. Der Kaurand der *Mandibeln*, der doppelt breiter als das kleinste Quermass des Fusstheils ist, trägt nur 3 Zähne, in Grösse von aussen nach innen abnehmend; die Innerecke bildet einen 4. Zahn. Die *vorderen Maxillen* haben einen ziemlich tiefen gerundeten Einschnitt des Kaurandes, der mit Stacheln — unter denen der äusserste am grössten — bewaffnet ist. Die *hinteren Maxillen* sind kurz, stumpf konisch, mit reichem Börstchenbesatz im Ende und in der Innerkante.

Cirren. Das 1. Paar steht vom 2. ebenso weit ab wie dieses vom 6. Paare. Der äussere-hintere 7-segmentirte Ast ragt mit 3 Segmenten über den inneren-vorderen 6-segmentirten hinauf. Die Äste des 2.—6. Paares tragen bauchwärts am distalen Ende der Segmente je 2 lange — 2—3-mal länger als die Segmente — und 3 kleine Börstchen; dorsalwärts stecken in den Suturen selbst 4—5 kurze Börstchen. Die Äste des 2.—4. Paares sind fast gleich lang; diejenigen des 4. haben bezw. 18 und 17 Segmente. Die Inneräste des 5. und 6. Paares sind schwächer und kürzer — 13 Segmente am 5., 11 am 6. Paare gegen 20 Segmente des Aussenastes enthaltend.

Die *Schwanzanhänge* sind sehr schlank, aus 9 Segmenten, dem langen Protopodit der Cirren an Länge gleichkommend. Das distale Ende trägt einen Büschel feiner Börstchen, einige finden sich in den Suturen.

Penis ist dick, fast konisch; nur ein kurzer Endtheil schmal, hie und da mit rückwärts gerichteten Börstchen versehen.

Verwandtschaft. Der äusseren Gestaltung nach kommt diese Art ohne Zweifel dem *A. cornuta* DARWIN am nächsten. Als Unterschiede sind jedoch bei der fraglichen Form hervorzuheben: 1:o) die Entwicklung von — wenn auch chitinösen — Scuta; 2:o) die grosse Breite des proximalen Theils des Capitulum; 3:o) der Mangel an hörnerartige Auswüchse am Rücken[1]; 4:o) die bedeutend geringere Segmentenzahl des 1. Cirrenpaares; 5:o) die geringere Segmentenzahl (20) des Aussenastes des 6. Paares (gegen 63 bei A. cornuta); 6:o) 9 Segmente der Schwanzanhänge (gegen 8 bei A. cornuta), welche bedeutend kürzer sind als der Innerast des 6. Paares u. s. w.

Als Anhang zu *Alepas quadrata* führe ich das in Taf. II, Fig. 18 abgebildete Thierchen, welches ich auf dem Margo occludens scutorum bei Poecilasma vagans[2] antraf, vor. Wiewohl die Form des *Capitulum* derjenigen der Alepas quadrata fremd vorkommt, hängt dies jedoch in der That von dem kaum abgesetzten *Pedunkel* ab, was übrigens durch die innere Begrenzung des Mantels — in der Figur punktirt — schon deutlicher wird. Die Lage und Verhältnisse der Mantelöffnung könnte unter solchen Verhältnissen den Verdacht erregen, es liege hier eine Jugendform der fraglichen Art vor. Die nähere Untersuchung der inneren Organe konnte hierbei allein entscheidend sein, und zwar hat sich bei derselben folgendes herausgestellt.

Mundtheile. Die *Mandibeln* sind an Form und Bewaffnung denen der A. quadrata ähnlich; die *vorderen Maxillen* ebenso, jedoch mit der Ausnahme, dass die nach innen vom Einschnitte gelegene Partie derselben — bei A. quadrata quadratisch — hier rektangulär ist und somit weniger hervorragt, weshalb auch der Einschnitt selbst seichter ist.

Cirren. Die Äste des 1. Paares verhalten sich gegenseitig wie bei A. quadrata; im kürzeren Aste finde ich nur 5 deutliche Segmente, im grösseren dagegen 7. Die Äste des 4. Paares bestehen aus bezw. 8 und 9 Segmenten. Mehr abweichend ist dagegen die Segmentenzahl z. B. des 6. Paares. Obwohl auch hier der Innerast schwächer ist, sind 9 Segmente entwickelt, während dass im Aussenaste deren 10 sich finden. In den Schwanzanhängen sind nur 3 Segmente deutlich, jedoch mit Spuren noch zweier Suturen.

Was also die Mundtheile betrifft, stellen sie kein Hinderniss gegen eine Identificirung mit A. quadrata auf; bei den Cirren bietet, wie mir scheint, das ungleiche Verhältniss der Segmentenzahl der Äste unter sich bei dieser und jener Form die grösste Schwierigkeit. Vielleicht findet aber die Segmentirung bei dem Inneraste früher als bei dem äus-

[1] Solche treten doch bei A. cornuta nicht konstant auf.

[2] Diese selbst war im Nabel eines *Nautilus umbilicatus* von unbekannter Herkunft angetroffen.

seren statt. Dass dagegen die Gesammtzahl der Segmente *eines* Astes oder der Schwanzanhänge bei der kleineren Form geringer ist, darf bei Ähnlichkeit des allgemeinen Baues im übrigen nicht befremden, da derartige Verschiedenheiten ohne Zweifel bei den Häutungen und dem Längenwachsthum ausgeglichen werden.

Gymnolepas n. gen.[1]

Capitulum valvulis nullis. Cirri breves, æquales, rami longitudinem stipitum parum superantes. Appendices basales cirrorum desunt. Appendices caudæ non-articulatæ.

Capitulum ohne Schalen. Cirren kurz, gleich lang, die Äste von der Länge der Protopoditen. Fadenähnliche Anhänge bei der Cirrenbasis fehlen. Schwanzanhänge ungegliedert.

Pelagisch, auf Medusen.

Der *Mantel* im Ganzen ist dünn und schlank.

Von den *Mundtheilen* sitzen die *Palpen* der Oberlippe *breit* auf und sind rhomboidisch. Die *Mandibeln* sind langgestreckt; ihr distaler Theil ist von der Basis nicht eingeschnürt und mit 5 Zähnen nebst einer zahnähnlichen Innerecke versehen. Bei den *vorderen Maxillen* ist ebenfalls der distale Theil vom Basaltheile nicht abgesetzt und sein Kaurand ist nicht eingeschnitten, sondern nur schwach wellenförmig mit 8 Stachelgruppen. Die hinteren Maxillen sind fast halbmondförmig.

Es stellt die Gattung ein Verhältniss der *Cirren* dar, das bei keinem anderen Lepadiden — nur Anelasma ausgenommen — vorkommt. 1:o) Sind sie nämlich *alle* gleich lang; und 2:o) sind die Äste nicht doppelt länger als ihre Protopoditen, während dass bei den übrigen Lepadiden theils die hinteren Cirren jedenfalls oft bedeutend länger als das erste Paar sind, auch gewöhnlich in Länge nach hinten zunehmen, theils die Äste wenigstens der 2.—6. Cirren doppelt bis mehrmal länger als ihre Protopoditen sind; nur was das erste Paar betrifft ist das Längenverhältniss oft dasselbe wie bei *allen* Cirren des Gymnolepas und Anelasma. Wenn also bei diesen beiden Gattungen eine Reduktion sämmtlicher Cirren eingetreten ist, welche offenbar von ihren den übrigen Lepadiden fremden biologischen Verhältnissen abhängt, so macht sich doch zwischen ihnen ein erheblicher Unterschied geltend. Indem nämlich die Cirren bei Anelasma ganz ohne Bewaffnung sind und eine Segmentirung nur angedeutet, sind diejenigen des Gymnolepas ringsum und gleichmässig mit Börstchen ausgestattet — dadurch an die Bewaffnung des 1. Cirrenpaares der übrigen Lepadiden erinnernd — und haben dazu eine deutliche Segmentirung.

[1] Der Name *Gymnolepas* ist zwar im Jahre 1824 von De Blainville in seiner Dict. des Sc. Nat., Art. Mollusca, anstatt *Conchoderma* in Anwendung gebracht; da aber dieser, von Olfers 1817 gegeben, nunmehr allgemein anerkannt worden, steht jener Name zur freien Verfügung, passt auch auf den vorliegenden Fall durch seine Bedeutung vorzüglich ein.

Was andere Organe betrifft hat Gymnolepas das Fehlen der fadenähnlichen Anhänge bei der Cirrenbasis nicht nur mit Anelasma sondern auch mit Poecilasma, Dichelaspis, Oxynaspis, Ibla, Scalpellum und — zum Theil — Pollicipes gemeinsam.

Verwandtschaft. Von *Alepas*, welcher Gattung die ohne Zweifel hierher hörende Art A. parasita zugerechnet worden ist — siehe unten —, entfernt sich Gymnolepas a) durch die genannten zwei Merkmale der Cirren; b) durch Fehlen der Fadenanhänge derselben; c) durch ungegliederte Schwanzanhänge und d) durch die Form und Bewaffnung der Mundtheile. Und zwar nimmt die Gattung durch die Mundtheile eine ganz besondere Stellung ein, indem ähnlich gebaute Mandibeln bei keiner der bisher bekannten Gattungen vorkommen, und die vorderen Maxillen — ihrem Kautheile nach, übrigens aber nicht — nur mit denjenigen *Ibla's* eine schwache Ähnlichkeit haben. Bezüglich der Cirren hat nur Anelasma solche Verhältnisse der Äste und Stiele wie Gymnolepas aufzuweisen, entfernt sich aber übrigens sehr weit von der Gattung.

Gymnolepas pellucida n. sp.

(Taf. II, Fig. 19; Taf. VII, Fig. 22; Taf. VIII, Fig. 1, 5, 11, 17.)

Diagn. Capitulum bullatum pellucidum, apertura ampla, non prominente. Appendices caudæ ad suturam mediam stipitis cirri 6:ti porrectæ.

Pedunculus pellucidus, postice crassior, capitulo duplo longior.

Capitulum bläschenförmig, durchsichtig; die Mantelöffnung gross, nicht hervorragend. Schwanzanhänge bis zu der mittleren Sutur des 6. Cirrenprotopodits hinaufreichend.

Pedunkel doppelt länger als das Capitulum, durchsichtig, nach hinten dicker.

Farbe bei zwei Spiritus-Exemplaren: Mantel, sowohl das Capitulum als der Pedunkel, glashell, schwach röthlich. Die Ovarien und Cementdrüsen sowie -ausfuhrgänge röthlich. Körper weissgrau, durch den Darminhalt dunkel. Cirren röthlich.

Masse. Länge des ganzen Körpers 18 Mm.
» » Capitulum 8 »

Fundort und Vorkommen. Atlanten, in 33° N. Lat., 30° W. Long., auf der Unterseite einer Medusa befestigt. 2 Ex. (Kapitän G. C. Eckman $^{1}/_{6}$ 1892). UM.

Descr. Bei den beiden Exemplaren ist das Innerblatt des *Mantels* nebst dem Körper selbst durch die Mantelöffnung herausgestülpt. Es ist mir dieser Fall auch bei anderen Lepadiden, besonders aber bei den dünnhäutigen, z. B. einigen Dichelaspis-Arten vorgekommen, wenn sie durch Spiritus oder andere Flüssigkeiten behandelt worden sind. Bei der fraglichen Art bekommt das ohnedies sehr aufgetriebene Capitulum hierdurch das Ansehen einer in der Quere ausgedehnten Blase, an deren Ende der Körper hängt.

Mundtheile. Der freie Rand der hohen *Oberlippe* ist fein gezähnt. Die *Palpen* sind weniger scharf als gewöhnlich von der Oberlippe getrennt, treten vielmehr als rhomboidische Zipfel mit breiter Basis zu deren Seiten auf. Jedenfalls ist ihre Zugehörigkeit zu

der Oberlippe, den Mandibeln gegenüber, offenbar. Die *Mandibeln* sind verhältnissmässig schmal, fast gleichbreit, und der Kaurand hat 5 Zähne nebst einer zahnähnlichen Innerecke; der Aussenzahn steht doppelt so weit vom 2. als dieser vom 3. entfernt. Die äussere Hälfte des Mandibels ist in den Seitenflächen mit kurzen Börstchen besetzt. Die *vorderen Maxillen* sind am Kaurande schmäler als unter demselben; der Rand selbst ist wellenförmig, mit 4 Gruppen von je 3, 4, 3, 5 fast gleichlangen Stacheln besetzt; darunter finden sich kleinere. Auch bei diesen ist die distale Hälfte oder Drittel mit kurzen Börstchen versehen. Die *hinteren Maxillen*, in der Mittellinie vereint, bieten nur einen kurzen von vorne nach hinten bogenförmigen freien Theil dar, dessen Oberfläche zahlreiche ziemlich lange und schlanke Börstchen oder vielmehr Haare trägt.

Cirren, in Länge unbedeutend nach hinten zunehmend, kurz, dick und fast gerade; die Protopoditen wenigstens halb so lang wie die Äste. Die Äste des 1. Paares sind bezw. 6- und 7-segmentirt. Bei den übrigen Paaren haben beide 7 Segmente. Jedes Segment trägt rings um das Ende steife Börstchen, im Allgemeinen länger als das Segment selbst; auch unter dem Ende, wenigstens bis zur Mitte, stecken dergleichen Börstchen.

Die *Schwanzanhänge* sind ungegliedert, stumpf-konisch, reichen nur bis zum Ende des proximalen Segmentes des 6. Protopodits (weil niedriger befestigt, sind sie jedoch in der That länger als dieses). In der Spitze und der Aussenseite stecken einige wenige kurze Börstchen.

Penis ist 4—5-gliederig, nach aussen schmäler; steife Börstchen stecken a) im Ende der Segmente, besonders des letzten, b) übrigens auf den Segmenten zerstreut. Die Länge des Penis macht $^2/_3$ des 6. Cirrenpaares aus.

Als *Darminhalt* habe ich nur Diatomaceen und Nematocysten unterscheiden können.

Lebensanpassungen. Wie zu erwarten ist, steht das Leben dieser Art auf Quallen mit ganz eigenthümlichen Anpassungen ihres Körpers in Zusammenhang. Die vorliegenden Exemplare sind beide in der *unteren* Seite — der Umbrella — der Qualle befestigt und zwar sind sie schon dadurch zwischen den Fäden jener geschützt, sei es dass die Qualle in Ruhe oder in Bewegung ist; in diesem Falle sind sie durch ihre Lage gegen den unmittelbaren Wasserdruck aufs beste verwahrt. Aber es ist ausserdem der ganze Mantel wegen seiner Durchsichtigkeit dem Wohnort gut angepasst. Was die Farbe der inneren Organe betrifft liegen zwar keine direkte Beobachtungen über das Verhältniss zwischen dem Wirthe und seinem Ansiedler vor, nach den Spiritusexemplaren zu schliessen durfte aber die rothviolette Farbe der Cirren, des Ovarium und des Cementapparates mit derjenigen der Qualle nicht disharmoniren. Endlich scheint auch die Länge des Ansiedlers, welche im Vergleich mit den Massen der Alepas-Arten auffallend gross ist, in einem gewissen Verhältniss zur Aushöhlung der sich bewegenden Medusaglocke zu stehen.

Von Intresse ist die fragliche Form mit anderen im Meere herumtreibenden Lepadiden, z. B. den Lepas-Arten, zu vergleichen. Es siedeln sich diese als Jungen auf verschiedenen Gegenständen, wie Holz, Pimpsteinen, Algen, Federn u. s. w. an; wenn ausgebildet ragen sie von der Unterlage immer frei hinaus, sind somit den Einflüssen des Windes und der Wellen immer bloss gestellt. Was in jenem Falle von grösstem Vortheil war, würde hier vernichtend sein: der dort dünne durchscheinende Mantel ist hier durch einen

sehr festen, dicken vertreten, und zwar ist das Capitulum ausserdem durch Ausbildung von die Weichtheile mehr weniger deckenden Kalkplatten widerstandsfähiger geworden; anstatt des dort schwachen schlanken Pedunkels tritt uns hier ein sehr muskulöser entgegen. Endlich zeugen auch die Cirren der Lepas-Arten durch ihre kräftige Entwicklung und ihren reichen Börstchenbesatz davon, dass sie für das Nahrungsbedürfniss ganz auf sich selbst hingewiesen sind, während dass Gymnolepas gerade durch die Bewegungen ihres Wirthes mit allem was ihr nöthig ist versorgt wird, ein Umstand welcher der auch im Vergleich mit den Alepas-Arten geringen Ausbildung der Cirren zu Grunde liegt.

Geschichtliches über die pelagischen Alepas-Formen.

1. Während der französischen Astrolabe-Expedition wurde in der Meeresenge von Gibraltar im Monat Mai 1826 ein Lepadide auf einer Medusa, der Gattung *Equorea* Forskål nahe stehend, angetroffen und im folgenden Jahre von den Ärtzten und Naturforschern der Expedition Quoy und Gaimard unter dem Namen *Anatifa univalvis* bekannt gemacht.[1] Die kurze Beschreibung lautet wie folgt: »Cette anatife, d'une seule pièce, gelatineuse, diaphane, a une seule ouverture en devant, verticale et presque constamment béante; la partie posterieure est arrondie et le pédicule, mediocrement allongé, est blanc et transparent. Comme les autres animaux de ce genre, celui-ci est muni de douze paires de cirrhes accouplés sur deux rangs; ces cirrhes médiocrement allongés, blancs, ne se recoquillant point, ont environ dix anneaux tous couverts de poils à leur base. La bouche est très-large. Le reste du corps est d'un blanc mat lavé d'une teinte jaunâtre». »Cette Anatife qu'on pourrait aussi nommer *fabiforme*, parcequ'elle a la forme d'une grosse fève, se trouvait sous l'ombrelle d'une Méduse voisine de l'*Equorée* Forskål, à laquelle elle était adhérente». Die eine der beigefügten Figuren stellt das ganze Thier dar, mit *bläulichen* Cirren, übrigens weisslich; die andere giebt einen Cirrus vergrössert wieder, auch bläulich wie in der Hauptfigur mit 3-segmentirtem Protopodit und 12-segmentirten Ästen, in deren Suturen kurze Börstchen stecken, deren Endglied aber in der Spitze unbewaffnet ist.

Mit dieser Beschreibung stimmen freilich die vorliegenden Exemplare was die Beschaffenheit des Mantels sowie die Bewaffnung und gegenseitige Lage der Cirren anbelangt, sie weichen aber durch die Form des Capitulum und die Segmentenzahl der Cirren ab. Das innere Blatt des Capitulum ist zwar mit dem Körper herausgestülpt, aber auch bei natürlicher Lage dieser Theile hat dasselbe nicht die »bohnenähnliche» Form, welche übereinstimmend in Wort und Bild bei jener sich findet. Das Capitulum ist nicht langgestreckt, sondern vielmehr gerundet, bläschenförmig. Die Cirrenglieder sind im Texte als »ungefähr» 10, in der Figur als 12 in jedem Aste angegeben. Bei unseren Exemplaren kommen deren nur 7 vor.

2. In seiner »Manuel de l'histoire naturelle des Mollusques» stellt Sander Rang eine besondere Gattung *Alepas* für Anatifa univalvis Quoy et Gaimard auf und karakterisirt sie folgendermassen:

[1] Ann. des Sc. Nat. T. 10, p. 234; Pl. 7, fig. 8, 8 a. Paris 1827.

»Animal ovale, comprimé, fabiforme, arrondi près du pédicule, celui-ci médiocrement allongé; cirrhes un peu courts, se recourbant à peine à leur sommet, et composés d'environ dix à douze articles hispides à leur base».

»Coquille remplacée par une enveloppe d'une seule pièce épaisse, subgelatineuse et un peu diaphane, sans autre ouverture que celle qui sert au passage des cirrhes, se continuant avec le pédicule, et ne présentant aucune trace de pièces testacées».

Der Artnamen *univalvis* wird, da er einen *Gattungs*karakter bezeichnet, durch *parasita* ersetzt.

3. Während der Weltumseglung mit der Korvette *Coquille* entdeckte Lesson schon im Monat September 1823 im Atlanten auf 25° W. Long. einen pelagischen nicht schalentragenden Lepadiden, der unter einer Medusa, *Dionœa cerebriformis* Less. befestigt war. Es wurde aber das Thier zuerst im Jahre 1830[1] unter dem Namen *Triton* (Alepas) *fasciculatus* Less. veröffentlicht. Nachdem der Verfasser die *Anatifa univalvis* Quoy et Gaimard erwähnt hat, sagt er: »cette espèce paraît différer de notre Triton fasciculatus, tout en se rapportant au même genre» und spricht sich sodann für die Anwendung des von Sander Rang vorgeschlagenen Gattungsnamens Alepas aus, dessen Diagnose er indessen ein wenig abweichend aufstellt, nämlich: »Animal fabiforme, à enveloppe membraneuse sans pièce calcaire au centre, ovale-allongée, convexe et arquée sur le dos, mince et ouverte en devant, obtuse au sommet, renflée à la base, composée de deux tuniques, l'une externe, consistante, mince, ferme, l'autre interne, débordant legèrement la précédente, très mince, très diaphane, et souvent plissée. Le pedicel est court, ridé, cylindrique, et s'insère sur un pedoncule commun qui reçoit jusqu'à 9 ou 10 individus, formant ainsi une ombelle. Deux languettes bifurquées occupent le bas de l'ouverture orale. Les bras sont au nombre de sept paires de chaque côté, minces, arrondis, à dix articulations ciliées chacune, et terminés en pointe grêle». Über die Art sagt er nur: »ce triton est en entier d'un jaune-citron clair. Sa consistance est mollasse».

Theils der Umstand, dass zwei gespaltene »languettes» — ob chitinös oder verkalkt? — an der Basis der Mantelöffnung vorhanden sind, theils die Angabe von *sieben* 10-segmentirten Cirrenpaaren jederseits scheint anzudeuten, dass diese Art von der unsrigen verschieden sei. Es ist das 7. Paar offenbar die Schwanzanhänge gewesen, die cirrenähnlich waren; bei den unsrigen ist dies gar nicht der Fall. Das erste Merkmal, sowie die *ganz* citrongelbe Farbe macht ausserdem wahrscheinlich, dass die Lesson'sche Species mit der von Quoy und Gaimard beschriebenen nicht identisch ist.

4. Es gewinnt diese Ansicht dadurch eine Stütze dass die letztgenannten Verfasser in der im J. 1834 erschienenen Arbeit: »Voyage de l'Astrolabe» bei Besprechung des Gibraltar-Fundes — hier *Anatifa parasita* genannt — wiederum von den Lesson'schen »Languettes» nichts erwähnen; auch werden hier wiederum die Cirren blau, ihre Börstchen kurz gezeichnet, während dass die Lesson'sche Form mit *gelben*, längere und dichtgedrängte Börstchen tragenden Cirren abgebildet wird. Möglicherweise darf doch keine allzu hohe Bedeutung der Farbenverschiedenheit beigemessen werden; es sagen nämlich Quoy und

[1] Voyage autour du Monde sur la Corvette la Coquille par L. I. Duperrey. Zoologie par Lesson, p. 442; Pl. 16, fig. 6. Paris 1830.

Gaimard in Bezug auf den Pedunkel: »il est representé jaunâtre[1] ainsi que le corps du manteau; mais il est des individus qui sont blancs.»[2]

Nach dem Gesagten leuchtet es von sich selbst ein, dass so lange noch über den inneren Bau sowie über die möglichen Altersunterschiede dieser pelagischen Alepas-Formen nichts sicheres vorliegt, über die Stellung der fraglichen Art zu ihnen kein entscheidender Urtheil abgegeben werden kann.[3]

Was die **nicht pelagischen Alepas-Arten** betrifft, so stellt die Vergleichung mit ihnen Folgendes heraus:

Unter den 5 bisher bekannten Alepas-Formen fehlen zwar der A. cornuta, pedunculata und tubulosa Mantelplatten jeder Art; sie zeichnen sich aber durch eine mehr weniger hervortretende Mantelöffnung aus, ein, wie es scheint, der Gattung Gymnolepas nicht zukommendes Merkmal. Wichtigere Unterschiede bieten aber die Körperanhänge dar. Was nämlich 1:o) die *Cirren* betrifft, ist bei den in dieser Hinsicht bekannten Alepas-Arten die Segmentenzahl der hinteren Cirren viel grösser als diejenige der vorderen. So haben bei *A. pedunculata* die Äste des 1. Cirrenpaares resp. 7 und 8 Segmente, diejenigen des 6. dagegen 14 Segmente; bei *A. minuta* diejenigen des 1. 9 Segmente, des 6. 15 Segmente und bei *A. cornuta* diejenigen des 1. resp. 23 und 13 Segmente, des 6. 63 Segmente des äusseren Astes — der innere ist hier und beim 5. Paare rudimentär, nur 11—13 Segmente enthaltend. Diesen Zahlen entsprechend ist auch die Länge der Äste sowohl als der Protopoditen der hinteren Fusspaare bedeutend grösser als diejenigen des 1. Fusspaares. Bei Gymnolepas sind die hinteren Cirren 7-gliederig, das 1. Paar 6—7-gliederig; alle gleichlang. Was ferner 2:o) die *Appendices abdominales* angeht, so sind sie bei denselben Arten *viel*-gliederig — bei *A. pedunculata* 10-gliederig, bis zum Ende des 3. Segmentes des 6. Cirrenpaares reichend, bei *A. minuta* 7-gliederig, länger als der Protopodit derselben Cirren und bei *A. cornuta* 8-gliederig, von der Länge desselben Protopodits. Bei Gymnolepas sind sie ungegliedert und reichen nur zum Ende des proximalen Segmentes des 6. Protopodits.

Oxynaspis patens C. W. Auriv.

(Taf. III, Fig. 1—2; Taf. VI, Fig. 13—15; Taf. VIII, Fig. 9.)

Diagn. Capitulum valvulis 5. Carina angulo mediano obtuso. Scuta solum dimidiam partem lateralem capituli, scilicet ventralem occupantia.

Pedunculus cylindricus, mollis, capitulo vix dimidio brevior.

Corpus totum — ne valvulis quidem exceptis - aculeis chitinosis rigidum, formam aculeorum Antipathidis, cui affixum, mirum in modum imitantibus.

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[1] In Voy. de l'Astrolabe 1834.

[2] So ist mit dem in Ann. des Sc. Nat. T. 10, 1827 abgebildeten Exemplare der Fall.

[3] In Monograph on the Cirripedia, the Lepadidæ, 1851, p. 163, nimmt Darwin *Anatifa univalvis* Quoy et Gaimard und *Triton (Alepas) fasciculatus* Lesson als Synonyma unter seinem *Alepas parasita* Sander Rang auf. Dieser Art werden »scuta cornea» zugeschrieben; die verschiedene Farbe der Cirren, die zwar bei dem Verf. einigen Zweifel über deren Identität erregt, wird vermuthungsweise auf Rechnung der Spiritus-Einwirkung in dem einen Falle geschrieben.

Capitulum fast trapeziumförmig, die postumbonale Rückenseite am längsten; mit 5 Platten. Carina von dem median belegenen Umbo aus stumpfwinkelig gebogen. Scuta nur die ventrale Hälfte der Capitulumseite jederseits aufnehmend.

Pedunkel cylindrisch, unverkalkt, kaum halb so lang wie das Capitulum.

Die ganze Körperoberfläche — die Platten mit einbegriffen — trägt Chitindörnchen, denjenigen des Hornskelettes des *Antipathes*, dem das Thier aufsitzt, auffallend ähnlich.

Farbe unbekannt.

Masse. Länge des Körpers 14 Mm.
» » Capitulum 8 »
Breite » » (über dem Carinalumbo) 4 Mm.

Fundort und Vorkommen. Antillenmeer, unweit der Insel Anguilla, in 125—355 Met. Tiefe. Zahlreiche Exemplare. (A. Goës). RM.

Syn. 1892. Oxynaspis patens C. W. Aurivillius.[1]

Descr. *Capitulum* sowie Pedunkel sind von dicht stehenden, im freien Theile höckerigen oder stacheligen Chitindörnchen besetzt. Wie aus der Taf. VI, Fig. 13 ersichtlich, sind diese Dörnchen direkte Bildungen des Mantelepithels, deren Zellen an ihrer Basis höher als die gewöhnlichen sind. Auch geht bis nahe unter die Spitze ein vom Epithel gefüllter Kanal. Sie setzen nicht nur die Chitinschichten des Mantels durch — die übrigens mit geschlängelten luftführenden Kanälchen reichlich versehen sind —, sondern reichen auch, wenigstens mit dem höckrigen Endtheile, über die weiche Rinde des Antipathes' empor, welche am öftesten das ganze Thier überwuchert. Es kommen aber diese Dörnchen nicht nur den Weichtheilen des Mantels sondern sogar den Platten zu. Diese sind nämlich mit so vielen Kanälen versehen — siehe Taf. VI, Fig. 15 — als Dörnchen in der Oberfläche, und zwar sind diese, von der Verkalkung nicht betroffen, denjenigen des übrigen Mantels völlig ähnlich. Es setzen aber diese Kanäle, wie natürlich, das Vorhandensein des Dörnchens schon bei beginnender Verkalkung voraus; und zwar hat diese also die umliegenden Chitinschichten, nicht aber die derbe Cuticula des Dörnchens betroffen. Als Beleg eines solchen Verhaltens dienen, ausser der Form der Kanäle selbst und der Lage der Kalkschichten in ihrer Umgebung, auch die Ränder der Platten. Diese sind nämlich in der Regel nicht eben, sondern hie und da gerundet ausgeschnitten und zwar immer in den Stellen wo, bei Erweiterung der Platten, ein Dörnchen der neuen Schicht in den Weg trat; es wird anfangs nur theilweise vom Kalke umschlossen und anstatt eines Kanales ist noch nur eine mehr weniger tiefe Rinne da. Zuerst nach wiederholten Schichtenablagerungen kommt das völlige Einschliessen zum Stande.

Die von den Platten frei gelassenen Theile des Capitulum sind theils der ovale oder annähernd rektanguläre Zwischenraum zwischen Carina und Scutum, theils ein trianguläres Feld — mit der Spitze nach vorne — unmittelbar vor der Mantelöffnung und zugleich vor den Umbones der Scuta.

Primordialplatten und Wachsthum der bleibenden Platten. Die Primordialplatte des Scutum ist kielförmig oder triangulär, die abgerundete Basis nach hinten; sie ist ein wenig

[1] l. c.

vom Margo occludens entfernt und ein wenig hinter dessen Mitte belegen. Das Wachsthum geschieht anfangs stärker nach vorne als nach hinten. Die Anwachsstreifen sind concentrisch, mit der grössten Ausdehnung in die Richtung gegen Terga, stark ausgeprägt. Der Schliessrand der Scuta ist in der Quere gefurcht.

Die Primordialplatten des *Tergum* sind oval, in unmittelbarer Nähe der hintersten Spitze gelegen. Das Wachsthum findet von da aus nur nach vorne statt. Der Schliessrand ist wie bei Scutum quergefurcht, und zwar kommt diese Querfurchung in beiden Fällen ohne Zweifel dadurch zum Stande, dass die Chitindörnchen des Mantelrandes eine Zeit lang nur unvollständig von den Kalkschichten umschlossen werden, somit in mehr oder weniger offenen Rinnen stehen bleiben.

Die *Carina* nimmt vor der im Winkel belegenen Primordialplatte fast ebenmässig nach hinten und nach vorne in Länge zu, was aus sehr kleinen Exemplaren ersichtlich ist. Im Umkreis der Carina findet sich dieselbe Crenulirung oder Zackenbildung wie bei den Scuta und Terga, offenbar durch dieselbe Ursache, die also mit der Schichtung nichts zu schaffen hat, entstehend.

Mundtheile. Die *Oberlippe* ist zungenförmig, nach vorne umgebogen, nicht über die Mundtheile gewölbt. Die *Palpen* sind kurz, konisch, mit zahlreichen Börstchen von ihrer eigenen Länge. Die *Mandibeln* tragen 4 oder 5 Zähne — auch bei demselben Exemplare wechselnd — und deren Innerecke ist zahnähnlich; der Abstand zwischen dem 1. und 2. Zahn kommt demjenigen zwischen diesem und der Innerecke gleich. Die *vorderen Maxillen* haben im Kaurande einen seichten Einschnitt; der Aussenzipfel trägt 3, der innere, nur schwach hervorstehende, ungefähr 12 Stacheln; die gerundete Innerkante trägt wie die Seitenflächen zahlreiche zerstreute Börstchen, die Aussenkante winzige Börstchenbüschel. Die *hinteren Maxillen* sind kurz, gerundet, mit dicht stehenden langen Börstchen.

Cirren. Das 1. Paar steht nur wenig vom 2. ab, das nur mit 3—4 Segmenten über den längeren Ast jenes hinauf reicht; der längere Ast ist 11-gliederig, die 2 äussersten Segmente über den 9-gliederigen Vorderast hinaufstehend. Das 2.—6. Paar trägt ventralwärts 4—5 Börstchenpaare von dem kleinen proximalen zu dem äussersten an Grösse zunehmend; dieses ist doppelt grösser als das entsprechende Cirrensegment; dorsalwärts steckt in den Suturen je ein Büschel von 3—4 Börstchen, deren meistens nur eins länger als das entsprechende Segment ist. Die Äste des 5. Paares zählen je 16 und 17 Segmente; diejenigen des 6. Paares je 18 und 19 Segmente.

Schwanzanhänge fehlen gänzlich.

Der *Penis* ist so lang wie das 5. oder 6. Cirrenpaar, schmal, die äussere Hälfte cylindrisch mit nach aussen oder nach hinten stehenden Börstchen.

Verwandtschaft. Der besonders auffallende äussere Unterschied — die Form und Ausdehnung der Scuta — von der einzigen bisher bekannten Art, *Oxynaspis celata* Darwin, ist von einem nicht unwichtigeren inneren — dem Fehlen der Schwanzanhänge — begleitet. Zu bemerken ist ausserdem die verschiedene Form der vorderen Maxillen. Andrerseits giebt sich die Zusammengehörigkeit beider Formen nicht nur durch die äussere Morphologie im Allgemeinen, z. B. die Wachsthumsart der Platten, zu erkennen, sondern dahin zeigen, meines Erachtens, auch die *biologischen* Verhältnisse. Beide sind nur auf

Hornkorallen, nämlich *Antipathes*-Arten angetroffen, von deren Rinde sie mehr weniger überwuchert werden. Bei beiden treten Dörnchen über die verkalkten sowohl als über die Weichtheile ebenmässig zerstreut auf; und zwar schreibt DARWIN — jedoch nicht ohne Bedenken [1] — dieselben dem Koralle zu. Wie oben angezeigt, nehmen bei *O. patens* diese Dörnchen vom Mantelepithel des Cirripeden ihren Ursprung und, weil nirgends verkalkt und im freien Theile mit Höckern oder Nebendörnchen besetzt, sind sie den Dörnchen der Koralle täuschend ähnlich. Da nun der weichen Rinde des Antipathes alle dergleichen Hornbildungen fremd sind, das hornige Achsenskelett mit ihren Dörnchen aber auf den Cirripeden nicht übergehen kann, so steht auch was *O. celata* betrifft mir keine andere Erklärung der Dörnchen übrig als dass sie, wie im fraglichen Falle, aus dem Cirripeden selbst herstammen. So weit also diese zwei Arten angeben, *kommt der Gattung Oxynaspis eine Art »Mimicry»* zu, was um so mehr auffällt, da dergleichen, sogar die Kalkplatten durchsetzende Dörnchen bei keiner anderen Cirripedengattung bekannt sind. Und zwar wird dem Cirripeden dadurch ein doppelter Schutz gewährt, dass diese Dörnchen nicht nur denjenigen des Antipathes ganz ähnlich sind, sondern offenbar dahin wirken, dass die Rinde der Koralle auf dem Cirripeden dieselben Anhaltspunkte wie auf dem eignen Achsenskelette bekommt, somit den Cirripeden ganz und gar maskiren kann, was bezüglich der Kalkplatten von besonderem Vortheil sein muss.

Über die Stellung von *Oxynaspis*, als Gattung, sei noch bemerkt, dass sie zwar schon durch die Form der Platten, vor Allem aber durch deren *Wachsthum*, z. B. dasjenige der Scuta — vergl. oben —, an die Gattung Scalpellum erinnert und zugleich durch die *Zahl* der Platten den Übergang zu Conchoderma und Lepas vermittelt.

Scalpellum gemma C. W. AURIV.

(Taf. III, Fig. 3—5; Taf. V, Fig. 7.)

Diagn. Capitulum valvulis 13, validis, nudis; primariis longioribus, trigono-pyramidalibus, secundariis brevibus, extrorsum aut carina aut sulco mediano instructis, incurvatis; omnibus reticulato-striatis, in seriebus quattuor dispositis. Apices scutorum tergorumque prominentes, apex carinæ inter terga latens.

Pedunculus verticillis 19—20 confertis squamarum rigidarum alternantium instructus.

Capitulum blüthenknospenähnlich, aus 13 nackten Platten, deren die *primären*, Scuta, Terga und Carina, lang dreieckig-pyramidal, die *sekundären* kurz, einwärts gekrümmt, nach aussen mit einem Mittenkiele oder -furche versehen sind. Die Spitzen der Scuta und Terga ragen frei hinaus; die Spitze der Carina ist zwischen den Terga verborgen.

Pedunkel mit 19—20 dichten Kreisen mit einander abwechselnder — also 9—10 in jeder Längenreihe steckender — harter, nach aussen stehender Kalkschuppen.

[1] — — — — »it has, I believe, no spines of its own». Und weiter unten: »the peduncle — — — — is, I believe, without spines». DARWIN l. c. p. 134—5.

Farbe des in Spiritus aufbewahrten Thieres: kalkweiss, indem keine Weichtheile von aussen her sichtbar sind.

Masse. Länge des Thieres 37 Mm.
» » Capitulum — nach hinten — 25 Mm.
Breite » » — quer über Subcarina und Rostrum — 26 Mm.

Fundort und Vorkommen. Im nördlichen Eismeere, unweit der Ostküste Grönlands in etwa 1,800 Met. Tiefe auf Thon- und Steingrund. 1 Ex. (Die schwedische Sofia-Expedition im J. 1883). RM.

Syn. 1892. Scalpellum gemma C. W. AURIVILLIUS.[1]

Descr. *Die Beziehungen der Capitulumplatten zu einander und zu denjenigen anderer Lepadiden sowie der Balaniden.* Es sind besonders zwei äussere morphologische Merkmale dieser Art, denen in systematischer Hinsicht die grösste Bedeutung beizumessen ist, und zwar: 1:o) *die scharfe Ausprägung der Skulptur, Form und Grösse der Scuta, Terga und Carina den anderen Platten gegenüber.* Es bestätigt dies Verhältniss in auffallender Weise einerseits die Thatsache, dass *die in der Entwicklung eines Cirripeden zuerst auftretenden Platten gerade die Scuta, Terga und Carina sind,* welche durch die sogenannten Primordialplatten angelegt werden; *auf diese fünf beschränkt sich die Plattenzahl* vieler ausgebildeten Lepadiden z. B. *der Gattungen Lepas, Poecilasma, Megalasma, Dichelaspis, Oxynaspis* und *Conchoderma.* Andrerseits, wo mehr als fünf Platten da sind, z. B. bei Zwergmännchen von Scalpellum, wo auch ein Rostrum auftritt oder bei den hermaphroditischen oder weiblichen Scalpellum-Arten, welche bis auf 15 Platten haben, kommen ebenfalls den Scuta, Terga und Carina Primordialplatten zu, *die übrigen* dagegen — Rostrum einbegriffen — *wachsen nicht von dergleichen Platten aus.* Es sind also *jene* Platten ohne Zweifel als ursprünglicher zu betrachten, weshalb ich sie auch als *primär, diese* dagegen als *sekundär* bezeichnet habe.[2] Bei keinem bisher bekannten Scalpellum der Jetztzeit ist nun die Verschiedenheit der Primär- und Sekundärplatten so augenfällig wie bei *Scalpellum gemma,* indem diese nicht nur an Grösse und Lage jenen untergeordnet, sondern nach aussen längs der Mitte breit gefurcht sind — auch einerseits von der Furche mitunter einen schmalen Längskiel haben — oder wie Rostrum einen zwar breiteren Längskiel tragen, jedoch übrigens geplattet sind, während dass bei den primären die Aussenfläche durch einen starken Längskiel stumpfwinklig ausgeht, die Platte im Querschnitt also dreieckig ist.

Nur *Scalpellum villosum* DARWIN und *Sc. trispinosum* HOEK weisen einen ziemlich ähnlichen Unterschied der Lage und Grösse beider Plattengruppen auf, der jedoch nicht — in so fern dies aus den Beschreibungen erhellt — bis auf die Form derselben sich streckt.

2:o) Ist der Diagram des Capitulum, in so fern darin die gegenseitige Einschaltung der Platten erkannt wird, sehr belehrend, indem er *über die Verwandtschaftsbeziehung der Balaniden zu den Lepadiden Auskunft giebt.*

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[1] l. c. p. 126.

[2] C. W. AURIVILLIUS, Über einige Ober-Silurische Cirripeden aus Gotland. Bihang till K. Svenska Vet. Akad. Handlingar. Bd 18. Afd. IV, N:o 3, 1892, p. 7.

Es ist aber dies nur dadurch möglich, dass sämmtliche Platten *nach aussen und innen von einander* liegen, bezw. einander mehr weniger überlagern, anstatt dass bei allen übrigen Lepadiden — Scalpellum trispinosum HOEK [1] und Pollicipes mitella L. ausgenommen — die Platten *neben* einander geordnet sind, also von einem Rechts oder Links, Vor oder Hinter die Rede sein muss.

Bezüglich der Stellung der Lepadiden zu den Balaniden hebt nun schon DARWIN hervor, dass bei der Gattung Pollicipes und zwar besonders bei P. mitella die Plattenanordnung unter allen die nächste Beziehung zu derjenigen der Balaniden hat. Bei dieser Art sind nämlich die Terga und Scuta nicht nur unter sich eingelenkt — was eben dem Balanidenoperculum kennzeichnend ist —, sondern werden an der Basis theils von sehr langen Lateralia, Carina und Rostrum, theils von zahlreichen kürzeren Sekundärplatten umgestellt. Weil aber die Gesammtzahl dieser gross — sie können bis auf 26 gehen — und ihre Breite gering ist, wird gewissermassen ihre Lage im Verhältniss zu den grösseren versteckt, d. h. der zu Grunde des Schalenkranzes der Balanen liegende Plan und Reihenfolge der Platten ist freilich in ihren Hauptzügen da, aber in Betreff der Carino- und Rostrolateralia nicht deutlich nachweisbar.

Bei Scalpellum gemma ist dieser Plan zum vollen und klaren Ausdruck gekommen, denn erstens sind *die Scuta mit den Terga eingelenkt*, indem sie den basoscutalen Rand des Tergum in eine Furche nach innen von ihrer dorsalen Kante aufnehmen. Zweitens wird *ihre Basis ventral- und dorsalwärts bezw. von Rostrum und Carina und seitwärts von den Rostrolateralia, Lateralia und Carinolateralia umgestellt* und zwar *in zweien abwechselnden Kreisen*, so dass die Platten des äusseren Kreises — *Carinolateralia und Rostrolateralia* — zunächst je *die Basis der Carina und Lateralia* und diejenige *der Lateralia und Rostrum* decken. [2] *Es sind aber diese Platten gerade diejenigen, welche die Bedeckung der typisch zu betrachtenden Balaniden bilden.*

Bei der Gattung *Octomeris* (vergl. Taf. V, Fig. 8) setzt sich nämlich der Schalenkranz aus 8 Platten zusammen, nämlich a) gegenüber einander liegende Carina und Rostrum, welche bei weitem stärker entwickelt sind als b) die 2 Lateralia, c) die 2 Carino-Lateralia und d) die 2 Rostro-Lateralia, obschon alle dieselbe Höhe haben. [3] Innerhalb des Schalenkranzes findet sich wie bei den meisten Balaniden die zwei Scuta und zwei Terga, unter sich in der Quere eingelenkt und der Länge nach die Mittelspalte zum Durchtreten der Cirri bildend, durch deren Schliessen die vier Platten als wahrer *Deckel* — Operculum — über die Weichtheile sich bewähren. Sie sind alle niedrig, die Scuta anfangs fast horizontal, die Terga nach unten wachsend.

In Bezug auf diese typischen Verhältnisse der Balaniden zwischen dem Schalenkranze und dem Operculum tritt bei *Scalpellum gemma* hervor, dass 1:o) *die Carina allein die Höhe des Operculum erreicht hat*, während dass die übrigen, auch Rostrum, in Länge weit zurück geblieben sind. Es steht aber dieser Lepadide in dieser Hinsicht nicht verein-

[1] Leider kann, besonders durch die Winzigkeit der Rostrolateralia, in der Figur HOEK's die Einschaltung der Sekundärplatten nicht völlig ermittelt werden.

[2] Dazu kommt freilich noch eine Subcarina, die jedoch — weil augenscheinlich einem *dritten* unteren Kreise angehörig — den Zusammenhang der übrigen nicht beeinträchtigt.

[3] Dies ist wenigstens bei den Platten der mir vorliegenden *Octomeris angulosa* der Fall, deren distale Enden jedoch, wenigstens bei älteren Individen, immer verwittert sind.

zelt da; vielmehr *ist dies Verhältniss der Regel*, und zwar sind dabei die Zwergmännchen besonders merklich, wenn anders bei ihnen das ursprüngliche Verhalten sich beibehalten hat. Über die nähere Zugehörigkeit der Carina zu den Terga und Scuta als zum Rostrum spricht jedenfalls die Anlegung jener, nicht aber dieses, durch Primordialplatten. Und, obgleich dies bei Octomeris nicht der Fall ist, macht sich auch bei mehreren Balaniden, z. B. Balanus-Arten, Elminius und Pachylasma, ein Unterschied in Richtung und Höhe zwischen Carina und den übrigen Kranzplatten — Rostrum mit einbegriffen — geltend.

Der einzige *recente* Lepadide, welcher hinsichtlich der relativen Länge der Carina und Rostrum (und Lateralia) sich den Balaniden am meisten nähert, ist übrigens *Pollicipes mitella* L.

Unter den *fossilen* liefert der im Silur Gotlands von Prof. G. Lindström entdeckte *Pollicipes signatus* C. W. Auriv.[1] das alleinige Beispiel ähnlicher Verhältnisse. Wenn übrigens alle Platten da sind, nähert sich dieser Lepadide zu den 6-schaligen Balaniden — z. B. der Gattung Balanus — mehr als zu den 8-schaligen — Octomeris —, indem die Rostrolateralia mit dem Rostrum verschmolzen zu sein scheinen. Weil aber die Sekundärplatten sich nicht überlagern, muss ich auf die Besprechung ihrer gegenseitigen Einschaltung verzichten.

2:o) Der Querdurchschnitt des Scalpellum gemma, sowie der Lepadiden im Allgemeinen, stellt einen schmalen Ellips dar, dessen Breite nur um die Hälfte der Länge beträgt, während dass diese Masse bei den Balaniden fast gleich sind; und zwar hängt damit die verschiedene Lage des Operculum innerhalb des Schalenkranzes bei Balaniden und Lepadiden am nächsten zusammen. Wenn nun von den Operculumplatten, sowie auch von der einzigen accessorischen Kranzplatte bei Scalpellum gemma, nämlich Subcarina, Abstand genommen wird, stellen sich *die Diagramme* folgendermassen heraus: a) *bei Octomeris* (Taf. V, Fig. 8): *Carina* wird beiderseits von den Carinolateralia, *Rostrum* von den Rostrolateralia *überlagert*. Die *Lateralia* werden *einerseits* von den Rostrolateralia *überlagert*, *andrerseits überlagern* sie selbst die Carinolateralia. b) *bei Scalpellum gemma* (Taf. V, Fig. 7): *Carina* wird beiderseits von den Carinolateralia, *Rostrum* von den Rostrolateralia *überlagert*. Die *Lateralia* werden einerseits von den Rostrolateralia, andrerseits von den Carinolateralia *überlagert*.

Der einzige Unterschied zwischen den beiden Diagrammen besteht also nur in der Einschaltungsweise der Lateralia nach der carinalen Seite zu.

Mundtheile. Die *Oberlippe* ist gegen das Ende höher — wie angeschwollen —, längs der Mitte gefurcht. Die *Palpen* sind breit zungenförmig mit langen Endbörstchen. Die *Mandibeln* haben 3 grosse Zähne, die Innerecke, von der Seite konisch, trägt zahlreiche kleine Zähne oder vielmehr breite Stacheln; übrigens stecken in den Rändern Börstchen. Die *vorderen Maxillen* scheinen einen tiefen Ausschnitt zu haben, was jedoch dadurch hervorgerufen wird, dass der innere Zipfel weit hinaus ragt, denn der grosse Stachel der Aussenecke ist fast in derselben Höhe wie der Boden des Ausschnittes befestigt; der Rand des fast rhomboidischen Zipfels ist gerade, mit ungefähr 11 Stacheln bewaffnet. Die Flächen und Ränder sind dicht mit Börstchen versehen. Die *hinteren Maxillen* sind breit,

[1] Siehe die Bemerkung zur Seite 42.

der distale Rand ausgeschnitten und zu beiden Seiten des Ausschnittes, besonders aber nach aussen, mit langen kurzgefiederten Börstchen ausgestattet; der Basaltheil ist vom distalen Theile wie eingeschnürt.

Cirren. Das zweite Paar ragt mit dem letzten Viertel über das erste hinaus und ist von derselben Länge wie das dritte. Die folgenden nehmen nach hinten in Länge zu, so dass das 6. um $^1/_4$ länger als das 2. ist. Die Äste aller Paare sind unter sich fast gleichlang. Die Glieder des 1. Paares sind kurz, dick, ringsum mit Börstchen bewaffnet. In den Vorderästen des 2. und 3. Paares sind besonders die proximalen Segmente auch kurz und dick und deren Börstchen gedrängt. In den Hinterästen dieser sowie überall in den hinteren Paaren sind die Segmente länger und die Börstchen ventralwärts in 5—6 Paaren geordnet — in der Mitte jedes Paares 1—2 kleine Börstchen —, dorsalwärts in den Suturen zu Büscheln um je 4—6 beisammen stehend.

Die *Schwanzanhänge* sind einfach, breit zungenförmig, nur $^1/_3$ des 6. Protopodits messend; in deren Ende stecken einige Börstchen, kaum so lang wie der Anhang selbst.

Der *Penis* ist sehr schwach, kaum länger als die Cirrenprotopoditen, cylindrisch, am Ende mit feinen anliegenden Haaren ausgestattet.

Verwandtschaft. Die schon von Darwin nachgewiesene nahe Verwandtschaft der Gattungen *Scalpellum* Leach und *Pollicipes* Leach, die er zwar bei Scalpellum villosum am deutlichsten ausgesprochen fand, ist später noch durch die während der Challenger-Expedition angetroffene *Scalpellum trispinosum* Hoek bestätigt. Und wenngleich das Ende der Carina bei Scalpellum gemma nicht frei hinaus ragt — was indessen der Fall sein würde, wären nicht die Tergalenden rückwärts umgebogen —, so stehen doch diese Arten sowohl durch gleiche Plattenzahl als durch deren Anordnung im Grossen einander näher als die übrigen, und zwar bildet also auch Scalpellum gemma ein wichtiges Verbindungsglied zwischen den beiden Gattungen. Da ausserdem der Pedunkel — wie bei allen Pollicipes-Arten — mit Kalkschuppen versehen ist, welche mit derselben Wachsthumsart — von der Spitze aus — wie die Capitulumplatten die Richtung der Sekundärplatten vereinigen, also, wie bei gewissen Pollicipes-Arten, den Übergang jener in diese vergegenwärtigen, so steht diese Art der Gattung Pollicipes ohne Zweifel noch näher als Sc. villosum oder Sc. trispinosum. Was die Weichtheile betrifft haben die beiden Maxillen mit denjenigen der Pollicipes mitella L. eine schlagende Ähnlichkeit.

Dass unter solchen Verhältnissen diese Form jedoch der Gattung Scalpellum beigezählt worden ist, hängt hauptsächlich von dem Fehlen eines Subrostrum und der fadenähnlichen Anhänge (»filamentary appendages» Darwin's) sowie von der geringen Zahl der dem Capitulum zuzurechnenden Platten ab, alles Karaktere welche, wo noch die beiden Gattungen getrennt werden, für Scalpellum kennzeichnend zu zählen sind.

Schliesslich sei noch von der oben besprochenen, durch die Einschaltung der Platten bedingten *Verwandtschaftsbeziehung dieser Art zu den typischen Balaniden* erinnert, die um so bemerkenswerther ist als diese Verwandtschaft früher innerhalb der Gattung Pollicipes und zwar bei P. mitella gefunden wurde.

Scalpellum scorpio C. W. Auriv.

(Taf. III, Fig. 6—8; Taf. IX, Fig. 10—13.)

Forma hermaphroditica. **Diagn.** Capitulum valvulis 13, rigidis, cute pubescente tectis. Carina angulata, parte postica $^1/_5$—$^1/_7$ partis anticæ æquante. Subcarina, carino-lateralia et rostrolateralia exstantia, unguiformia. Rostrum triangulum, antice latius, in medio carinatum, apice vix exstante. Lateralia triangula, basi curvata. Umbones valvarum — carina excepta — in apice postico vel exstante siti.

Pedunculus conicus, pubescens, seriebus transversis 3—4 hamulorum minutissimorum inter se remotis instructus.

Hermaphroditische Form. Capitulum mit 13 harten Kalkplatten von feinhaarigem Chitin bedeckt. Carina winkelig; ihr postumbonaler Theil nur $^1/_5$—$^1/_7$ des præumbonalen in Länge messend. Subcarina, Rostrolateralia und Carinolateralia klauenähnlich, herausragend. Rostrum gekielt, von triangulärem Umriss, die Basis nach vorne, die Spitze kaum heraus stehend. Lateralia dreieckig, mit bogenförmiger Basis. Die Umbones der Platten — Carina ausgenommen — in der Spitze belegen.

Pedunkel konisch, die Spitze nach vorne, wie Capitulum feinhaarig mit 3—4 von einander abstehenden Querreihen winziger Kalkhäkchen versehen.

Farbe. In den Spiritusexemplaren ist das Capitulum gelbbraun oder graubraun wegen des durch die Platten durchscheinenden dunkelbraun pigmentirten Mantelepithels. Der Pedunkel ist am häufigsten der Länge nach dunkelbraun gestreift.

Masse. Länge des Thieres 48 Mm.
» » Capitulum 24 Mm.
Grösste Breite des Capitulum über Rostrum und Subcarina 20 Mm.

Mas pusillus. **Diagn.** Capitulum valvulis 6 — scilicet scutis, tergis, rostro, carina —, quarum carina leviter arcuata longissima, rostrum fortiter curvatum brevissimum. Margo tergalis scutorum concavus, margo basalis vel rostralis fortiter arcuatus. Umbones valvularum in apice postico siti. Pedunculus truncato-conicus, sicut capitulum pubescens.

Zwergmännchen. Capitulum mit 6 Platten, nämlich Scuta, Terga, Rostrum und Carina, deren Carina am längsten, schwach gebogen, Rostrum am kleinsten, mehr gekrümmt ist. Der Tergalrand der Scuta ist konkav, deren Rostralrand stark konvex. Die Umbones sind im hinteren Ende der Platten belegen. Der Pedunkel ist vom Capitulum abgesetzt, konisch, gleichwie das Capitulum feinhaarig.

Farbe in den Spiritusexemplaren graugelblich.

Masse. Länge des Thieres 4 Mm.
» » Capitulum 3 »
Breite » » 2 »

Fundorte und Vorkommen. 1) Chinesisches Meer, 50 Meile S. von Amoy in 60 Met. Tiefe. Mehrere Exemplare in einer Gruppe vereint. (J. Petersen). UM.

2) Japan, in der Hirado-Strasse, 33° 10′ N. Br., 129° 18′ O. L., in 80 Met. Tiefe, auf Algenstückchen nebst Alepas japonica befestigt. 2 Ex. (E. Svensson). UM. Zwergmännchen der Ventralfläche jener äusserlich aufsitzend.

Syn. 1892. Scalpellum scorpio C. W. Aurivillius. [1]

Descr. a) ***Die hermaphroditische Form.*** Ausser der allgemeinen Pubescens der Oberfläche des Thieres finden sich in Anwachslinien der Terga und Carina 4—6 Querreihen grösserer Haare oder vielmehr Börstchen — sie sind nämlich steifer als die übrigen —, deren Spitzen oft in verschiedener Weise einfach oder doppelt häkchenförmig sind, ein Umstand der zweifelsohne zum Festhalten fremder Gegenstände, vor Allem der Thier- oder Algenkolonien welche in der That sich dort niederlassen, dienen. Subcarina, Carinolateralia und Rostrolateralia gehen, von der flachgedrückten Basis sich verschmälernd, nach aussen und sind zugleich nach vorne gekrümmt; ihre konvexe Fläche ist mehr oder weniger vertieft; sowie die übrigen Platten sind sie vom Chitin bedeckt. Sämmtliche Platten zeigen, neben den Anwachslinien, auch feine radiäre Riefen. Die winzigen Kalkhäkchen des Pedunkels sind entweder äusserlich fühlbar — in den vorderen Reihen — oder stecken tiefer im Chitin — in den hinteren später gebildeten Reihen.

Mundtheile. Oberlippe gewölbt, die freien Seitenränder nach hinten stehende gerundete Zipfel bildend auf denen die *Palpen* ruhen. Diese sind zungenförmig, in der Spitze und in der inneren Kante mit mehrreihigen kurzgefiederten Börstchen versehen, von denen die distalen am längsten sind. Die *Mandibeln* haben 5 Zähne, deren der nächstäusserste am kleinsten, bei dem einen Mandibel mit einem Nebenzahn versehen ist; die hervorstehende Innerecke ist mit einer oder zweien Gruppen feiner Zähne ausgestattet. Den *Maxillen* fehlt ein Ausschnitt des Kaurandes, welcher bis auf einen hervorstehenden Höcker der Innerecke gerade ist. Ausser den dicht stehenden feineren Zähnen des Höckers stecken im Kaurande ungefähr 15 grössere Stacheln. Die hinteren Maxillen sind trapezoidisch, der bogenförmige Aussen- und der konkave Innenrand ist mit zahlreichen kurzgefiederten Börstchen besetzt.

Cirren. Diejenigen des 1. Paares stehen in einem der Breite zweier Protopoditen entsprechenden Abstand vom 2. Paare ab und machen nur $^2/_3$ dessen Länge aus; die Äste sind gleich lang, 14-gliederig, rings um mit Börstchen versehen. Die übrigen Paare nehmen nach hinten etwas in Länge zu; sie tragen im Allgemeinen ventralwärts 5—6 Querreihen von je 2 längeren und 2—3 kurzen Börstchen; nur beim 2. Paare sind sämmtliche Börstchen der ventralwärts ausgeschweiften Segmente mehr zusammengedrängt. Dorsalwärts finden sich in den Suturen selbst 5—6, bei den hinteren Paaren kurze, bei den vorderen, besonders aber dem zweiten, lange und auch zahlreichere Börstchen.

Die *Schwanzanhänge* sind kurz konisch, ventralwärts unter der Spitze mit wenigen Börstchen; sie reichen bei weitem nicht zum distalen Segmente des 6. Cirren-Protopoditen hinauf.

Die proximalen $^3/_4$ des *Penis* sind konisch, das distale $^1/_4$ schmal, cylindrisch; er ist mit zahlreichen mehr oder weniger vollständigen Suturen sowie mit kurzen oder längeren Börstchen versehen.

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[1] l. c. p. 126.

b) ***Das Zwergmännchen, im Vergleich mit der hermaphroditischen Form.*** Dem *Körper* fehlen eigentliche Segmente, nur kommen im Zwischenraum zwischen dem 1. und 2. Cirrenpaare 2—3 unvollständige Chitinfalten vor.

Mundtheile. Die *Palpen* sind mehr gleichbreit und nur im Ende mit grösseren Börstchen, in der vorderen Seite mit kurzen stachelähnlichen versehen. Die *Mandibeln* haben nur 4 Zähne, von denen der nächstäusserste am kleinsten ist. Die vorderen *Maxillen* weichen nur durch einen im Verhältniss zum Höcker kürzeren geraden Kaurandtheil ab: auch sind die Stacheln weniger an Zahl.

Das 1. *Cirrenpaar* ist vom 2. noch mehr als bei der oben beschriebenen Form entfernt und macht ungefähr $^3/_4$ der Länge dieser aus; die Äste bestehen je aus 5 Segmenten, sind aber durch ihre gleiche Länge und die wenigstens distal ringsum steckenden kurzgefiederten Börstchen denjenigen der vorigen ähnlich; ein Endbörstchen hat jedoch die Länge des ganzen Astes erreicht. Bei den Cirren des 2. Paares ist der eine Ast nur 1 Segment länger als der andere, beide 7-gliederig. Das 6. Paar ist 9-gliederig — bei Scalpellum scorpio hermaphrod. dagegen 15-gliederig. Alle sind ventral mit 3—4 Paar Börstchen — von denen das proximale am kleinsten —, dorsal in den Suturen mit 3 Börstchen ausgestattet; die hermaphroditische Form hat bezw. 5—6 Paare ventralwärts und 5—6 Börstchen dorsalwärts. Beim 2. Paare sind auch hier die proximalen Segmente des kürzeren Astes kürzer und deren Börstchen mehr zusammengedrängt.

Die *Schwanzanhänge* reichen nur bis zur Mitte des proximalen Protopoditsegmentes des 6. Cirrus hinauf, sind übrigens wie bei der hermaphroditischen Form gebaut.

Der *Penis* ist fast halb so lang wie das 6. Cirrenpaar, sehr grob, nach dem Ende kaum schmäler; seine Dicke am distalen Ende ist bedeutend grösser als diejenige der Cirren in derselben Höhe — was bei der hermaphroditischen Form gar nicht der Fall ist.

Verwandtschaft. Bezüglich der *Zahl* und *Anordnung* der Capitulumplatten steht *Scalpellum scorpio* offenbar dem *Scalpellum Peronii* J. E. Gray näher als zu den übrigen bekannten Arten. Ausserdem ist die *Form* der Terga, Scuta, Rostrum und Rostrolateralia ähnlich, wiewohl das Wachsthum der Scuta verschieden ist. Besonders abweichend sind Carina, Carinolateralia und Lateralia durch eine andere Lage der Umbones und die davon bedingte Form. Vom Pedunkel des Sc. Peronii werden keine Kalkhäkchen erwähnt. Übrigens weicht die Bewaffnung der Mandibeln und der Schwanzanhänge am meisten ab. Das Zwergmännchen ist durch die Form und Lage der Platten unter den bekannten demjenigen des Scalpellum villosum ähnlicher als des Scalpellum Peronii; bei den Scuta, Terga und Carina findet sich die nagelähnliche Primordialplatte vor.

Scalpellum calcaratum C. W. Auriv.

(Taf. IV, Fig. 5—6.)

Diagn. Capitulum valvulis 14. Carina angulatum; parte posteriore $^1/_3$ partis anterioris æquante. Carinolateralium tertia pars extra carinam exstans. Rostri pars antica latior, in cute occulta, postica quadrata, superficialis. Umbo

scutorum in angulo postico, lateralium pone centrum angulo postico-ventrali approximatus, inframedianorum margini antico proximus.

Pedunculus seriebus aculeorum rigidorum obliquis distantibus.

Capitulum mit 14 Schalen. Carina winkelig; der hintere Theil macht $^1/_3$ des vorderen aus. Carinolaterale mit $^1/_3$ seiner Länge rückwärts frei herausragend. Der vordere breitere Theil des Rostrum im Chitin eingegraben, der hintere quadratische an die Oberfläche tretend. Umbo des Scutum am hinteren Ende, derjenige des Laterale ventralwärts und nach hinten von Centrum, derjenige des Inframedianum nahe am vorderen Rande belegen.

Pedunkel mit kurzen Kalkstacheln in schiefen von einander entfernten Reihen bewaffnet.

Farbe der in Spiritus aufbewahrten Exemplare gelblich braun zwischen den, wenigstens in den peripherischen Theilen mit feinhaariger Haut überzogenen, daher grauweissen Platten.

Masse. Länge des Körpers 8 Mm.
» » Capitulum 5 »
Breite » » 3,5 »

Fundort und Vorkommen. Im Stillen Ocean,[1] dem Zweige eines Madreporiden aufsitzend. 4 Ex. RM.

Syn. *Scalpellum calcaratum* C. W. Aurivillius.[2]

Descr. Durch das im Verhältniss zum Pedunkel kurze, gegen diesen quer abgegrenzte Capitulum, sowie durch das nach hinten spornähnlich herausstehende Carinolaterale, das bauchwärts sehr kurze Rostrolaterale und die Bewaffnung des Pedunkels ist diese Art von den meisten leicht kenntlich.

Von der Ventralseite gesehen ist das Capitulum über den Rostrolateralia am dicksten.

Mundtheile. Der *Oberlippen*zipfel ist nach vorne umgebogen. Die *Palpen* sind konisch und deren Endstacheln länger als die seitlichen. Die *Mandibeln* haben 3 Zähne; der Winkel zwischen dem 2. und dem Aussenzahn ist tiefer und weiter als zwischen dem 2. und 3.; die Innerecke trägt entweder 1 breiten oder 2 schmale Zähne. Die *vorderen Maxillen* sind über der Mitte am breitesten; der Kaurand ist schmäler, nach innen abschüssig, gegen den Innenrand einen stumpfen Winkel bildend. Ein zwar kleiner aber deutlicher Einschnitt trennt die hervorragende äussere, mit 3 Stacheln bewaffnete Partie von der inneren niedrigen, gebogenen, mit 7—8 Stacheln versehenen. Die *hinteren Maxillen* sind verhältnissmässig schmal, nach innen kaum konkav; die äusseren Stacheln sind ein wenig länger als die inneren.

Cirren. Das 1. Paar steht in einem Abstand von zweier Protopoditen Breite vom 2. ab, ungefähr $^4/_5$ dessen Länge entsprechend. Der Hinterast ist um 1 Segment länger als der vordere, beide sind dicker als die folgenden. Das 2.—6. Paar trägt ventralwärts den Segmenten entlang 3 Börstchenpaare, dorsalwärts 1—2 kurze Börstchen.

[1] Für die Zuverlässigkeit dieser Angabe kann ich jedoch nicht einstehen; es ist der Einsammler nicht bekannt.
[2] l. c.

Die *Schwanzanhänge* sind konisch, reichen kaum bis zum distalen Segmente des 6. Protopoditen hinauf und das Endbörstchen ist kürzer als der Anhang selbst.

Penis fehlt dem untersuchten Exemplare.

Verwandtschaft. Es kann diese Art in Bezug auf die Platten der »unteren» Reihe — Rostrum, Rostrolateralia, Inframediana und Carinolateralia — am besten dem *Scalpellum vulgare* zur Seite gestellt werden. Auch Carina gleicht derselben dieser Art; dagegen weichen Scuta, Lateralia, Pedunkel und Cirren ab.

Scalpellum gibberum C. W. Auriv.

(Taf. IV, Fig. 3—4.)

Diagn. Capitulum valvulis 14. Carina angulata, parte posteriore $^3/_8$ longitudinis totius carinæ æquante. Carinolateralium $^1/_4$ extra carinam exstans. Rostrum antice et postice quam in medio latius, in cute occultum; pars media rectangulata superficialis. Umbones scutorum, lateralium et inframedianorum ut in Sc. calcarato siti.

Pedunculus granis calcareis ornatus.

Capitulum mit 14 Schalen. Carina winkelig; ihr hinterer Theil macht $^3/_8$ der ganzen Länge der Carina aus. Carinolaterale mit $^1/_4$ seiner Länge rückwärts frei herausragend. Rostrum vorne und hinten breiter, im Chitin verborgen; die rektanguläre Mitte erhaben. Umbones des Scutum, Laterale und Inframedianum wie bei Sc. calcaratum belegen. Pedunkel mit erhabenen Kalkkörnchen.

Farbe der Spiritus Exemplare bräunlich-gelb; die Platten und Körnchen grauweiss.

Masse.

Länge	des	Körpers	8 Mm.
»	»	Capitulum	6 »
Breite	»	»	4 »

Fundort und Vorkommen. Atlantischer Ocean, südlich von La Plata in 100 Met. Tiefe auf Sandboden, an Hydroidröhrchen befestigt. 3 Ex. (Die schwedische Eugenie-Expedition 1851.) RM.

Syn. 1892. Scalpellum gibberum C. W. Aurivillius. [1]

Descr. Die *Mundtheile* sind denjenigen des Scalpellum calcaratum sehr ähnlich gebaut, besonders ist dabei die karakteristische Form der vorderen Maxillen hervorzuheben; die Innerecke beider *Mandibeln* geht in 2 Zähne aus.

Auch die *Cirren* stimmen mit Sc. calcaratum überein und zwar darin, dass jedes Segment der hinteren Paare ventralwärts nur 3 Börstchenpaare trägt. Der Hinterast des 2. Paares ist um 2 Segmente länger als der vordere. [2]

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[1] l. c.

[2] Es könnte dies wegen der Beschädigung dieser Cirren bei *Sc. calcaratum* nicht sicher ermittelt werden.

Die *Schwanzanhänge* reichen ein wenig über das proximale Protopoditsegment hinauf; in deren Spitze stecken 2 Börstchen, kürzer als der Anhang, und in den Seiten stecken sehr winzige Börstchengruppen oder -reihen.

Verwandtschaft. Was über Scalpellum calcaratum in Beziehung zu Sc. vulgare gesagt ist gilt auch für diese Art, mit Ausnahme jedoch der Carina. Auffallend ist, in Betreff der Körperanhänge, die Übereinstimmung mit Sc. calcaratum, von welchem indessen Lateralia, Carina, Rostrolateralia und Pedunkel abweichen.

Scalpellum septentrionale C. W. Auriv.

(Taf. IV, Fig. 7—8.)

Diagn. Capitulum valvulis 14. Carina angulata, parte postica 1/4 partis anticæ æquante. Rostrum cuneatum, basi pedunculum versus, rostrolateralia plane sejungens. Carinolateralia apice non prominente. Umbones scutorum in apice postico, lateralium pone medium et margini ventrali propius, inframedianorum in medio marginis ventralis positi.

Pedunculus squamis semiellipticis in seriebus longitudinalibus 8—9 et verticillis 8—9 alternatim dispositis, sat longe distantibus.

Capitulum mit 14 Schalen. Carina winkelig; der postumbonale Theil 1/4 des præumbonalen betragend. Rostrum kielförmig, die Basis dem Pedunkel zugekehrt, den ganzen Zwischenraum zwischen den ebenso langen als breiten Rostrolateralia ausfüllend. Carinolateralia ragen nicht frei heraus. Umbo des Scutum im hinteren Ende, derjenige des Laterale ventralwärts und nach hinten vom Centrum, des Inframedianum in der Mitte des Ventralrandes belegen.

Pedunkel mit halbelliptischen von einander abstehenden, in 8—9 senkrechten Reihen und 8—9 Kreisen abwechselnd geordneten Kalkschüppchen.

Farbe der Spiritusexemplare: die Weichtheile weisslich grau, übrigens kalkweiss.

Masse. Länge des Thieres 11 Mm.
» » Capitulum 8 » [1]
Breite » » 5 »

Fundort und Vorkommen. Nordsee, Skagerak in 590—890 Met. Tiefe entweder auf Hydroiden oder Muscheln, in braunem oder graubläulichem feinen Thonboden, befestigt. Zahlreiche Exemplare. (Die meisten während der schwedischen Gunhild-Expedition im Monat Juni 1879 gesammelt). RM.

Syn. 1892. Scalpellum septentrionale C. W. Aurivillius. [2]

Descr. Die Platten des Capitulum sowohl als die Pedunkelschüppchen sind alle nackt. In Seitenansicht ist das Capitulum in der Höhe des Endes des Scutum am breitesten; von der Ventralseite aus ist es an der Basis der Scuta am dicksten.

[1] Zu bemerken ist jedoch, dass die Länge des Capitulum im Verhältniss zum Pedunkel Schwankungen unterworfen ist, so dass bei einem 10 Mm. langen Exemplar anderen Fundortes das Capitulum nur 6,5 Mm. misst.
[2] l. c.

Mundtheile. *Oberlippe* lang, nach *vorne* umgebogen; der distale Theil einen gerundet-zungenförmigen Zipfel mit winzigen Stachelreihen darstellend. Die *Palpen* sind konisch, mit einem Endbüschel von Börstchen, kürzer als die Palpen selbst. Die *Mandibeln* haben 3 oder 2 Zähne und feine kammzahnähnliche Stacheln in der verbreiteten Innerecke; mit Ausnahme der in Büscheln geordneten Seitenbörstchen sind sie den Mandibeln des Scalpellum gemma sehr ähnlich. Die *vorderen Maxillen* sind schmal, nach aussen gleichbreit mit geradem Kaurande, der mit 8 längeren und mehreren kurzen Stacheln versehen ist. Die *hinteren Maxillen* haben einen kaum ausgeschnittenen distalen Rand; jederseits der seichten Einbuchtung stecken lange kurzgefiederte Stacheln.

Cirren. Das 1. Paar macht nur die Hälfte des 6. aus und sein Vorderast ist bedeutend dicker — besonders distal — und kürzer als der hintere, auch ist sein Börstchenkleid dicker. Die übrigen Paare tragen ventralwärts in jedem Segmente 4—5 Paare längere Börstchen und in der Mitte jedes Paares 1 kurzes.

Die *Schwanzanhänge* sind sehr kurz, konisch, reichen nicht bis zum distalen Segmente des 6. Protopoditen hinauf; im Ende stecken wenige Börstchen, kaum so lang wie die Anhänge selbst.

Penis fehlt den untersuchten Exemplaren, deren Capitulum dagegen im vorderen Theile von Eiern strotzt.

Postembryonale Entwicklung. Bei einigen Exemplaren aus 600—675 Met. Tiefe fanden sich innerhalb des Capitulum vor dem Körper und zu dessen Seiten zahlreiche Jungen, alle offenbar im ersten postembryonalen Stadium begriffen. Sie stellen ganz dieselbe äussere Form und dieselben Anhänge wie das unten ausführlich erwähnte erste Entwicklungsstadium des Scalpellum erosum — wozu hingewiesen wird — dar; nur sei bemerkt, dass im Ende des 2. Anhangspaares nur 2 Börstchen sich finden. Es sind diese Jungen ebenso wenig als jene zum freien Herumschwimmen fähig, und wenn es zulässig ist von einem anderen Tiefsee-Scalpellum — Scalpellum obesum — Schlüsse zu ziehen, bringt nicht nur dieses sondern auch das folgende Cyprisstadium bis zur Anhaftungszeit sein Leben innerhalb des mütterlichen Capitulum zu.

Verwandtschaft. Es gehört diese Art durch die Form der Carina und des Rostrolaterale, nach der von Hoek gemachten Gruppirung, der Scalpellum Strömi-carinatum-recurvirostrum-Gruppe an und kommt Sc. Strömi am nächsten; weicht jedoch in Bezug auf Carinolaterale, Laterale und Pedunkel ab. Der Pedunkel erinnert an denjenigen des Sc. angustum G. O. Sars.

Scalpellum erosum C. W. Auriv.

(Taf. IV, Fig. 11—12; Taf. IX, Fig. 5).

Diagn. Capitulum valvulis 14. Carina angulata; parte posteriore $^1/_{11}$ partis anterioris æquante. Carinolateralia retro non exstantia. Rostrum cuneiforme, antice latius, postice in malleolum dilatatum. Rostrolateralia margine rostrali

latitudinem æquante. Umbones scutorum et inframedianorum ut in Sc. septentrionali, lateralium apici postico quam in hac specie propior.

Pedunculus seriebus 8 longitudinalibus squamarum æqualium, squamis alternis in parte dorsali pedunculi sese attingentibus, in parte ventrali paullo distantibus.

Capitulum mit 14 Schalen. Carina winkelig; der hintere Theil beträgt $^1/_{11}$ des vorderen. Carinolaterale ragt nicht frei heraus. Rostrum keilförmig, die Basis nach vorne; nach hinten knöpfchenartig erweitert. Rostrolateralia am Rostralrande ebenso lang wie breit. Umbones des Scutum und Inframedianum wie bei Sc. septentrionale, derjenige des Laterale dem hinteren Ende näher als bei jener Art belegen.

Pedunkel mit 8 Längenreihen gleichgrosser Schüppchen; diejenigen jeder zweiten Reihe auf der Rückenseite einander berührend, auf der Bauchseite mehr abstehend, dadurch Längenfurchen bildend.

Farbe der Spiritus-Exemplare bräunlich. Die grauweissen Platten sind von einer dünnen Chitinhaut überzogen.

Masse. Länge des Körpers 11 Mm.
» » Capitulum 8 »
Breite » » 4,5 »

Fundort. N.W. Atlanten, 53° 34′ N. Lat., 52° 1′ W. Long., in 1,744 Met. Tiefe auf hellgrauem Thonboden mit Steinen. 3 Exemplare. (Die schwedische Ingegerd-Gladan Expedition 1871). RM.

Syn. 1892. Scalpellum erosum C. W. Aurivillius. [1]

Descr. Die Schalen, besonders Scuta und Terga, sind angefressen. In Ventralansicht ist das Capitulum quer über der Mitte der Rostrolateralia am breitesten.

Mundtheile. Die *Oberlippe* ist mit der distalen Hälfte nach vorne umgebogen, die *Palpen* konisch, um die Spitze mit 6—7 Börstchen, in der hinteren Seite mit 4 Stacheln versehen. Die *Mandibeln* haben 3 Zähne und eine breite hervorstehende feingekämmte Innerecke; übrigens mit sehr feinen Haarbüscheln versehen. Die *vorderen Maxillen* sind gleichmässig gebogen mit parallelen Rändern, der Kaurand hat einen kaum merkbaren Einschnitt, nach aussen von welchem 2 längere, 2 kürzere Stacheln und nach innen etwa 8 Stacheln stecken. Die *hinteren Maxillen* haben eine nur schwach eingebuchtete Innerkante; die äusseren Börstchen sind länger als die inneren.

Cirren. Das 1. Paar ist auf einem hervorragenden Höcker befestigt, weshalb sie theils dem 2. anzuliegen, theils um $^5/_6$ desselben zu messen scheinen; die Segmente sind dicker und gerundet, besonders diejenigen des um 2 Segmente kürzeren Vorderastes, alle mit zahlreichen gehäuften Börstchen. Das 2.—6. Paar trägt ventral, jedem Segmente entlang, 4—5 Börstchenpaare, deren das proximale sehr klein ist; rückwärts in den Suturen 3—4 kleine Börstchen.

[1] l. c.

Die *Schwanzanhänge* sind gerundet, konisch, ein wenig kürzer als das proximale 6. Protopoditsegment, im Ende wenige Börstchen von der Länge des Anhanges, übrigens Reihen sehr winziger Stacheln tragend.

Penis fehlt.

Postembryonale Entwicklung. Innerhalb des Capitulum wurden bei dem grössten Exemplare zahlreiche Jungen angetroffen und zwar in der gewöhnlichen Lage der Eier, vor dem Körper und zu dessen Seiten. *Es weichen diese von dem allgemein bekannten Lepas-Nauplius ganz ab.*

Der *Körper* ist linsenförmig, von den Seiten ein wenig zusammengedrückt, hat also mit dem Cyprisstadium einige Ähnlichkeit, obgleich auch die untere Kontur, in Seitenansicht, gerundet ist. Die obere Kontur ist nach vorne mehr gewölbt als nach hinten, wo der Körper in einen gerundeten Höcker endigt.

Am meisten bemerkenswerth sind die *Körperanhänge.* Es finden sich deren 1:o) dem Auge am nächsten ein Paar winzige Dörnchen- oder Börstchen-tragende Höcker.

2:o) Der ventralen Mittellinie näher ein Paar einfacher, stark entwickelter 2-segmentirter Anhänge, deren distales Segment nur halb so dick wie das proximale und um viel kürzer ist, im Ende ein stumpfes und 4 spitze kurze Dörnchen tragend. Ausserdem kommen in beiden Segmenten Spuren von Einschnürungen vor. Die Anhänge sind ziemlich steif nach unten-hinten gestreckt.

3:o) Unmittelbar hinter den genannten scheint ein Paar schmälere Anhänge, ebenso lang wie jene, auszugehen; sie sind jedoch in der That etwas innerhalb jener befestigt. In der Mitte und nahe am Ende findet sich je eine Sutur; ausserdem Andeutungen von Suturen mit winzigen Börstchen. Im Ende stecken 2 oder 3 lange dünnwändige Börstchen, deren wenigstens eins in einen Börstchentrichter endigt. Dem Bau nach zu schliessen kommt diesen Anhängen eine Art Sinnesfunktion zu.

4:o) Hinter dem letztgenannten Paare ragen jederseits zwei konische nicht differenzirte Anhänge hervor, die hinteren unmittelbar vor oder in der Aussackung.

5:o) Innerhalb einer Aussackung der Körperhaut hinter der Mitte der Ventralseite sind 7 Paar Anhänge zu bemerken und zwar 6 vordere gleich lange Paare, deren Endbörstchen je in eine dornähnliche Hervorragung der Haut auf der unteren Oberfläche des Sackes ausgehen, und 1 kurzes Paar, dessen Endbörstchen ebenfalls in ein Dörnchen der Haut endigen, welches jedoch weiter vom 6. Dörnchen als dieses vom 5. absteht.

Was nun die morphologische Natur dieser Anhänge betrifft, kann nur die Vergleichung mit den Anhängen des gewöhnlichen Cirripeden-Nauplius, z. B. demjenigen des Scalpellum vulgare, einen wenn auch muthmasslichen Aufschluss darüber geben.

In seiner Monograph on the Cirripedia, Balanidæ, Pl. 29, giebt Darwin eine Abbildung dieses soeben aus dem Eie entschlüpften Nauplius wieder. Über die Genauigkeit dieser Figur habe ich mehrmals Gelegenheit gehabt an lebenden Exemplaren Sicherheit zu gewinnen. Es kommen diesem Nauplius, der in Seitenansicht eine nach oben bogen-

[1] Zu bemerken ist dass das 1. — proximale — Segment nicht unbedeutend länger nach vorne seinen Ursprung nimmt.

förmige, vorne und hinten jäh abschüssige, nach unten fast gerade Kontur hat, 4 Paar Anhänge zu; die vordersten sind klein, jederseits des Auges der Mittellinie sehr nahe befestigt, die übrigen gehen in der Mitte zwischen dem Aussenrande und der Mittenlinie aus. Ausserdem findet sich aber auch ein Paar dem Vorderrande sehr genäherte sogenannte Stirnhörner.

Was nun zuerst die Stirnhörner betrifft, welche, obschon verschieden ausgebildet, bei allen bisher bekannten Cirripeden-Nauplii bekannt sind, so sind sie wahrscheinlicherweise durch die winzigen Börstchenhöcker vertreten. Bei solcher Deutung würden die zu den Seiten des Auges steckenden fadenähnlichen Anhänge — die frontalen Sinnesorgane — hier fehlen.

Das erste, einfache Fusspaar des gewöhnlichen Nauplius findet sich ohne Zweifel in den stark entwickelten 2-segmentirten Anhängen wieder, welche gerade durch die Enderweiterung des proximalen Segments als die künftigen Haftantennen der Cyprislarve sich bewähren. Dem zweiten, zweiästigen Fusspaar des Nauplius durfte wiederum das hintere entwickelte Anhangspaar, obschon einfach, entsprechen. Das dritte, zweiästige Fusspaar des Nauplius aber, das in der ferneren Entwicklung des Cirripeden zu Mandibel wird, ist hier durch das vordere rudimentäre Anhangspaar vertreten. Ein Homologon zum hinteren rudimentären Paare des fraglichen Scalpellum-Jungen findet sich in einem zuerst beim *Meta*nauplius auftretenden Anhangspaar, die künftigen Maxillen.

Was endlich eine besondere Aufmerksamkeit verdient ist die Anlage beim Scalpellum erosum-Jungen der 6 Cirrenpaare und der Schwanzanhänge, von denen gar keine Spur bei den gewöhnlichen Cirripeden-Nauplii sich findet. Wohl kennt man aber dass, zur Zeit der Umwandlung in das Cyprisstadium, d. h. beim Metanauplius, die Theile angelegt werden, welche bei der Häutung hervortreten, und zwar dass gerade an der Unterseite nach hinten von den drei Beinpaaren der Körper aufgetrieben wird, wo die 6 Cirrenpaare und die Schwanzanhänge sich hervorbilden.

Unter Berücksichtigung dieser Umstände sowie der Thatsache, dass bei Scalpellum erosum der beschriebene Junge unmittelbar aus dem Eie sich entwickelt, kann ich nicht umhin hierin *eine Verkürzung der postembryonalen Entwicklung* zu sehen, eine Ansicht die ausserdem durch das *Vorkommen*, freilich bei anderen aber unter denselben Verhältnissen lebenden Arten, *auch des Cyprisstadium innerhalb des Capitulum* gestützt wird. Es wäre nämlich dieser Umstand, bei einem frei umherschwimmenden Larvenstadium, sehr schwer erklärlich. Und wenn nach dem Grunde dieser Verhältnisse gesucht wird ist er, meines Erachtens, von biologischer Natur. Es leben nämlich die Arten, bei denen ich bisher diese besondere Entwicklung wahrgenommen habe, sämmtlich in grösseren Tiefen, während dass Scalpellum vulgare wenigstens bei der schwedischen Westküste schon in 30 Meter Tiefe getroffen wird. Und was die Lepas-Arten betrifft, gehören sie ohne Ausnahme der Wasseroberfläche an. In diesem Falle, wo immer ein herumtreibender oder -fahrender Gegenstand die Unterlage bildet, muss also ein frei herumschwimmendes oder -treibendes Stadium der Entwicklung für die Fortdauer der Art sehr förderlich sein. Bezüglich des Scalpellum vulgare durften wohl die herumschwimmenden Larven auch in dem Falle, wo sie in die obersten Wasserschichten emporkommen, jedoch einen für die Anheftung der Puppe geeigneten Boden, ohne allzu sehr decimirt zu werden, erreichen; wenigstens ist die gewöhn-

liche Unterlage dieser Art — Sertularia abietina — in dergleichen Tiefen sehr allgemein. In Betreff der in Tiefen, welche bis zu 1,700 Meter herab gehen, lebenden Arten, wie Scalpellum erosum, stellt sich die Sache ganz anders. Es lässt sich nämlich kaum annehmen, dass die Larven, wenn schwimmfähig, von den Wasserströmungen unberührt in der Nähe der Geburtsplätze bleiben, sondern dagegen in Wasserschichten kommen würden, welche schon durch ihre Temperatur vernichtend wirkten, oder auch, falls sie das Larvenleben glücklich durchgemacht, sehr leicht auf solchen Boden gerathen würden, der für ihre Bedürfnisse sich geradeaus nicht anpasste. Auch diese scheinen nämlich fast ausschliesslich auf Hydroiden hingewiesen zu sein. Die Vortheile einer Metamorfose welche, bis zur Zeit des Festhaftens, innerhalb des Mutterthieres sich vollbringt sind also einleuchtend. *Es ist* aber, bei solcher Weise der Sicherung der Art, *das schwimmende Larvenstadium, weil überflüssig, aus der Entwicklungsreihe weggelassen;* und zwar entspricht der aus dem Eie entschlüpfende Junge durch seine äussere Form sowie durch die sieben Anhänge des Hinterkörpers am meisten dem Metanauplius, innerhalb dessen der Cyprislarve angelegt wird. Mit dem gewöhnlichen Nauplius hat er freilich, der Zahl nach, 4 Paare vorderer Körperanhänge gemeinsam; während dass aber die drei hinteren beim Nauplius das Schwimmen besorgen, sind hier zwei von diesen rudimentär und dem dritten fehlen ganz und gar Schwimmbörstchen, an deren Stelle winzige Dörnchen getreten, die höchstens eine beschränkte Bewegung innerhalb des mütterlichen Capitulum unterhelfen können.

Von dem ausgebildeten Cyprisstadium abgesehen, das wahrscheinlich durch die wenigstens einseitig gefiederten Cirrenbörstchen einer, wenn auch beschränkten Schwimmfunktion fähig ist, haben also *diese Tiefsee-Cirripeden durch Anpassung an die äusseren Lebensverhältnisse das Schwimmvermögen eingebüsst.*

Verwandtschaft. Durch die Bedeckung des Capitulum — mit Ausnahme des Rostrum und Inframedianum — erinnert diese Art vielleicht am meisten an *Sc. angustum* G. O. Sars; die Form des Rostrum und Inframedianum ist dieselbe wie bei *Sc. obesum* mihi. Der Pedunkel stimmt am besten mit demjenigen des *Sc. Strömi* M. Sars.

Scalpellum obesum C. W. Auriv.

(Taf. IV, Fig. 9—10; Taf. IX, Fig. 6—8.)

Diagn. Capitulum valvulis 14, rigidis. Carina angulata, parte posteriore $^1/_6$ partis anterioris æquante. Carinolateralia extra carinam paullo exstantia. Rostrum cuneiforme, antice latius, postice velut in malleolum dilatatum. Rostrolateralia margine rostrali latitudinem æquante. Umbones scutorum, lateralium et inframedianorum ut in Sc. septentrionali.

Pedunculus seriebus longitudinalibus squamarum inæqualium utrinque acute desinentium inter se interjectis.

Capitulum mit 14 harten Schalen. Carina winkelig; der Hintertheil macht $^1/_6$ des vorderen aus. Carinolaterale ein wenig ausserhalb der Carina hinausragend. Rostrum kielförmig, die Basis nach vorne; das Hinterende knöpfchenartig erweitert. Rostrolateralia ebenso lang am Rostralrande wie breit. Umbones der Scuta, Lateralia und Inframediana wie bei Sc. septentrionale belegen.

Pedunkel mit dicht stehenden Längen- und Querreihen der Grösse nach ungleicher Schüppchen, deren spitze Enden zwischen den benachbarten tief eingreifen.

Farbe des Mantels zwischen den kalkweissen Platten und Schüppchen bräunlich-grau bei den Spiritus-Exemplaren.

Masse. Länge des Thieres 11 Mm.
» » Capitulum 8,5 »
Breite » » 4,5 »

Fundort. Nordsee, Storeggen in 110 Met. Tiefe, auf Hydroiden befestigt. 3 Exemplare. RM.

Syn. 1892. Scalpellum obesum C. W. Aurivillius.[1]

Descr. Von der Seite gesehen hätte das Capitulum einen fast ovalen Umriss, bildete nicht der postumbonale Theil der Carina einen stumpfen Winkel gegen den Hinterrand des Tergum. Von der Ventralseite aus ist das Capitulum am dicksten über der Mitte der Rostrolateralia.

Mundtheile. Die *Oberlippe* ist nach oben und vorne gebogen. Die *Palpen* sind konisch, um die Spitze mit längeren, nach unten mit stachelähnlichen Börstchen versehen. Die *Mandibeln* tragen nur 3 Zähne; der Aussenzahn durch einen tiefen Winkel vom mittleren getrennt; die Innerecke breit, quer abgestutzt, durch feine Stacheln wie gekämmt; die Seiten und Kanten des Mandibels sind feinhaarig. Die *vorderen Maxillen* haben einen geraden Kaurand ohne jedweden Einschnitt oder Erhebung, nach aussen mit drei gröberen, in der Mitte und nach innen mit 7—8 feineren Stacheln versehen; die Seitenflächen tragen Börstchen. Der Innerkante der *hinteren Maxillen* fehlt ein Ausschnitt und die Börstchen sind nicht in Gruppen getrennt.

Cirren. Das 1. Paar ist durch eine Lücke von dreier Protopoditen Breite vom 2. entfernt; der hintere Ast ragt mit 2 Segmenten über den vorderen hinauf; dieser ist 2—3-mal dicker als jener, die mittleren Segmente am dicksten und alle mit zahlreichen gedrängten Börstchen ausgestattet. Die übrigen Paare tragen der Ventralseite entlang 5—6 Paare sehr langer Börstchen, rückwärts in den Suturen 3—4 kurze Börstchen.

Die *Schwanzanhänge*, ungegliedert, reichen bis zur Basis des distalen Protopoditsegmentes hinauf; im Ende stecken einige Börstchen deren das grösste kaum länger als $^1/_2$ des Anhanges ist. Den zwei untersuchten Exemplaren fehlt ein *Penis*.

Postembryonale Entwicklung. Innerhalb des Capitulum eines Exemplares fanden sich zahlreiche Jungen im Cyprisstadium in der Lage welche anders die Eier einnehmen. Die Cypris-schale (Taf. IX, Fig. 6) ist rückwärts stark konvex, ventralwärts fast gerade, sehr fein gestreift. Von dem, seinem Haupttheile nach fast konischen Körper gehen nach unten

[1] l. c.

und hinten *7 Paar Anhänge* aus, je aus einem 2-segmentirten Protopodit und — mit Ausnahme des 7. — aus zweien 2-gliederigen Ästen bestehend. Das distale Segment dieser Äste trägt sehr lange nach hinten gerichtete, einerseits gefiederte, andrerseits gezähnte Börstchen; ausserdem findet sich in den Enden beider Segmente des grösseren Astes je einen Stachel. Bei dem 7. hintersten Paar, den Schwanzanhängen des ausgebildeten Cirripeden entsprechend, sitzt dem Protopoditen nur ein einziges längliches Segment auf. Die Antennen, vor der Mitte des unteren Randes zwischen den Schalen heraustretend, sind verhältnissmässig stark und lang, 4-gliederig; das konische Endglied trägt einen sehr kurzen mit Börstchen versehenen Nebenast und im Ende stecken einige kurze Börstchen. Bezüglich dieses Cyprisstadium sind besonders zwei Umstände bemerkenswerth und zwar 1:o) sein Auftreten *innerhalb des Capitulum des Mutterthieres.* Es kann dies meines Erachtens deshalb kein Zufall sein, weil die Jungen dort nicht nur in bedeutender Menge sich fanden sondern vorzüglich in dessen vorderen Theile, also um den Körper selbst — nicht um die Cirren — auftraten. Sämmtlich waren frei. Es scheint also hier ein Fall vorzuliegen, wo die postembryonale Entwicklung bis zu der Zeit, wo die Cypris sich fest setzt, innerhalb des Mutterthieres verläuft. Und zwar steht dies wahrscheinlich mit der Lebensweise dieser und verwandter Arten in Zusammenhang, welche von derjenigen der Gattung Lepas so sehr abweicht. Es beschränkt sich nämlich, meines Wissens, auf die letztgenannte Gattung allein die bisher gemachten Beobachtungen über das Leben des Cypris-Stadium der Lepadiden, die zwar darauf ausgehen, dass nach der Häutung des freischwimmenden Metanauplius theils fortwährend ein — wenn auch beschränkteres — Schwimmen, theils, später, ein langsames Herumkriechen oder -Schreiten Statt finde. Für die Jungen eines in bedeutender Tiefe lebenden Thieres könnte aber jene Bewegungsweise vielleicht verhängnissvoll genug sein, indem sie von einer für sie geeigneten Unterlage weg führte, während dass im fraglichen Falle die Cypris-Jungen wahrscheinlich erst zur Zeit des Festhaftens ihren Schutz verlassen um sich selbständig anzusiedeln. Für eine solche Annahme scheint auch das Verhalten der Fussbörstchen zu sprechen, die zwar sehr lang und zahlreich sind, aber nur schwach und einseitig gefiedert. 2:o) Ist der Bau des letzten Anhangspaares bemerkenswerth und zwar dadurch, dass trotz seiner Winzigkeit ein *zweigliedriger Protopodit* von dem langgestreckten Endsegment unterscheidbar ist. Es zeigt dieser Bau unwillkürlich auf die vorderen sechs Fusspaare hin, welche sämmtlich einen 2-gliederigen Protopodit haben, der zwar dort stärker ist und zwei Äste trägt. *Die nähere Beziehung des 7. Paares, d. i. der Schwanzanhänge, zu den übrigen, welche bei der entwickelten Form dieser Art und im Allgemeinen gar nicht erkennbar ist, tritt also hier offen zu Tage.* Das Endglied durfte dem proximalen Segment eines Astes der übrigen Füsse entsprechen.

Verwandtschaft. Es hat diese Art die meiste Ähnlichkeit mit *Scalpellum Strömi* M. Sars, von dem sie jedoch bezüglich des Rostrum, Carinolaterale und Pedunkels besonders abweicht.

Scalpellum luridum C. W. Auriv.

(Taf. IV, Fig. 13—14.)

Diagn. Capitulum valvulis 14. Carina angulata, parte posteriore $^1/_{11}$ partis anterioris æquante. Carinolaterale vix extra carinam exstans. Rostrum lineare, latitudine solum $^1/_6$ latitudinis rostrolateralium æquans. Rostrolateralium margine rostrali latitudine dimidio breviore. Umbones scutorum, lateralium et inframedianorum ut in Sc. septentrionali.

Pedunculus squamis aut apice truncatis aut triangularibus, antice distantibus, postice confertis.

Capitulum mit 14 Schalen. Carina winkelig; der hintere Theil beträgt $^1/_{11}$ des vorderen. Carinolaterale kaum rückwärts hervorragend. Rostrum stäbchenförmig; die Breite beträgt nur $^1/_6$ der Breite des Rostrolaterale. Rostrolateralia am Rostralrande nur halb so lang wie breit. Umbones des Scutum, Laterale und Inframedianum wie bei Sc. septentrionale belegen.

Pedunkel entweder mit abgestutzten oder triangulären Schüppchen, nach vorne spärlich, nach hinten dicht steckend.

Farbe des Mantels der Spiritus-Exemplare bräunlich zwischen den Platten und Schüppchen, die, weil von einer dünnen Chitinhaut bedeckt, grauweiss sind.

Masse. Länge des Thieres 11 Mm.
» » Capitulum 6,5 »
Breite » » 3,5 »

Fundort. Baffinsbay, 68° 8′ N. Lat., 58° 47′ W. Long., in 300 Met. Tiefe auf Stein- und Thonboden. 3 Ex. (Die schwedische Ingegerd-Gladan Expedition 1871). RM.

Syn. 1892. Scalpellum luridum C. W. Aurivillius. [1]

Descr. In Ventralansicht (Fig. 14) ist das *Capitulum* über dem vorderen Theile der Scuta am breitesten. Im Verhältniss zu den Scuta ist Rostrum sehr kurz, indem es nur $^1/_5$—$^1/_6$ der Länge des Scutalschliessrandes entspricht. Der Pedunkel ist nach hinten doppelt breiter als nach vorne und zwar enthalten die Querreihen dort 16—18, hier 8—9 Schüppchen.

Mundtheile. Die distale fast triangulare Hälfte der *Oberlippe* ist nach vorne umgebogen. Die *Palpen* sind wie gewöhnlich konisch mit wenigen Börstchen am Ende, übrigens mit Gruppen oder Reihen sehr feiner Börstchen. Die *Mandibeln* haben 3 fast gleich abstehende Zähne, die Innerecke ist durch feine Zähnchen wie gekämmt; übrigens sind sie mit feinen gruppenweise steckenden Börstchen bedeckt. Die *vorderen Maxillen:* der Kaurand hat zwar eine seichte Einbuchtung, die jedoch wegen der Hervorragung der inneren Hälfte des Randes tiefer zu sein scheint; die äussere Hälfte ist mit 2 längeren und 2 kürzeren, die innere mit 6 längeren und 3—4 kürzeren Stacheln bewaffnet; übri-

[1] l. c.

gens wie die Mandibeln. In den *hinteren Maxillen* findet sich eine kaum merkbare Vertiefung des Innenrandes, zu deren Seiten die fast gleich langen Börstchen stehen.

Cirren. Das 1. Paar steht nur wenig vom 2. ab; der Hinterast ist um 2 Segmente länger als der vordere und macht etwa $^5/_6$ des 2. Paares aus; die 6 Segmente des Vorderastes — besonders die mittleren — sind dicker als diejenigen des Hinterastes und die proximalen tragen zahlreichere Börstchen. Auch die Vorderäste des 2. Paares sind etwas kürzer als die Hinteräste. Die Bewaffnung des 2.—6. Cirrenpaares ist: ventralwärts 4—5 Börstchenpaare jedem Segmente entlang, von denen die 4 distalen länger als das Segment selbst, das proximale, wie gewöhnlich, sehr kurz ist. In der Mitte jedes Börstchenpaares stehen 1—2 kurze, gerade hinaus gerichtete Börstchen; dorsal in den Suturen stecken 3—4 Börstchen, kürzer als das entsprechende Segment.

Die *Schwanzanhänge* sind nur wenig länger als das proximale Protopoditsegment und ihre Breite macht nur ungefähr $^1/_5$ der Breite dieser aus; sie sind fast gleichbreit mit abgerundetem Ende, nur mit Reihen sehr winziger Börstchen versehen.

Penis fehlt. *Eier* mit gewöhnlicher Lage sind bei den untersuchten Ex. vorhanden.

Verwandtschaft. Diese Art ist in gewissen Hinsichten, z. B. durch Rostrum und Rostrolateralia, mit *Sc. angustum* G. O. Sars näher verwandt als mit den übrigen; da aber von den Weichtheilen der letztgenannten Art nichts bekannt ist, kann eine eingehende Vergleichung nicht statt finden. In Bezug auf Inframedianum und Carina nähert sich Sc. luridum am meisten dem Sc. erosum.

Scalpellum grönlandicum C. W. Auriv.

(Taf. V, Fig. 1—2.)

Diagn. Capitulum valvulis 14. Carina obscure angulata, umbone pæne terminali. Carinolaterale extra carinam non exstans. Rostrum cuneiforme, postice latius, antice truncatum. Rostrolateralium margine rostrali latitudinem dimidiam æquante. Umbones scutorum, lateralium et inframedianorum ut in Sc. eroso.

Pedunculus seriebus 8 longitudinalibus squamarum 8, dimidia parte inter adjacentes interjectarum.

Capitulum mit 14 Schalen. Carina nicht deutlich winkelig; umbo fast endständig. Carinolaterale rückwärts nicht herausstehend. Rostrum kielförmig, die Basis nach hinten, mit abgestutztem vorderen Ende. Rostrolateralia am Rostralrande nur halb so lang wie breit. Umbones des Scutum, Laterale und Inframedianum wie bei Sc. erosum belegen.

Pedunkel mit 8 Längenreihen von je 8 breiten, zur Hälfte zwischen den seitlich angrenzenden eingeschalteten Schüppchen.

Farbe der Spiritus-Exemplare gelbbräunlich zwischen den Pedunkelschüppchen und den von dünner Haut bedeckten Capitulumplatten.

Masse. Länge des Thieres 8,5 Mm.
» » Capitulum 5,5 »
Breite » » 3 »

Fundort. Baffinsbay, 72° 4′ N. Lat., 59° 50′ W. Long., in 400 Met. Tiefe auf hartem grauen Thonboden. 1 Ex. (Die schwedische Ingegerd-Gladan Expedition 1871). RM.

Syn. 1892. Scalpellum grönlandicum C. W. Aurivillius. [1]

Descr. Es hat das *Capitulum* dieser Art — die Enden ausgenommen — eine fast elliptische Begrenzung und ist quer über der Basis des Rostrum am dicksten. Von den Platten ist besonders das Rostrum karakteristisch.

Mundtheile. Der Endzipfel der *Oberlippe* steht in geradem Winkel nach vorne gegen den Basaltheil und ist mit feinen Börstchengruppen besetzt. Die *Palpen* sind konisch, im Ende mit längeren, in der Hinterseite mit kurzen Börstchen. Die *Mandibeln* haben 3 Zähne; der Aussenzahn ist durch einen tiefen Einschnitt vom 2. mehr entfernt als dieser vom 3. Die Innerecke ist durch feine Zähnchen wie gekämmt. Bei den *vorderen Maxillen* ist ein Einschnitt nur angedeutet; nach aussen davon stecken 3 Stacheln, nach innen ungefähr 6, deren 3 länger — wenn auch schlanker — als die Aussenstacheln sind. Bei den *hinteren Maxillen* ist die Einbuchtung der Innerkante sehr schwach, die äusseren Börstchen sind länger als die inneren.

Cirren. Das 1. Paar steht in einem Abstand von wenigstens zweier Protopoditen Breite vom 2. ab, ungefähr $^4/_5$ der Länge dieses Paares entsprechend. Der Hinterast ist um 2 Segmente länger als der vordere und schmäler; die Börstchen sind dicht gedrängt. Das 2.—6. Paar trägt ventralwärts jedem Segmente entlang 4—5 Börstchenpaare, von denen das proximale am kürzesten ist, dorsal 3—4 kurze Börstchen; die Äste sind gleich lang ausser beim 2. und 6. Paare, deren Hinterast je mit einem — das 2. — oder mit 2—3 Segmenten — das 6. Paar — den vorderen überragt.

Die *Schwanzanhänge* sind kleine, dem 6. Protopoditen anliegende Zipfel, die nicht bis zu dessen distalem Segmente hinauf reichen; das Endbörstchen ist kürzer als der Anhang selbst.

Ein *Penis* fehlt dem untersuchten Exemplare.

Verwandtschaft. Diese Art erinnert besonders durch Carina an die Capitulum-Form des *Sc. angustum* G. O. Sars; auch der Pedunkel ist demjenigen dieser Art ähnlich. Inframedianum und Carinolaterale sind aber denjenigen des *Sc. erosum* ähnlicher. Das Rostrum ist eigenartig gebildet.

Scalpellum cornutum G. O. Sars.

Von dieser arktischen Form liegen sowohl grössere als kleinere Exemplare vor, und zwar sei von diesen zu bemerken, dass 1:o) die Carinolateralia noch nicht »cornuta», sondern rückwärts stumpf sind und nicht herausragen, dass 2:o) der postumbonale Theil der

[1] l. c.

Inframediana kürzer als der præumbonale ist und dass 3:o) die Pedunkelschüppchen weniger dicht stehen; alles Unterschiede welche offenbar mit dem Alter ausgeglichen werden.

Masse. 2 Ex. aus dem Karischen Meere 8 Mm. lang. 2 Ex. aus Matotschkin Scharr 10 Mm. lang.

Fundorte und Vorkommen.

a) Karisches Meer, 75° 34′ N. Lat., 79° 45′ O. Long. in 46 Met. Tiefe.

b) Matotschkin Scharr, in dem Beluscha-Busen in 50—90 Met. Tiefe. In beiden Fällen auf mit Sand gemischtem Thonboden. Einige Ex. (Die schwedischen Novaja-Semlja-Expeditionen 1875 und 1876). RM.

Descr. Von den bisher nicht beschriebenen *Körperanhängen* ist folgendes zu erwähnen. *Mundtheile:* der Zipfel der *Oberlippe* steht nach vorne und ist mit feinen Börstchen besetzt. Die konischen *Palpen* tragen in der Spitze wenige theils längere theils kürzere Börstchen und in der Hinterseite sehr winzige Börstchenreihen oder -büschel. Die *Mandibeln* haben 3 Zähne, unter denen der Aussenzahn der bei weitem grösste ist — und in der Innerecke 2 gleich grosse oder 4—5 ungleich grosse schwächere Zähne. Die *vorderen Maxillen* sind schmal; der Ausschnitt des Kaurandes ist deutlich; nach aussen davon stehen 2 lange, nach innen einige kürzere Stacheln. Die *hinteren Maxillen* haben eine kaum eingebuchtete Innerkante; die äusseren Börstchen sind grösser als die inneren.

Cirren. Das 1. Paar steht zwar vom 2. ab und ist kürzer als dieses, aber nur wenig dicker; der Hinterast ist um 2 Segmente länger. Die übrigen Cirren tragen ventralwärts den Segmenten entlang 5 Paar Börstchen, rückwärts in den Suturen je 2 kurze Börstchen.

Die *Schwanzanhänge* reichen bis zur Basis des distalen 6. Protopoditsegmentes; in deren Ende selbst steckt ein Paar kurze Börstchen.

Postembryonale Entwicklung. Wie bei Sc. obesum fanden sich *innerhalb* des Capitulum eines grossen Exemplares zahlreiche Jungen im Cyprisstadium, welche vor und um den Körper frei lagen. Bei einer Länge von 0,75 Mm. sind diese denjenigen des Scalpellum obesum ähnlich, nur sind sie nach vorne ein wenig höher als nach hinten. Die 6 Füsschenpaare und die Schwanzanhänge sind ähnlich gebaut.

Aus dem Vorkommen des Cyprisstadium ist sehr wahrscheinlich, dass der soeben ausgeschlüpfte Nauplius wie bei Sc. erosum gebildet ist. Die untersuchten Eier waren noch zu wenig entwickelt um dieses mit Sicherheit entscheiden zu können.

Scalpellum prunulum C. W. Auriv.

(Taf. V, Fig. 3—4.)

Diagn. Capitulum valvulis 14. Carina arcuata. Rostrum minimum, longitudine solum 1/3 marginis rostralis rostrolateralium æquans. Umbones scutorum et lateralium ut in Sc. eroso, inframedianorum antice siti.

Pedunculus seriebus 8 longitudinalibus squamarum 5—6 inter se sat distantibus, quarum partes laterales extremæ solum inter adjacentes interjectæ sunt.

Capitulum mit 14 Schalen. Carina einfach gebogen. Rostrum rudimentär, nimmt nur das hintere 1/3 das Rostralrandes der Rostrolateralia auf. Umbones des Scutum und Laterale wie bei *Sc. erosum*, derjenige des Inframedianum im schmalen Vorderende belegen.

Pedunkel mit 8 Längenreihen von je 5—6 von einander ziemlich entfernten Schüppchen versehen, deren äusserste Enden zwischen den nächststehenden sich einschalten.

Farbe des Spiritus-Exemplares bräunlich gelb zwischen den weissen Platten und Schüppchen.

Masse. Länge des Thieres 6 Mm.
» » Capitulum 4 »
Breite » » 2,5 »

Fundort. Das Antillenmeer, bei St. Martin, in 350—600 Met. Tiefe.

Syn. 1892. Scalpellum prunulum C. W. Aurivillius. [1]

Descr. Wegen der einfach gebogenen, fast zum Hinterende des Tergum reichenden Carina hat das *Capitulum* einen eiförmigen Umkreis, mit Ausnahme des queren oder konkaven Vorderendes.

Mundtheile. Der nach vorne umgebogene Zipfel der *Oberlippe* ist kurz, von der Seite aus gerundet. Die *Palpen* sind gestreckt konisch mit einigen Börstchen um das Ende und in der Hinterseite kurze Stacheln. Die *Mandibeln* haben 3 Zähne, deren der äussere sehr gross ist: der eingehende Winkel gegen den 2. ist doppelt tiefer als derselbe zwischen dem 2. und 3. Zahn; die Innerecke ist durch 5—6 kleine geplattete Zähne, die in der Mitte am breitesten sind, gekämmt. Der Kaurand der *vorderen Maxillen* hat einen zwar seichten aber breiten Einschnitt; nach aussen davon stecken 2 lange und 1 kurzer Stachel, nach innen 3 längere und 2—3 kürzere Stacheln. Die *hinteren Maxillen* haben einen fast geraden inneren Rand; die längsten Börstchen stecken in der äusseren Ecke.

Cirren. Das 1. Paar ist vom 2. entfernt; der Hinterast um 2 Segmente länger als der 6-gliederige vordere, dessen mittlere Segmente übrigens dicker sind als bei dem Hinteraste. Im 2.—6. Cirrenpaare stecken ventralwärts den Segmenten entlang je 4 Börstchenpaare, in Grösse von hinten nach vorne abnehmend; das hinterste ist um 1/3 länger als das zweite, welches dem angehörigen Segmente in Länge gleichkommt, das vorderste ist sehr klein; rückwärts stecken in den Suturen 2 kurze Börstchen.

Die *Schwanzanhänge* messen in Länge nur 1/3 des proximalen 6. Protopoditsegmentes und tragen im Ende 2 Börstchen von der Länge des Anhanges selbst.

Postembryonale Entwicklung. Innerhalb des Capitulum vor dem Körper und zu dessen Seiten fanden sich einige Jungen im Cyprisstadium, denjenigen des Scalpellum cornutum an Form sehr ähnlich d. h. nach vorne höher und mehr gerundet als nach hinten. Die Antennen sind kürzer und dicker als bei Scalpellum obesum, bei den Schwanzanhängen ist das distale Protopoditsegment bedeutend dicker und doppelt länger als das proximale; das Endglied ist nach dem Ende zu schmäler.

Das Vorkommen des Cyprisstadium dieser Art innerhalb des Capitulum steht wie bei den vorigen, wo dasselbe Verhältniss erwähnt worden, ohne Zweifel mit ihrer Tiefsee-

[1] l. c.

natur in Zusammenhang. Vom erstem Stadium ist zwar bei dem Exemplare nichts zu sehen, aber es bringt auch dieses wahrscheinlich sein Leben eben daselbst zu.

Verwandtschaft. Es erinnert diese Art, ausser durch Scuta und Terga, durch Carina, Laterale und vielleicht auch Carinolaterale an *Scalpellum cornutum* G. O. Sars, durch Inframedianum dagegen an *Sc. distinctum* Hoek, *Sc. striolatum* G. O. Sars und *Sc. japonicum* Hoek.

Scalpellum aduncum C. W. Auriv.

(Taf. V, Fig. 5—7.)

Diagn. Capitulum valvulis 14. Carina angulata, parte posteriore $^1/_{11}$ partis anterioris æquante. Carinolaterale vix extra carinam exstans. Rostrum antice et postice truncatum, postice latius, latitudine mediana $^1/_3$ latitudinis rostrolateralium æquante. Rostrolateralium margine rostrali latitudinem æquante. Pars postrema tergorum in hamulum decurvata. Umbones scutorum, lateralium et inframedianorum pæne ut in Sc. eroso.

Pedunculus squamulis paucis latis, inæqualibus, distantibus.

Capitulum mit 14 Schalen. Carina winkelig, der hintere Theil $^1/_{11}$ des vorderen betragend. Carinolaterale kaum rückwärts hervorragend. Rostrum stäbchenförmig, in beiden Enden abgestutzt, nach hinten breiter als nach vorne; die mittlere Breite macht $^1/_3$ der Breite des Rostrolaterale aus. Rostrolateralia am Rostralende ebenso lang wie breit. Die Spitze des Tergum ventralwärts hakenförmig gebogen. Umbones des Scutum, Laterale und Inframedianum fast wie bei Sc. erosum belegen.

Pedunkel mit wenigen, breiten, unregelmässigen und von einander entfernten Schüppchen besetzt.

Farbe der Spiritus-Exemplare gelblich braun zwischen den kalkweissen Platten.

Masse. Länge des Thieres 2 Mm.
» » Capitulum 1,5 »
Breite » » 1 »

Vorkommen. Auf den Extremitäten eines Pantopoden, *Phoxichilidium fluminense* Kröyer aus unbekanntem Fundort, angetroffen. 2 Ex. RM.

Syn. 1892. Scalpellum aduncum C. W. Aurivillius. [1]

Descr. *Mundtheile.* Der *Oberlippen*zipfel steht nach unten und vorne heraus. Die *Palpen* konisch mit 3 Endstacheln und 2 ebenso langen Seitenstacheln. Die *Mandibeln* haben 3 Zähne, von denen die inneren mehr hervorstehen, die Innerecke läuft in einen spitzigen Zahn fast ebenso gross als die anderen aus; der Kaurand ist schmal. Die *vorderen Maxillen* haben in der Mitte des schmalen Kaurandes einen sehr kleinen Einschnitt; nach aussen davon stehen 3 starke Stacheln; nach innen 5—6 schmälere, deren eins aber länger als die äusseren ist.

[1] l. c.

Cirren. Das 1. Paar ist kürzer als das 2.; die Äste sind fast gleich lang, der vordere ein wenig dicker als der hintere. Der Hinterast des 2. Paares ist um 1—2 Segmente länger als der vordere, die Äste der übrigen Paare sind gleich lang, ventral mit 2—3 Börstchenpaaren, dorsal in den Suturen je mit 1—2 Börstchen ausgestattet.

Die *Schwanzanhänge* sind gerundet-konisch und reichen nur bis zur Mitte des 1. Protopoditsegmentes hinauf.

Es kommt mir aus mehreren der angeführten Merkmale wahrscheinlich vor, dass die Exemplare noch nicht vollwachsen sind.

Scalpellum stratum C. W. Auriv.

(Taf. III, Fig. 10—11; Taf. VIII, Fig. 8.)

Diagn. Capitulum valvulis 15, rigidis. Carina æqualiter curvata, valvula primordiali in apice postico. Subcarina minima, triangularis, æquilateralis. Rostrum longitudine marginem occludentem scutorum æquans, convexum, postice acuminatum, in medio latius quam antice, fere angulatum. Rostrolaterale triangulare, longitudine $^1/_3$ rostri æquans. Laterale et inframedianum quadrangularia, margine scutali illius tertiam solum partem longitudinis scutorum æquante. Umbones valvarum omnium in angulo postico positi.

Pedunculus seriebus 14 obliquis squamarum 14—15 rhomboidalium velut stratus.

Capitulum mit 15 kalkharten Schalen. Carina einfach gebogen, ihre Primordialplatte im hinteren Ende belegen. Subcarina klein, gleichseitig triangulär. Rostrum ebenso lang wie der Schliessrand der Scuta, konvex, nach hinten spitz, hinter der Mitte am breitesten, fast winkelig. Rostrolaterale triangulär, in Länge $^1/_3$ des Rostrum messend. Laterale et Inframedianum viereckig, der Scutalrand jener Platte nur $^1/_3$ der Länge des Scutum messend. Der Umbo sämmtlicher Platten in der hinteren Ecke belegen.

Der Pedunkel ist gleichwie gepflastert durch 14 schiefe Reihen von je 14—15 rhomboidalen Schüppchen.

Farbe der Spiritus-Exemplare: hell bräunlich, am Capitulum nur zwischen den Plattenrändern, am Pedunkel deutlicher zwischen den Schüppchenreihen sichtbar.

Masse. Länge des Körpers 9 Mm.
» » Capitulum 5,5 »
Breite » » — quer über Rostrum — 3 Mm.

Fundort und Vorkommen. Das Antillenmeer, unweit Anguilla [1] in 360—680 Meter Tiefe. Mehrere Exemplare (A. Goës). RM.

Syn. 1892. Scalpellum stratum C. W. Aurivillius. [2]

[1] Es wird hiermit ein Fehler in der vorläufigen Mittheilung verbessert, wo, statt Anguilla, St. Martin als Fundort angegeben ist.

[2] l. c.

Descr. *Mundtheile. Oberlippe* nach oben und vorne gebogen, zungenförmig. Die *Palpen* sind konisch, im Ende und gegen dasselbe zu längere Börstchen, nach unten und hinten kurze stachelähnliche Börstchen tragend. Die *Mandibeln* haben 4 Zähne, die Innerecke ausgenommen, welche mit 2 entweder kleinen parallelen oder grösseren divergirenden Zähnen ausgestattet ist; an der Basis der grossen Zähne sind winzige Nebenzähnchen merkbar; die Seitenflächen und Kanten tragen Börstchen. Der Kaurand der *vorderen Maxillen* ist in den äusseren $^3/_5$ gerade; anstatt des gewöhnlichen Ausschnittes innerhalb der 3 Stacheln der Aussenecke findet sich eine winzige *Erhebung;* in der Mitte stecken 5 lange Stacheln. Die inneren $^2/_5$ stehen kegelförmig hervor, so dass die kurzen Endstacheln weiter hinaus ragen als diejenigen des geraden Theils; der Kegel ist übrigens ringsum mit Stacheln oder Börstchen versehen. Die *hinteren Maxillen* sind zu den Seiten des seichten Ausschnittes in der Mitte des breiten inneren Randes mit Börstchen versehen, die jedoch kürzer als diejenigen des Aussenrandes sind.

Cirren. Das 1. Paar ist vom 2. durch eine Lücke von der Breite 2—3 Protopoditen entfernt und macht etwa $^3/_4$ der Länge des zweiten Paares aus; die Äste sind fast gleich lang, die proximalen Segmente des vorderen Astes besonders dick, alle mit gedrängten Börstchen versehen. Die übrigen Paare tragen ventralwärts den Segmenten entlang 4—5 Börstchenpaare, dorsalwärts in den Suturen 3—4 Börstchen.

Die *Schwanzanhänge* sind sehr winzig, nur einen kleinen Bruchtheil des 6. Protopoditen ausmachend, mit Endbörstchen von der Länge des Anhanges versehen.

Penis ist sehr lang, nach aussen allmählig schmäler, überall mit spärlichen Börstchen ausgestattet.

Verwandtschaft. Unter allen bisher bekannten Scalpellum-Arten sind nur bei Scalpellum rostratum 15 Platten vorhanden und zwar dieselben wie bei der fraglichen Art. Auch sind die Rostra beider übereinstimmend und die Pedunkelschüppchen haben einige Ähnlichkeit in Form, wenn auch nicht in Anordnung. Mit Ausnahme von den Terga, dem Rostrum und der Subcarina fallen aber die Umbones bei Scalpellum rostratum nicht mit dem Hinterende zusammen, vor Allem ist der Unterschied in Betreff der Carina gross. In der letzten Hinsicht kommt Sc. acutum HOEK dem Sc. rostratum näher, denn es liegen dort sämmtliche Umbones im hinteren Ende, und die Carina ist also einfach gebogen; die Plattenzahl des Sc. acutum ist indessen 13, indem, bei Mangel eines Inframedianum, das Laterale gross ist, $^2/_3$ der Länge des Scutum messend; die Pedunkelschüppchen sind anders geformt und geordnet.

Was die Weichtheile betrifft, wird für Sc. rostratum dieselbe eigenthümliche Form der vorderen Maxillen wie bei Sc. stratum angegeben. [1]

Es könnte nun die Frage gemacht werden, welcher der genannten Arten die fragliche am nächsten zu stellen sei. Von den inneren Theilen abgesehen — die aus Mangel an Angaben ausser Betracht kommen müssen — bekommt diese Frage den Sinn: ist innerhalb der fraglichen Gattung bei Beurtheilung der Verwandtschaft ein höherer Werth auf die Wachsthumsart als auf die Zahl und Anordnung der Platten zu setzen? Meinestheils kann ich nicht umhin die Antwort in *diese* Richtung zu geben und zwar bei Erwägung

[1] Über den Bau dieser Mundtheile bei Sc. acutum findet sich keine Angabe.

des Umstandes, dass die Platten, z. B. des Scalpellum vulgare, anfangs ausschliesslich in proximale Richtung wachsen um später auch distalseits des Umbo sich zu erweitern. Wenn also wie bei Sc. rostratum die Umbones einiger Platten, z. B. der Scuta, nur wenig vom distalen Ende entfernt liegen, durfte diesem Verhältnisse eine nicht allzu hohe Bedeutung gegeben werden, während dass andrerseits die Zahl der Platten schon bei ganz kleinen Exemplaren dieselbe ist wie bei den erwachsenen und zwar dazu mit derselben gegenseitigen Lage, ein Verhältniss, das auch bei sehr winzigen Exemplaren der fraglichen Art erkenntlich ist.

Scalpellum galea C. W. Auriv.

(Taf. III, Fig. 9 und Taf. VIII, Fig. 23.)

Diagn. Capitulum valvulis 12. Carina arcuata. Carinolateralia extra carinam exstantia. Rostrum deest. Rostrolateralia humillima, sinistrum latius, præter os ad latus dextrum porrectum, parte extrema fissa. Inframedianum dextrum deest, sinistrum basi antica, in hamulum deorsum curvatum exiens. Umbones scutorum, lateralium et inframedianorum in angulo postico siti.

Pedunculus seriebus 10—12 longitudinalibus squamarum antice distantium postice confertarum.

Capitulum mit 12 Schalen. Carina einfach gebogen. Carinolaterale rückwärts frei hinausragend. Rostrum fehlt. Rostrolateralia sehr niedrig, das linke breiter geht der Mündung vorbei, und nimmt in ihrem gespaltenen Ende das ventralwärts spitz auslaufende rechte auf, welches schmäler als Scutum ist. Rechtes Inframedianum fehlt; linkes hakenförmig, nach unten gebogen, die Spitze nach hinten. Umbones des Scutum, Laterale und Inframedianum an der hinteren Spitze belegen.

Pedunkel mit 10—12 Längenreihen vorne von einander entfernter, hinten dicht stehender Schüppchen.

Farbe des Spiritus-Exemplares gelbbraun zwischen den weissen Platten und Schüppchen.

Masse. Länge des Thieres 10 Mm.
» » Capitulum 7 »
Breite » » 4,5 »

Fundort. Atlantischer Ocean, S. von La Plata in 93 Met. Tiefe. 1 Ex. (Die schwedische Eugenie-Expedition). RM.

Syn. 1892. Scalpellum galea C. W. Aurivillius. [1]

Descr. Der lange Lateralrand des Scutum und dem entsprechend die Länge des Scutalrandes des Laterale sind besonders bemerkenswerth; als eine Folge davon — unter Beibehalten der Begrenzung des Pedunkels gegen das Capitulum — kann theils die geringe Höhe der Rostrolateralia rückwärts zu, theils die sehr geringe Entwicklung des bleibenden Inframedianum und auf der anderen Seite das völlige Schwinden desselben bemerkt werden.

[1] l. c.

Mundtheile. Der Endzipfel der *Oberlippe* ist nach vorne umgebogen. Die *Palpen* sind in der proximalen Hälfte breit, sodann schnell schmäler; die Hinterseite der distalen Hälfte ist konkav mit kürzeren Börstchen als das Ende besetzt. Die *Mandibeln* haben 3 Zähne, der Aussenzahn doppelt länger als die übrigen; die Innerecke stellt einen breiten geplatteten Zipfel, dessen abgerundetes Ende mit 6—7 feinen Zähnen wie gekämmt ist, dar. Den *vorderen Maxillen* fehlt ein Einschnitt; nahe bei der Innerecke steht ein kleiner Höcker hervor; es trägt der Kaurand im ganzen 16—17 Stacheln. Die Innerkante der *hinteren Maxillen* ist konkav; nach innen von der Einbuchtung stehen nur 4 kurze Börstchen; nach aussen davon sind längere und kürzere Börstchen gehäuft.

Cirren. Des 1. Paar steht vom 2. ab und ist kürzer als dieses; der Hinterast ragt mit den 2 Endsegmenten über den aussergewöhnlich breiten Vorderast empor, der seine Platte gegen die Mundtheile wendet; es gehen das 2.—6. Segment in grosse Seitenzipfel aus und sind dicht mit langen Börstchen besetzt. Das 2.—6. Cirrenpaar trägt ventralwärts 4 Börstchenpaare, nach aussen in Länge zunehmend.

Die *Schwanzanhänge* sind schmal, 7-gliederig, von der Länge des 6. Protopoditen, die Endbörstchen nicht eingerechnet, welche so lang wie die letzten 4 Anhangssegmente sind. In den Suturen stecken auch Börstchen.

Verwandtschaft. Diese Art ist dem *Scalpellum pedunculatum* Hoek am meisten ähnlich, und zwar durch die Form und Lage der Carina, des Scutum, des Laterale und — wie es scheint — des Rostrolaterale. Carinolaterale steht weniger hervor und ist gleich wie Inframedianum anders geformt; auch weicht sie durch Mangel eines Rostrum und durch die Bewaffnung des Pedunkels ab.

B. ABDOMINALIA.

Lithoglyptidæ nov. fam.

Corpus pallio forma sacculi indutum, postice paribus 4 cirrorum birameorum instructum. Appendices caudæ 3—4 articulatæ. Pedunculus vix exstans, forma lenticulari. In corallis aut in testis domicilium excavantes.

Körper in einem beutelförmigen Mantel eingehüllt, im Ende mit 4 Paaren zweiästiger Cirren versehen. Schwanzanhänge 3—4-gliederig. Pedunkel kaum vom Körper herausragend, linsenförmig mit ovaler oder elliptischer Haftfläche. Leben in der Oberfläche von Korallen oder Molluskenschalen eingebohrt.

Lithoglyptes n. gen.

Cirri terminales setis numerosis instructi, antici minores; stipitibus 2-articulatis longitudine segmentum ultimum abdominis æquantibus. Cirri ovales biramei, stipite 2-articulato, ramo utroque 5—6-articulato.

Alle vier Endcirrenpaare mit zahlreichen Börstchen besetzt, nehmen an Länge nach vorne ab. Die 2-gliederigen mit schräger Sutur versehenen Stiele sind ebenso lang wie das letzte Körpersegment. Die Mundcirren tragen je zwei 5—6-gliederige Äste auf einem langen 2-gliederigen Stiel.

Lithoglyptes indicus C. W. Aurıv.

(Taf. V, Fig. 9—13 und 16—18; Taf. VI, Fig. 2—4; Taf. VII, Fig. 1—6.)

Diagn. *Femina.* Os pallii latitudinem summam sacculi æquans, rectum; cervix sacculi compressa. Appendices caudæ 3-articulatæ, solum $^1/_3$ stipitum cirrorum proximorum æquantes.

Mas pusillus, pallio feminæ affixus, oblongo-ovalis, organis solum generationis et sensus instructus. Tractus intestinalis deest.

Weibchen. Mantel beutelförmig, nach dem Boden der Bohrhöhle zu abgerundet, nach aussen zusammengedrückt; Mündung von der grössten Breite des Sackes, schlitzenförmig. Mündungsrand gerade, von der geraden rückständigen Befestigungsfläche durch einen winkligen Einschnitt getrennt. Körper 11—12-gliederig. Schwanzanhänge 3-gliederig, das Basalsegment mehr als doppelt dicker als das äusserste Segment, im Ganzen nur $^1/_3$ des nächsten Cirrenstieles messend.

Männchen, am Mantel des Weibchens befestigt, fast spulförmig, mit einem brei konischen Höcker. Nur Generationsorgane — Testis, Vesicula seminalis[1] und ein weit vorstülpbarer Penis — sammt Nervensystem vorhanden. Nahrungskanal fehlt.

Farbe des Weibchens weisslich, der Mündungsrand und angrenzende Manteltheile indigoblau.

Masse. a) des Weibchens: Länge des Thieres zu 6 Mm.
Grösste Breite desselben 4 »
b) des Männchens: Länge 0,5 Mm.

Fundort und Vorkommen. Javasee und Indischer Ocean an der Westküste Sumatras. Bohrt in Korallen und Molluskenschalen. Zahlreiche Exemplare. (Der Verfasser.) RM.

Syn. 1892. Lithoglyptes indicus C. W. Aurivillius.[2]

Lithoglyptes bicornis C. W. Auriv.

(Taf. V, Fig. 15.)

Diagn. *Femina.* Os pallii $^1/_3$ latitudinis summæ sacculi æquans, parum curvatum. Appendices caudæ 3-articulatæ, longitudinem stipitum cirrorum proximorum fere æquantes.

Weibchen. Mantel beutelförmig, nach aussen schmäler, die Mündung nur $^1/_3$ der grössten Breite betragend. Mündungsrand schwach gebogen mit 2 Paaren börstchentragender konischer Chitinhörner versehen. Befestigung wie bei L. indicus. Schwanzanhänge 3-gliederig, schlank, fast ebenso lang wie die nächsten Cirrenstiele.

Farbe. Unterhalb der Mündung findet sich ein dunkelvioletter Streifen, übrigens weisslich.

Masse. Länge des Thieres 2,5 Mm.
Grösste Breite desselben 1,5 »

Fundort und Vorkommen. Javasee. Bohrt in Korallen. Wenige Exemplare. (Der Verfasser.) RM.

Syn. 1892. Lithoglyptes bicornis C. W. Aurivillius.[3]

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[1] Es ist diese in der vorläufigen Mittheilung aus Uebersehen Receptaculum seminis genannt worden.
[2] l. c. p. 133.
[3] l. c. p. 134.

Lithoglyptes ampulla C. W. Auriv.

(Taf. V, Fig. 14.)

Diagn. *Femina.* Os pallii 1/4 latitudinis summæ sacculi æquans, parum curvatum. Appendices caudæ 4-articulatæ, solum 1/2 longitudinis stipitum cirrorum proximorum æquantes.

Weibchen. Mantel kolbenförmig, nach aussen von der ovalen Befestigungsfläche halsförmig sich verengernd. Mündungsrand schwach gebogen, nur 1/4 der grössten Weite des Sackes betragend, einerseits mit 2 Angelhäkchen, andrerseits mit 2 fühlerähnlichen gegliederten Hörnern versehen. Schwanzanhänge 4-gliederig — die Sutur zwischen dem 2. und 3. Segmente undeutlich —, schwach entwickelt, im Ganzen nur halb so lang wie die Stiele des nächsten Cirrenpaares.

Farbe weisslich.

Masse. Länge des Thieres 4,5 Mm.
Grösste Breite desselben 2,5 »

Fundort und Vorkommen. Javasee. Bohrt in Korallen. 1 Ex. (Der Verfasser.) RM.

Syn. 1892. Lithoglyptes ampulla C. W. Aurivillius.[1]

Vergleichung zwischen den Gattungen Lithoglyptes und Alcippe in morphologischer und biologischer Hinsicht.

A. Weibchen.

Wie bei den Lepadiden und Balaniden ist der Gegensatz zwischen dem eigentlichen *Körper* und einem diesen umhüllenden *Mantel* ausgeprägt.

a) ***Mantel.*** Mit diesem Namen wird bekanntlich eine Herausstülpung bezeichnet, welche bei den Lepadiden sowohl als bei den Balaniden, von der Rückenseite des Vorderkörpers ausgehend, seitwärts und ventralwärts sich derartig verbreitet, dass sie dort eine Falte rings um den Körper bildet, nur in der Mittenlinie der Bauchseite eine Spalte für das Durchtreten der Cirren offen lassend. Auf der Rückenseite gehen die beiden Blätter der Ausstülpung mehr oder weniger auseinander: indem das innere Blatt dem eingezogenen Körper sich immer eng anschliesst, bildet das äussere bei den *Lepadiden* eine cylindrische oder stumpf-konische Aussackung, den sogenannten *Stiel* — daher der Name *Pedunculata* —, bei den *Balaniden* liegen die beiden Blätter einander ziemlich nahe an, aber es hat hier im Allgemeinen anstatt einer Verlängerung eine Erweiterung des Zwischenraums statt gefunden. In jedem Falle hat diese besondere Aussackung einen doppelten Zweck und zwar 1:o) nach *aussen* hin, indem sie *zur Befestigung des Thieres* dient, sei

[1] l. c. p. 134.

es dass nur ein beschränkter Endtheil derselben — wie bei den meisten Lepadiden — oder der grösste Theil — wie bei den Balaniden — oder sie ganz und gar — wie bei Anelasma — dabei in Anspruch genommen wird. 2:o) nach *innen* zu hat sie eine besondere Aufgabe, insofern nicht nur die Cementorgane sondern zugleich die weiblichen Generationsorgane immer dort stecken.

Wenn nun die beiden fraglichen Gattungen, *Lithoglyptes* und *Alcippe*, bezüglich des Mantels untersucht werden, dürfte wohl eine nur äussere Inspektion unentschieden lassen, ob sie der einen oder der anderen Gruppe angehören, ja sogar ob sie unter die höheren Cirripeden überhaupt in dieser Hinsicht eingereiht werden können. Bei *Lithoglyptes* ist der sackförmige Mantel überall — also auch im Boden der Bohrhöhle — gleichförmig, mit Ausnahme einer ovalen, bisweilen von einem Chitinwulste umgesaumten dorsal belegenen Fläche; durch den Mangel an Längs- und Quermuskeln zeichnet sich diese von den übrigen Theilen des Mantels aus. Bei *Alcippe* besitzt der übrigens weiche Mantel ebenfalls auf der Rückenseite, von der Nähe der Mündungsspalte an beginnend, eine meistens rundliche oder unregelmässig geformte Scheibe, welche jedoch nicht weich ist wie bei Lithoglyptes, sondern aus festem gelblichen Chitin besteht. Zwischen den beiden Gattungen besteht auch der Unterschied, dass die Scheibe jener in einer Ebene liegt, welche auf der Horizontalebene durch den Mündungsrand vertikal steht, die Scheibe dieser dagegen mit derselben Ebene parallel ist und in der That dem Dache der Bohrhöhle sich anschmiegt.

Reicht aber die oberflächliche Musterung losgelöster Thiere nicht hin um deren Natur klar zu stellen, so giebt doch schon die Untersuchung derselben in situ, d. h. nach ihrem Verhältniss zu den Bohrhöhlen, darüber einen wichtigen Aufschluss. Da beide Gattungen gerade durch ihr Bohrvermögen ein Mittel haben sich ganz und gar im festen Kalkgesteine oder in der Schneckenschale zu verbergen und gegen jedweden äusseren Einfluss zu sichern, sollte man von vornherein glauben, dass sie, wenn einmal völlig eingegraben, in ihren Höhlen ganz frei lägen. Es ist dem aber nicht so. Wenn man nämlich einen Lithoglyptes vorsichtig herausnimmt, wird ein wenn auch schwacher Widerstand von der genannten ovalen Scheibe aus bemerkt und zwar zeigt sich die Wand unter der Scheibe verkalkt, die äusserste Kalkschicht die Form der Scheibe genau entsprechend. Bei Entkalkung dieser Schichten tritt ein Netz von Cementkanalen, besonders im Umrisse derselben, hervor, ganz wie ich dergleichen in den Kalkstückchen, welche die Bohrgänge des *Lithotrya* auskleiden, gefunden habe. Bei der letztgenannten Gattung sondert aber eine kurz oberhalb des Stielendes befindliche Scheibe die Plättchen ab, und es kann also die Lithoglyptes-Scheibe *physiologisch* mit jener gleichgestellt werden: *es dienen beide zur Befestigung der Thiere* innerhalb der Bohrhöhlen. *Alcippe* schliesst sich in Betreff der Funktion der Scheibe dem *Lithoglyptes* nahe an, indem ich auch bei ihr Cementkanälchen zwischen der Scheibe und dem hier unmittelbar anliegenden Höhlendach getroffen habe. Aber es giebt ausserdem die anatomische Untersuchung des Lithoglyptes sowie der Alcippe an die Hand, dass die genannte Scheibe sammt den sich daran schliessenden inneren Organen auch *morphologisch* mit dem Lepadidenstiel gleichbedeutend ist. Durch die Mitte des Thieres der Länge nach geführte Schnitte (vergl. Taf. VI, Fig. 3) legen nämlich dar, dass die bei den Lepadiden und Balaniden bekannte Hautausstülpung auch hier

dorsalwärts vom Vorderkörper ausgeht und zwar die beiden Blätter sich übrigens dicht anliegen, bei der Haftscheibe aber einen Zwischenraum zwischen sich lassen, welcher ganz wie bei jenen theils von den weiblichen Generationsorganen theils von den Cementorganen ausgefüllt wird.

Wenn also das Verhältniss des Mantels der fraglichen Gattungen unzweifelhaft auf eine Verwandtschaft mit den höheren Cirripeden hindeutet, so kann immer noch fraglich sein, an welche der beiden Gruppen — die Lepadiden oder die Balaniden — sie sich am nächsten anschliessen. In dem Falle wo wie hier der Mantel ganz unverkalkt ist, muss gerade die Art der Befestigung dabei entscheidend sein. Nun geschieht aber diese bei den *Balaniden* derart, dass, vom ursprünglichen Haftpunkte der Cyprisantennen aus, die Basis, sie mag übrigens verkalkt sein oder nicht, sich nach allen Seiten hin gleichförmig entwickelt, somit der Periodicität des Wachsthums zufolge concentrisch ausgebildet erscheint, und zwar bleibt jede neue Schicht durch peripherische Erweiterung des Cementkanalsystems dem Boden haften. Bei den *Lepadiden* wiederum stellt gewöhnlicherweise nur eine beschränkte Fläche am Ende des Pedunkels die Verbindung mit der Unterlage dar, die im Allgemeinen von den Antennen aus ziemlich gleichmässig nach allen Seiten erweitert wird, aber bisweilen — wie bei Scalpellum vulgare — je nach dem Dickenwachsthum des Stieles bei jeder Häutung *einseitig* — und zwar rostralwärts — verlängert, zugleich auch ein wenig verbreitert werden kann.

Es scheint nun vielleicht der Umstand, dass bei Lithoglyptes und Alcippe eine Stielbildung gar nicht vorkommt, vielmehr eine im Verhältniss zum Mantel im Ganzen ziemlich beträchtliche Fläche zur Anheftung dient, für ihre Einreihung unter den Balaniden zu sprechen. Dagegen zeugt aber die Thatsache, dass die Haftscheibe auf die nämliche Weise wie bei Scalpellum sich vergrössert, und zwar nicht gleichförmig, sondern in eine von der Mündung aus distale Richtung hin.

Dem Einwurf wiederum, welcher gemacht werden könnte, dass die *Kalk*absonderung von der Haftscheibe bei Lithoglyptes an die Balaniden erinnert, wird das Beispiel der bohrenden Lepadidengattung *Lithotrya* entgegen gesetzt, welche, wenn übrigens ein Zweifel bezüglich der Stellung der fraglichen Gattungen sich findet, gerade durch ihre Lebensweise besser als andere Lepadiden geeignet ist dieselbe aufzuklären. Es stimmt nämlich 1:o) *die Lage der Haftscheibe* mit derselben bei Lithoglyptes (und Alcippe) überein in so fern sie *nicht am Ende selbst des Pedunkels*, sondern hinter diesem seitwärts belegen ist, ein Umstand, der wesentlich von der Bohrfunktion des Mantels abhängt. Es wird 2:o) von dieser Haftscheibe bei *Lithotrya* und *Lithoglyptes Kalk*, bei *Alcippe festes Chitin gegen die Wand der Bohrhöhle abgesetzt*, in allen Fällen den sicheren Stützpunkt darbietend, welcher gerade die bohrende Thätigkeit der Thiere bedingt. Endlich ist 3:o) die Art der Veränderungen dieser Anheftungsflächen im Grunde bei allen die nämliche: es geschieht deren Vergrösserung in einer der Mündung entgegengesetzten Richtung, mit dem Unterschied, dass bei Alcippe die Erweiterung von der ursprünglichen Befestigungsfläche der beginnenden Scheibe aus stattfindet, bei den beiden anderen mit einem, durch die Häutungen veranlassten Herabrücken derselben in die Höhle verbunden ist. *Die auf diese Weise in den Gängen der grossen Lithotryæ entstandene einseitige Reihe dachziegelartig sich*

überlagernder Kalkschüppchen sind also mit den winzigen Kalkschichten des kleinen Lithoglyptes völlig homologe Bildungen.

Nach dieser Auseinandersetzung der Natur der Haftscheibe bei *Lithoglyptes* und *Alcippe* steht es noch übrig ihre *funktionelle Bedeutung* näher zu besprechen.

Wie schon angedeutet, wird durch die Scheibe eine Verbindung zwischen Mantel und Bohrhöhle bewirkt, die indessen, weil verschiedenartig ausgebildet, für jede Gattung besondere Erwähnung verdient. Ich mache also mit dem Befunde bei Alcippe Anfang.

Alcippe bohrt auf der Innerseite der Schalen gewisser Schnecken, wie Buccinum, Fusus, Littorina, welche von Einsiedlerkrebsen bewohnt sind.[1] Es kommen die Höhlungen entweder in Columella — oft dicht gehäuft — oder in der letzten Windung vor. Ausser durch die länglich-ovale, in dem engeren Theile etwas gekrümmte Mündung, die zum Heraustreten der Cirren dient, kündigt sich die Alcippe-Höhle bei gewisser Grösse durch von dem schmalen Mündungstheil strahlförmig ausgehende Zeichnungen an, welche in dem sehr dünnen Höhlendache unmittelbar über die Haftscheibe sich finden. Bei näherer Untersuchung besteht jeder Strahl aus wenigen sehr feinen nach aussen sich öffnenden durch weisslich gefärbte Streifen oder Punkte im Innern der Schale mehr oder minder vollständig verbundenen Löchern.

Es sind diese schon von Hancock,[2] dem Auctor der Gattung Alcippe, erwähnt und abgebildet. Fünf Jahre später macht Darwin[3] über dieselben folgende Bemerkung: »I may here observe, that certain radiating and often punctured lines, mentioned and figured by Mr. Hancock, which help to render the thin plate of shell over the peduncle conspicuous, are formed by the burrows of an excessively minute annelid, the punctures being apparently the exit orifices: I imagine that these annelids find it difficult to commence their burrows on the smooth surface of the shell, and that they congregate at these particular spots and thence burrow in radiating lines, owing to their having taken advantage of the little clifflike edges, at the narrow and disused ends of the fissures leading into the cavities occupied by the Alcippe, where alone they would not be disturbed by the action of the cirri, when first they commenced making their little burrows in the shell.»

Freilich kann die äussere Erscheinung der fraglichen Bildungen die Deutung derselben als Bohrgänge von Würmer erklären, es sprechen jedoch schon einige von aussen bemerkbare Umstände gegen diese Auffassung, nämlich a) die Regelmässigkeit des Verlaufs der Streifen, indem sie, anfänglich sehr nahe an einander laufend, nach der Peripherie der Höhle zu sich immer von einander entfernen; b) dass sie sämmtlich genau im Umriss der Höhle aufhören; c) dass oft in einem und demselben Streifen mehrere winzige Löcher, oft sehr nahe an einander, vorkommen, während dass in anderen solche ganz und gar fehlen; d) dass sämmtliche Streifen am häufigsten nicht genau von der Höhlenmündung aus-

[1] Meinestheils wenigstens habe ich an der schwedischen Küste zwar die leeren Bohrhöhlen, niemals aber ihre Einwohner in solchen Schneckengehäusen gefunden, die von den Paguren verlassen worden. Es scheint der Krebs das Gedeihen und die Lebensbedürfnisse der kleinen Cirripeden in ebenso hohem Masse zu fördern als bezüglich der oft gleichzeitig mit ihm zusammenlebenden Hydractinia echinata (wovon näheres vergl. die Arbeit: »Über Symbiose als Grund accessorischer Bildungen bei marinen Gastropodengehäusen.» K. Svenska Vet. Akad. Handl. Bd. 24. N:o 9. 1891.)

[2] Ann. and Mag. of Nat. Hist. Vol. 4, 1849. Pl. 8, 9.

[3] Ch. Darwin, A monograph on the subclass Cirripedia. London 1854.

strahlen, sondern zuerst in einem Abstand davon hervortreten, ein Verhältniss, welches, mit dem Mangel einiger Streifen an Löcher zusammengestellt, die oben gegebene Erklärung und überhaupt Würmer als Werkmeister der fraglichen Bildungen ausschliesst. Bei Auflösung der ganzen Kalkscheibe in schwacher Säure habe ich übrigens niemals eine Spur von Würmern darin gefunden, was jedoch wenigstens in solchen Fällen zu erwarten wäre, wo die Streifen noch keine Öffnungen zeigten.

Da folglich überhaupt an keine äusseren Einflüsse hierbei zu denken war, könnte die Erscheinung nur von Seite des Thieres selbst erklärt werden. Und zwar gab die Untersuchung des Bodens und der Wände der Bohrhöhle sowie der Lageverhältnisse des Thieres in derselben dabei den ersten Anhaltspunkt. Bei Musterung des Bodens besonders grosser Höhlen zeigen sich nämlich kleine reihenförmig geordnete von Kalk gefüllte Grübchen, deren einige Reihen durch Rücken von einander getrennt sind.

Es setzten sich diese Grübchenreihen auch auf die Wände und das Dach fort, im letzten Falle, wie oben angedeutet, durch ebenso mit Kalk gefüllte Furchen mehr oder weniger verbunden; es ist aber dort zugleich ein und anderes Grübchen zum Durchbruch gekommen, also wie ein winziges Loch auf der freien Schalenoberfläche erscheinend. Bei Vergleichung der Lage des Thieres im Verhältniss zu diesen Skulpturen der Höhle hat es sich erwiesen, dass die Grübchenthäler von peripherisch ausstrahlenden Rücken des Mantels, die Kalkrücken dagegen von Furchen des Mantels entsprochen werden. Die Grübchen selbst, sowie die im Dache sie verbindenden Furchen sind aber die Wirkungen der Bohrwerkzeuge — der meistens mit einer sternförmigen Scheibe endigenden Chitinnädel — welche gerade auf den Rücken der freien Manteltheile kräftig ausgebildet bei jeder Häutung erneuert werden. Der Umstand ferner, dass die Skulpturen des Bodens und der Wände nur in grossen schon völlig ausgebildeten Höhlen ausgeprägt sind, die Skulpturen des Daches dagegen im Allgemeinen sehr früh hervortreten, findet darin seine Erklärung, dass diese von den Rücken des die Scheibe umgebenden Mantelrandes eingegraben, aber sogleich nach einer Häutung von der vergrösserten unbewaffneten Haftscheibe bedeckt werden, welche dazu durch die Cementabsonderung sich am Dache befestigt; jene dagegen zwar mit diesem gleichzeitig gebildet werden, folglich unmittelbar vor jeder Häutung am schärfsten sein müssen, nach der Häutung aber theils durch die veränderte Lage der neuen Reibnädel, theils durch die dort freiere Bewegung des Mantels wieder verwischt werden. Sobald aber das Thier das Maximum seiner Grösse erreicht hat, also die Höhle nicht mehr erweitert wird, tritt die Skulptur auch im Boden und in den Wänden dauernd hervor.

Wenn nun nach der Bedeutung dieser Skulpturen dem Thiere gegenüber gefragt wird, kommt es mir wahrscheinlich vor, dass die Furchen und Grübchen des Daches eine festere Verbindung zwischen dem Thiere und der Höhle als sonst der Fall wäre, bewirken, indem die Rücken der Haftscheibe in jene eingreifen und durch ein dichtes Netz der Cementkanäle in ihnen haften bleiben.

Die Befestigung selbst scheint mir aber hier einen zweifachen Zweck zu haben und zwar 1:o) *den festen Stützpunkt der wichtigen Muskelbewegungen darzubieten, welche vor Allem die Erweiterung der Höhle des Thieres geradeaus bedingen.* Freilich werden auch bei Alcippe dergleichen Bewegungen des hinteren Körpers nach aussen und innen ausgeführt wie bei Lepadiden und Balaniden, es haben aber diese hier einen verhältnissmässig

geringen Umfang, was schon aus der Reduktion der Cirrenbewaffnung einleuchtet, aber die bei weitem wichtigsten Bewegungen, in denen auch der Mantel Theil nimmt, sind die unten näher zu besprechenden, wodurch dieser gegen den Boden und die Wände der Höhle gedrückt wird.

Es dient aber die feste Verbindung im Höhlendache auch 2:o) dazu *die Art und Richtung des ferneren Wachsthums der Haftscheibe anzugeben.* Je nachdem das Cypris-Stadium auf dem Columella oder auf der Innerseite der letzten Schneckenwindung sich festgesetzt hat, weist die Haftscheibe der jungen Alcippe verschiedene Formen auf. Es richtet sich nämlich diese sowie das Höhlendach, dem sie sich dicht anschmiegt, ganz nach dem Grade der Wölbung oder der Aushöhlung der freien inneren Schneckenoberfläche, welche sie unterminirt, und zwar ist folglich die Scheibe, wenn in der Columella steckend, immer konvex, wenn sie aber in der Windung steckt, entweder fast plan oder konkav. In beiden Fällen ist der Umstand bemerkenswerth, dass die Dicke des Höhlendaches sich immer gleich bleibt, ist nur einmal die Anlage der Scheibe da; denn es wird diese immer in einer mit der Oberfläche parallelen Ebene angelegt und giebt gerade durch ihre Befestigung in dieser Lage die Richtung, in welcher der peripherische Mantelsaum arbeiten soll, sowohl als die Form der ausgebildeten Scheibe an. Was wiederum die Entstehung der Scheibenanlage betrifft, scheint mir im Bau oder in der Thätigkeit des Thieres an und für sich keine Erklärung der Verhältnisse gegeben, dass dieselbe immer in der genannten Ebene entsteht, und zwar weder an die Oberfläche zu sehr sich nähert, so dass diese durchbricht, oder durch eine schiefe Lage während des Heranwachsens auch die geringste Blosslegung eines Theils desselben veranlasst. Dass die winzigen Löcher, welche hie und da längs den Furchen das Dach durchsetzen, von einer Bedeutung hierbei seien, kann ich um so weniger glauben als sie — wenigstens im Allgemeinen — gerade über dem ältesten Theil der Scheibe fehlen; wie schon angedeutet, verdanken sie ihre Entstehung offenbar den Chitinnädeln des die Scheibe umgebenden Mantelsaums, welche zwar, weil in den späteren Häutungen grösser als in den früheren, bei derselben Dicke des Daches, in jenen öfter durchbrechen als in diesen; jedoch scheint diese Verbindung nach aussen fast immer durch die abgeschabten und sodann zusammengekitteten Kalktheile geschlossen. Es sollte also das Thier zuerst, wenn es Mittelgrösse erreicht hat, während der Bohrung selbst durch das Durchbrechen des Daches in einigen Punkten mit der Schneckenhöhle von dieser Seite in Verbindung stehen.

Um sodann die Verhältnisse der Befestigung bei *Lithoglyptes* näher zu besprechen, unterscheidet sich diese Gattung von *Alcippe* schon durch die Lage der Haftscheibe in der Bohrhöhle. Es steht nämlich die Ebene durch dieselbe rechtwinklig auf die Horizontalebene durch die Höhlenöffnung (Taf. V, Fig. 16, 17), d. h. es kommt hier kein Höhlendach zur Seite der Öffnung zur Ausbildung, sondern die Befestigung ist *lateral.* Die leeren Höhlen sind ferner, ausser durch die Form der Mündung, zugleich durch der Scheibe gegenüberliegende ovale Kalkschichten kenntlich. In den meisten Fällen fand ich bei Herausnehmen des Thieres aus der Höhle eine feine schimmernde Chitinhaut an der letztgebildeten Kalkschicht haften, aber nur ausnahmsweise bot sich die Gelegenheit dar eine beginnende *Verkalkung* derselben zu beobachten. Es traten nämlich bisweilen sehr winzeig in beiden Enden stumpfe Kalkstäbchen in der ganzen Haut zerstreut auf, in einem

Falle waren sie hie und da mehr oder weniger sternförmig zusammengehäuft oder hatten sich deren fünf mit den Enden zu einem Fünfeck zusammengefügt, von dessen Ecken wiederum je ein Stäbchen hinausragte oder bildeten deren zwei einen geraden Winkel gegen einander u. s. w. Bei Behandlung mit schwacher Säure lösten sich diese Bildungen sämmtlich auf, ohne auch die geringste Spur einer organischen Grundsubstanz zu hinterlassen. Es sind die Kalkschichten aneinander durch Cementkanäle verkittet und zwar haftet die Scheibe auf dieselbe Weise an der jüngsten Schicht an. Die Hauptkanäle sind koncentrisch geordnet und zwar in der von der Mündung distalen Richtung, ganz wie die Anwachslinien, am meisten von einander getrennt; es kommen an ihnen hie und da längliche Erweiterungen sowie kurze Seitenzweige vor.

Durch die laterale Lage der Haftscheibe sowohl als durch Ablagerung verkalkter Schichten an der Höhlenwand zeigt *Lithoglyptes* mit *Lithotrya* Ähnlichkeit, obgleich bei dieser Gattung die Kalkschichten, dem jedesmaligen tieferen Eingraben und der Grösse des Thieres zufolge, nicht grösstentheils *auf* einander liegen, sondern *nach* einander, also reihenförmig, folgen.

Was ferner die Aufgabe der Lithoglyptesscheibe betrifft, so scheint diese auf die in Mom. 1:o) bei Alcippe angezeigte, zwar sehr wichtige Funktion sich zu beschränken, nämlich *der Stützpunkt der Muskelbewegungen* zu sein, welche aber hier *nicht vorzugsweise auf das Bohren, sondern zugleich auf die Nahrungsaufnahme sich beziehen.*

Mit dem Mantel in Zusammenhang sei noch die in den Höhlen beider Gattungen vorkommende mehr oder weniger ausgedehnte *Kalkauskleidung* derselben erwähnt. Oben ist bei Alcippe das Ausfüllen der Grübchen des Daches von einer Kalkmasse bemerkt worden, es gilt aber dasselbe auch von den Furchen des Daches sowie von den Grübchen des Bodens oder der Wände, kurz von allen Unebenheiten der Höhle. Dazu kommt noch, dass alle Ecken und Winkel der Höhle, welche vom erwachsenen Thiere nicht aufgenommen oder für dessen Bewegungen nicht nöthig sind, mit der nämlichen Substanz gefüllt werden und zwar wird vor Allem der Mündungshals der Höhle beider Gattungen verengert, bei Alcippe sogar der schmälste Theil der Mündungs-spalte versperrt. Je mehr nämlich das Thier seiner völligen Grösse sich nähert, um so mehr verlängert sich auch die Mantelöffnung und zwar dem festen Stützpunkt zufolge nur in die distale Richtung hin. Es entfernen sich aber in demselben Grade die Cirren des Körperendes von dem älteren engen Spaltentheile, der folglich nicht mehr zum Durchtritt jener dient und von beiden Seiten her durch die fragliche Kalkmasse immer mehr verengert wird. Bei der in Korallen bohrenden Lithoglyptes hat die Kalkabsonderung die besondere Bedeutung, zugleich die Unebenheiten der umgebenden Korallsubstanz zu glätten und die grossen Löcher oder Kanäle derselben zu überbrücken, eine in Betracht des ganz weichen Mantels des Thieres sehr wichtige Aufgabe, welche um so mehr sich geltend macht, je poröser die Koralle ist. Obwohl allgemeiner in dem kompakteren *Porites* bohrend, kommen nämlich die Thiere auch in dem lockeren *Goniastræa* vor und zwar fand ich bei Sumatra mehrere Bohrhöhlen, welche diese Koralle entweder quer oder der Länge nach durchsetzen aber in beiden Fällen von den durchschnittenen grossen Kanälen durch Kalkablagerung ganz abgeschlossen sind.

Wenn nun nach dem Ursprung dieser Kalkmasse gefragt wird, so giebt erstens ein Schleifschnitt quer durch die Höhle an, dass sie nicht wie diejenige, welche der Haft-

scheibe gegenüber liegt, geschichtet ist, sondern aus grösseren und kleineren unregelmässigen Kalkstückchen besteht, die mit braungelben Körnchen-ähnlichen Bildungen vermengt sind. Bei Abschaben der Kalkbelegung und deren Behandlung mit schwacher Säure lassen die Kalkstückchen ein organisches Residuum zurück und die gelben Bildungen sind unverändert. Was jene betrifft kommt es mir wahrscheinlich vor, dass sie zum Theil als Abschäbsel bei der Bohrung anzusehen sind, diese wiederum sind unzweifelhaft Produkte des bohrenden Thieres, sei es dass sie von besonderen Drüsen des Mantels — es finden sich solche zwar allgemein aber besonders im »Halse» bei Lithoglyptes vor —, oder vom Cementapparat geliefert werden. Und zwar ist der letztgenannte Fall dadurch ermöglicht, dass die obengenannte glänzende Haut, welche die Kalkschichten an der Fussscheibe bedeckt, sich auch ausserhalb dieser auf die angrenzenden Theile der Höhle erstreckt, wo sie von Auszweigungen der Cementkanäle festgehalten wird. Dass sie aber, auch bei erwachsenen Exemplaren, nicht immer dort vorkommt, findet natürlich in der beständigen Abnutzung der Wände durch die Mantelöffnung seine Erklärung. Ehe dies geschieht, scheint mir indessen oft eine Verkalkung stattzufinden; und zwar könnte deshalb die genannte bei der Entkalkung zurückbleibende organische Substanz zum Theil vom Thiere selbst herstammen.

Was ferner die Bohrwerkzeuge und die Schutzeinrichtungen der fraglichen Gattungen betrifft, so sind sie, wie leicht ersichtlich, ganz und gar Bildungen des Mantels. Wie schon gesagt fehlen jene den Haftscheiben, übrigens finden sie sich ziemlich gleichmässig über den Mantel zerstreut und sind bei beiden Gattungen gegen die Mündung grösser. Sie bestehen einzig und allein aus Chitin, sind 1—4-spitzige Dörnchen mit schwachem Stiel — Lithoglyptes — oder mit dickem höckerähnlichen Stiel, besonders im äusseren Manteltheile — Alcippe. Die Mündungsränder des Mantels beider Gattungen sind sowohl durch Form als durch Bewaffnung eigenthümlich. Es gehen nämlich die beiden Mantelblätter nicht in *eine* Kante zusammen, sondern bilden deren *zwei*, jederseits durch ein zwischenliegendes langgestrecktes Feld getrennt (Taf. V, Fig. 10). Es ist dies Feld nach der Rückenseite zu breiter und sein Innenrand ist gerade, folglich beim Einziehen des Thieres dem anderseitigen sich dicht anschmiegend. Die Form der beiden zusammengelegten Felder giebt die Form der Höhlenmündung treu wieder; und zwar bestehen sie im Gegensatz zum übrigen Mantel aus hartem gelben Chitin, somit die wichtige Funktion, welche ihnen obliegt, anzeigend. Sie müssen nämlich als Schliessdeckel der Wohnung betrachtet werden, welche dadurch, dass sie in die Höhlenöffnung genau passen, das in die Wohnung sich hineinziehende Thier ganz überdecken. Es kann dies bei beiden Gattungen durch direkte Beobachtung im Leben ermittelt werden, aber es zeugt bei Lithoglyptes noch ein anderer Umstand davon. Wenn das Thier die Cirren hinausstreckt — wobei die Schliessdeckel nicht nur aus einander weichen, sondern eine vertikale Stellung einnehmen, die Oberfläche den Höhlenwänden zugekehrt — zeigt sich, dass die Durchtrittsöffnung der Cirren nur die halbe Länge des Mantels beträgt, die ventrale Hälfte dagegen durch eine die Schliessdeckel verbindende dünne Haut mit längs der Mitte verlaufender Sutur geschlossen ist. Von dieser Sutur geht nahe am Mündungsrand ein breit sich anhaftender Muskel aus, welcher nach der Haftscheibe zu, also in schiefe Richtung, verläuft. *Es hat dieser Muskel offenbar die Aufgabe die Deckel zu schliessen.*

Bei Nachforschung einer dieser entsprechenden Einrichtung bei den höheren Cirripeden bieten sich von selbst zwei Gesichtspunkte, der *physiologische* und der *morphologische* dar. Was jene betrifft, ist zuerst einleuchtend, dass *die Aufgabe der Schliessdeckel zunächst derjenigen der Scuta der Lepadiden und Balaniden entspricht.* Wo diese Schilder eine grössere Ausbildung erreichen, treten sie nämlich in beiden Klassen vorzugsweise als die inneren weicheren Körpertheile deckend auf. Und zwar sind sie bei den Lepadiden mit den übrigen Capitulumplatten ähnlich ausgebildet, bei den Balaniden dagegen haben sie, sowie die Terga, im Allgemeinen eine grössere Selbständigkeit gewonnen, indem sie einen mehr oder weniger horizontalen Deckel darstellen. Diese Selbständigkeit giebt sich vor Allem durch eine grössere Beweglichkeit des Deckels zu erkennen und zwar wird diese durch besondere Muskeln vermittelt. Der einzige bei den Lepadiden vorhandene Schliessmuskel ist der *Musculus adductor scutorum*, welcher, auf der Innerfläche befestigt, die Scuta an einander zieht.

Ausser diesem kommt aber dem Scutum der Balaniden noch zwei Muskelpaare zu, nämlich a) *Musculus depressor scutorum rostralis*, welcher von der unteren rostralen Ecke der Platte ausgehend schräg rostralwärts nach der Basis verläuft, und b) *Musculus depressor scutorum lateralis*, welcher von der unteren tergalen Ecke der Platte ebenfalls nach der Basis geht. Wie der Name angiebt, liegt diesen Muskeln die Funktion ob, den Deckel[1] herunter in den Schalenkranz zu ziehen.

Was nun die funktionelle Bedeutung des genannten Muskels bei Lithoglyptes ankommt, giebt seine eigenartige Befestigungsweise zu, auf einmal das Zuschliessen der Deckelplatten und deren Herunterziehen in die Höhle zu bewirken. Es wird bei der Kontraktion derselben die Mediansutur der verbindenden Haut heruntergezogen, gleichzeitig aber die Schliessdeckel horizontal eingestellt und die inneren Ränder an einander fest geschlossen. Weil aber das distale Ende des Muskels an der Haftscheibe befestigt ist, hilft der Muskel auch dazu den Mündungsrand und den Halstheil des Mantels herunter in den Mündungshals der Bohrhöhle zu ziehen, dadurch die Weichtheile gegen Anfälle noch besser sichernd. *Es entspricht also der Muskel seiner Funktion nach den Musculi depressores und dem Musculus adductor scutorum zugleich.*

Aus morphologischem Gesichtspunkte weist die gegenseitige Einfügung des Muskels darauf hin, dass er mit einem Musculus depressor gleichbedeutend sein muss, denn es entspricht nach dem oben Gesagten die Haftscheibe bei Lithoglyptes der Basis der Balaniden. Dass er ferner in der Medianlinie verläuft und dazu auf der Rostralseite sich befestigt, scheint anzugeben, *dass er zunächst mit dem Musculus depressor rostralis bei den Balaniden vergleichbar ist.* Es kann zwar der Einwurf gemacht werden, dass er fast unter der Mitte der zusammengelegten Schliessdeckel ausgeht, der fragliche Muskel aber vom unteren Ende des Balanidenscutums; es lässt sich jedoch leichter denken, dass er von jenem Punkte an zu diesem vorgerückt sei, bei gleichzeitiger Vertheilung auf die beiden Scuta in unmittelbarer Nähe der Mittellinie als dass er, nach Zweispaltung, nicht nur mit den oberen Enden bis zu den äussersten Seitenecken, sondern auch mit den unteren von der Medianlinie am weitesten sich entfernt habe. Dass nämlich hier eine den höheren Cirripeden

[1] Es findet sich ein herunterziehender Muskel auch am unteren Rand des Tergum befestigt.

ganz fremde Bildung vorläge, halte ich in Betracht der übrigen homologen Gestaltung nicht wahrscheinlich.

Jedenfalls bietet das Vorhandensein wenn auch unverkalkter Schliessdeckel bei Alcippe und Lithoglyptes sowie eines dieselben niederziehenden Muskels bei dieser Gattung in phylogenetischer Hinsicht ein grosses Intresse, indem dadurch 1:o) über die erste Entstehung der Schutzplatten bei den bohrenden Cirripeden Licht geworfen wird und 2:o) die Scuta als die ältesten Deckplatten der Cirripeden sich bewähren.

Bezüglich des ersten Punktes könnten vielleicht die Schutzplatten des Lithoglyptes und Alcippe einzig und allein als Anpassungen an die bohrende Lebensweise betrachtet werden, und zwar deshalb, dass sie den einzigen blossgestellten Theil des Thieres, die Mantelöffnung, beschirmen. Mit ebenso gutem Grunde sollte man aber eine ähnliche Bildung — nur in grösserer Umfassung — bei dem bohrenden Lithotrya erwarten, während dass in der That nicht nur Capitulum sondern auch der Pedunkel mit mehreren Platten bewaffnet sind. Es sind also Lithoglyptes und Alcippe wahrscheinlich Vertreter einer früheren und zwar sehr einfachen Stufe in der Entwicklung der Mantelbewaffnung, besonders derjenigen, welche auf den Schutz sich bezieht.

Was den zweiten Punkt betrifft, so macht die, wenigstens bei Lithoglyptes, unzweifelhafte Scuta-Natur der chitinösen Schliessdeckel eine sehr bemerkenswerthe Bestätigung des von den Lepadidengattungen Alepas und Dichelaspis gelieferten Beispieles aus, dass wo nur ein Paar Platten, entweder verkalkt oder ganz chitinös, sich finden — z. B. bei Alepas minuta Philippi, Alepas quadrata mihi und Dichelaspis bullata mihi — diese die Scuta sind.

Aus dieser Erörterung der Scuta bei Alcippe und Lithoglyptes könnte vielleicht gefolgert werden, dass die Schliessdeckel dem Thiere nur als Schutzwehr dienen. Es kommt ihnen aber noch eine andere Aufgabe zu. Bei Musterung von deren Oberfläche bei Lithoglyptes zeigt sich nämlich nicht nur der ausgeschweifte Aussenrand durch kurze und dicke 2—3-spitzige Dörnchen bewehrt (Taf. V, Fig. 10—11), sondern auch der innere gerade Rand trägt 1-spitzige schief konische Dörnchen und in dem zwischenliegenden Felde stecken dergleichen winzige mit Haaren vermengt. Die Bedeutung dieser Bewaffnung wird durch die Bewegungsfähigkeit der Schliessdeckel aufgeklärt. Durch einen vertikalen Schlitz an der Dorsalseite sind nämlich diese fähig, bei Erschlaffung des genannten Muskels sich vertikal einzustellen, die Fläche mit den Dörnchen den Höhlenwänden zugewandt. Indem sie also die Cirren durchlassen, stellen sie sich ihnen zu beiden Seiten schützend um, ihre Berührung mit der Höhlenmündung abwehrend, wirken aber zugleich durch die Bewaffnung reibend und vergrössernd auf die Höhlenmündung und zwar mehr um deren dorsale als ventrale Hälfte, weil die Schliessdeckel ventralwärts theils schmäler sind, theils, durch einen Schlitz nicht getrennt, wenig aus einander weichen.

Bei einer solchen Nebenfunktion der Schliessdeckel könnte aber vermuthet werden, dass bei der Abnutzung entstandenes Abschäbsel im geöffneten Mantel sich ansammeln sollte, es wird aber dies durch andere Einrichtungen verhütet. Es finden sich nämlich erstens in der äusseren Mantelhälfte, besonders aber in den Mündungsfalten, Drüsen gehäuft, deren Mündungen im Mantelhalse zerstreut, auf den Schliessdeckel zahlreicher und in der verbindenden Haut am häufigsten, in kurzen Reihen um je 2—6, auftreten. Das

gelbbraune Sekret, welches hier und da auf diesen Manteltheilen, sowie bei Entkalkung der die Höhle bekleidenden Kalkmasse getroffen wird, stammt unzweifelhaft von diesen Drüsen her. Es scheint mir seine Bestimmung diejenige zu sein, sowohl die abgeschabten Kalkpartikeln vom Innern des Mantels fern zu halten, als durch Verkittung derselben die Unebenheiten und den beim Anwachs überflüssigen Raum der Höhle auszufüllen, somit den Bewegungen des Thieres eine glatte Fläche darzubieten. Wo aber die verbindende Haut aufhört, streckt sich rings um die dorsale Hälfte der Öffnung jederseits eine kammähnliche Stachelreihe, deren dicht um die Spitze mit ausstrahlenden Nebenstacheln versehene Stacheln durch ihre dichte Anordnung gerade daran gepasst sind die Öffnung von Eindringlingen jeder Art frei zu halten; ich habe ausserdem oft gelbbraune Sekrettropfen auf ihnen angetroffen, welche denselben Zweck haben.

Bei *Alcippe* finden sich Schliessdeckel von hauptsächlich derselben Form wie bei Lithoglyptes, auch kommen am Aussenrande die grössten 1—2-spitzigen Chitinhöcker mehrreihig vor; innerhalb dieser aber bis zum Innenrand kleinere konische Höcker. Da eine die ventrale Hälfte überbrückende Haut hier fehlt, ist die Innerseite des Mantels ein wenig unter den Schliessdeckeln mit dicht stehenden langen, nach aussen gerichteten Haaren versehen; gegenüber diesen findet sich jederseits auf der Oberlippe eine wagerechte Reihe ebenso gerichteter Börstchen. Dorsalwärts wird die kammähnliche Stachelreihe des Lithoglyptes durch ein schwach gebogenes Feld dicker konischer dicht stehender Chitinstacheln vertreten. Sämmtliche diese Bildungen, weil im Mantelschlunde selbst steckend und nach der Mündung gerichtet, sind offenbar Schutzeinrichtungen, welche das Eindringen fremder Körper in den Mantelsack verhüten. Vielleicht helfen aber die Stachelreihen der Oberlippe besonders dazu, die Nahrungszufuhr zu reguliren.

Was das *Muskelsystem* des Mantels betrifft, kommen bei Alcippe sowohl als Lithoglyptes 1:o) *Quermuskeln* und 2:o) *Längenmuskeln* vor, beide nach oben zum Mantelhalse, nach unten zur Fussscheibe sich streckend, jene ausserhalb dieser verlaufend (Taf. VI, Fig. 4 und 5). Es finden sich ferner 3:o) bei Lithoglyptes zahlreiche feine quergestreifte *Muskeln, welche* die dem Pedunkel entsprechende Abtheilung (= *die Ovarienhöhle*) in der Richtung des grösseren Körperdurchmessers *quer durchsetzen*, und deren beide Enden auf einer kurzen Strecke faserig gespalten sind. Bei Alcippe treten freilich auch zwischen der Aussen- und Innenwand derselben Höhle schmale strangförmige Bildungen auf, von jenen unterscheiden sie sich doch durch den ein wenig geschlängelten Verlauf und, insofern ich habe sehen können, durch Mangel an Querstreifen; es sind die Enden nicht tiefer als bei jener gespalten. Vielleicht ist ihre Funktion nur eine stützende sowie derjenigen, die überall zwischen aneinander liegenden Mantelfalten der Cirripeden vorkommen, oder sind sie wirklich auch kontrahirend. Jedenfalls sind jene wie diese von den übrigens im Mantel vorkommenden nach beiden Enden büschelförmig verbreiteten Stützzellen leicht ableitbar, was besonders beim Übergang der Haftscheibe in den Mantel einleuchtet (vergl. die genannten Figuren). Ausserdem gehen bei Lithoglyptes 4:o) *schiefe Muskeln* durch die Ovarienhöhle, nämlich theils die untere Hälfte des Schliessmuskels, welcher viergetheilt auf der Aussenwand der Höhle ein wenig nach aussen von der Mitte sich anhaftet, theils vier, von den letztgenannten kurz nach seinem Eintreten in die Höhle ausgehenden

Muskeln, deren anderes Ende auf der Innenwand der Höhle in und etwas über der Mitte 2 oder 3-getheilt sich befestigen (vergl. Taf. VI, Fig. 3 und 4). 5:o) Gehört zu den Mantelmuskeln der oben erwähnte, von der Mitte der Verbindungshaut zwischen den Scuta bei Lithoglyptes ausgehende Muskel, dessen innerhalb der Ovarienhöhle schief nach der Haftscheibe verlaufende untere Hälfte soeben erwähnt ist. Der Funktion nach entspricht er wie schon gesagt dem Musculus adductor und den Musculi depressores scutorum der Balaniden zugleich. Bei Alcippe fehlt die Verbindungshaut; auch ist kein entsprechender Muskel da, so fern ich habe ermitteln können; es werden folglich die Schliessdeckel, welche übrigens weniger ausgeprägt als bei Lithoglyptes sind, allein durch das Zurückziehen des Mantels in die Höhle zusammen gelegt, was besonders durch den engen Eingang begünstigt wird. Endlich 6:o) finden sich bei Alcippe auf der Dorsalseite zu jeder Seite von der vertikalen Spalte des Mündungsrandes *Muskeln*, welche *strahlenförmig nach unten und ventralwärts sich verbreiten.* Es sind die unteren Enden nach aussen von den Längenmuskeln befestigt. Was ihre Funktion betrifft kann ich nicht umhin der Ansicht Darwins beizustimmen, nach welcher sie für die Trennung der Mündungsränder, also für die Vertikalstellung der Scuta Bedeutung haben. Bei Lithoglyptes kommt ebenso in der Rückenlinie eine tiefe Einbuchtung des freien Mantelrandes vor und es finden sich jederseits des unteren Endes desselben ganz wie bei Alcippe Muskeln, welche jedoch nur nach unten, in der Richtung der Längenmuskeln des Mantels, gehen. Da sie, sofern ich gesehen habe, nur durch ihre Schmalheit von diesen unterschieden sind und nach unten denselben Verlauf haben, muss ich ihnen einerlei Funktion wie den Strahlmuskeln der Alcippe absprechen.

b) ***Körper.*** Bei Vergleichung des eigentlichen Körpers beider Gattungen fällt zuerst der Umstand auf, dass, bei einem schlankeren Bau des Hinterkörpers und einer bedeutend grösseren Entwicklung der Endcirren bei Lithoglyptes, das Körperende des hineingezogenen Thieres tief unten in der Höhle liegt, während dass das Körperende Alcippe's fast in gleicher Höhe mit der Mundöffnung sich findet. Die *Segmentirung* ist bei dieser Gattung weniger ausgeprägt, indem nur zwei Segmente — und zwar dem Körperende am nächsten — deutlich getrennt sind, bei Lithoglyptes können deren wenigstens vier unterschieden werden, und im Allgemeinen deuten drei Paare unvollständige Hautfalten an der Bauch- und Rückenseite noch vier Segmente an. Solche Andeutungen von Segmenten kommen auch bei Alcippe, obgleich in wechselnder Zahl, vor. Es liefert aber nicht die Segmentirung, sondern die *Körperanhänge* die wichtigsten Merkmale zur Unterscheidung der Gattungen. Das bei beiden ventralwärts schiefe Hinterende des Körpers trägt bei *Alcippe* nur *drei* Paar Anhänge; das hinterste Paar steckt nicht hinter, sondern zum Theil nach innen vom mittleren Paare und zwar dicht bei demselben, dadurch an die sogenannten Schwanzanhänge, Appendices abdominis, der höheren Lepadiden erinnernd. Auch dürfen sie wohl am besten als solche gedeutet werden, obgleich sie sowohl durch Gliederung als Börstchenausstattung und Länge den übrigen Paaren ähnlich sind.[1] Es

[1] Dass die starke Ausbildung dieses Paares kein Hinderniss gegen die Deutung desselben als »Appendices abdominis» ausmacht, scheint die Entwicklung des Thieres an die Hand zu geben. Im Sommer 1890 bekam ich in Bohuslän auch sehr kleine, nur 0,5 Mm. lange, neulich in der Schale eingegrabene Exemplare, deren Haftscheibe noch kaum entwickelt war und zwar die bleibende Lage noch nicht eingenommen hatte. Bei diesen war das mittlere Paar Anhänge am stärksten entwickelt, das letzte aber, obgleich schon 4-gliederig, machte kaum die

stehen aber diese nicht nur mehr aus einander, sondern haben auch eine eigenthümliche Bewaffnung, indem sie am oberen Ende des 2. Gliedes je ein ovales hervorragendes Knöpfchen tragen, welches mit kurzen feinen kammähnlichen, nach oben gerichteten Stachelreihen bedeckt ist. Es kommen dazu unten an der Basis der Cirren grössere ovale ähnlich bewaffnete Hervorragungen vor, welche gleichwie jene nach innen und bauchwärts gekehrt sind. Es sind jene schon von HANCOCK erwähnt und DARWIN spricht die Ansicht aus, sie seien die verkümmerten Inneräste der Cirren welche bei Alcippe, im Gegensatz zu den übrigen Lepadiden, einfach sind. Diese Erklärung findet darin eine wichtige Stütze dass 1:o) die Knöpfchen nach innen und ventralwärts vom dritten Segmente befestigt sind und dass 2:o) dieses Segment nicht wie z. B. bei den Appendices in der Mitte des zweiten Segmentes steckt sondern nach dessen Aussenseite zu, einen Raum für das Knöpfchen auf dessen Innerseite frei lassend. Zur Bestätigung seiner Annahme stellt DARWIN noch das Beispiel des *Alepas cornuta* vor, bei welcher die Inneräste des fünften und sechsten Cirrenpaares zwar noch gegliedert, aber viel kürzer und schwächer als die Aussenäste sind. So könnten auch andere Alepas-Arten, z. B. *A. japonica* vorgeführt werden, deren Innerast des 6. Cirrenpaares nach unten um $^1/_3$ schmäler als der Aussenast ist, also von diesem nach der Innerseite gedrängt nur als ein Anhang desselben erscheint.

Wenn aber die Knöpfchen morphologisch den Innerästen der Cirren entsprechen, steht jedoch noch die Frage nach dem Grunde dieser eigenthümlichen Umgestaltung, d. i. ihre *physiologische* Aufgabe, übrig. HANCOCK [1] hat die Vermuthung ausgesprochen, sie dienen zum Einfangen der Beute. DARWIN, der indessen wie es scheint nur Spiritus-Exemplare zu seiner Verfügung gehabt, spricht sich über denselben Gegenstand folgendermassen aus: »I at first thought, with Mr. Hancock, that these buttons served to catch the prey; but reflecting on their convexity and hardness, they appear very badly adapted for this purpose; it would, in fact, be a marvellous feat to secure, in the dark, any moving object between four balls. On the other hand, this very convexity, the hardness, and especially the crenated ridges, and the powerful muscles (which from the first surprised me), are all well explained, if we suppose the prey, being secured by the terminal segments, to be triturated between these four balls: any part which escaped upwards would, moreover, be retained in a sort of cage, formed by the inwardly inflected terminal segments with their hooked spines. This view of the very curious and unparalleled use made of a modified portion, not of the haunch, but of an upper part of the two posterior pairs of thoracic limbs, is in some degree confirmed by finding that Cryptophialus, which has apparently analogous habits, requires its food to be triturated, though in this case it is effected by very different means, namely, by four beautifully toothed discs, with brushes of hairs, developed within the lower end of the oesophagus. — The prey, when caught, would probably at once be carried by the movement of the articulated thorax to the mouth (itself moveable), and being there secured by the mouth in front, the caudal appendages behind, the tips of the cirri above, and the broad pedicels of the

Hälfte jener in Länge und Breite aus und zwar machte es durch die Befestigung an der Basis des mittleren Paares genau denselben Eindruck wie die Appendices abdominis der Lepadiden im Allgemeinen (Taf. VII, Fig. 16—18 im Vergleich mit Fig. 15.)

[1] Ann. and Mag. Nat. Hist. vol. 4, 1849.

first pair on the two sides, it would be triturated by the four crenated buttons, and would then be forced down the oesophagus by the action of the simple jaws.»

Als ich anfangs Alcippe-Exemplare untersuchte, welche ich an der Westküste Schwedens angetroffen hatte, kam es mir sonderbar vor, es sollten die fraglichen Bildungen im Dienste der Nahrung stehen, konnte aber zugleich, mit Hülfe nur todten Materials, keine andere befriedigende Erklärung darüber geben. Nachdem ich später eine Menge Individen von verschiedener Grösse gefangen, war es mir daran gelegen sie im Leben zu beobachten um auf solche Weise dem Geheimnisse auf die Spur zu kommen. Es stellte sich dann Folgendes heraus, sei es dass das Their in situ d. h. in der von der Seite geöffneten Höhle oder ausserhalb derselben beobachtet wurde.

Der Hinterkörper bewegt sich taktmässig von hinten-unten nach vorne-oben, ohne dass jedoch die Enden der drei Paare Anhänge im Allgemeinen ausserhalb der Mündung erscheinen. Es wird nämlich dies von den Mundcirren verhindert, die jedesmal nach hinten sich bewegen, indem sie mit den beweglichen Ästen wie mit Hämmern jene anschlagen. Sowohl der Hinterkörper selbst als die Anhänge pressen dabei den äusseren Theil des Mantels gegen die Höhle. Nachdem diese Bewegungen mehrere Male nach einander wiederholt worden, hören sie für einen Augenblick auf; es stemmen sich die zwei Cirren-Paare des Hinterkörpers den Mundcirren entgegen, während dass der Mantel im Ganzen, aber besonders dessen unterer hinterer Theil sich zusammenzieht um sogleich darauf sich auszudehnen. Er wird dabei nahe an die Wände der Höhle, besonders nach unten-hinten gedrückt. Sodann beginnen wiederum die erstgenannten Bewegungen des Hinterkörpers, u. s. w. in stätigem Wechsel. In diesen Bewegungserscheinungen liegt aber geradeaus die Erklärung der ausserordentlichen physiologischen Aufgabe der Alcippe-Cirren, welche in ihrem ganzen Bau sich ausspricht. Was die hinteren Cirren anbelangt, bestehen die Abweichungen 1:o) in den bis auf zwei mit spärlichen Börstchen ausgestattene Glieder verkümmerten Aussenästen und 2:o) in den zu einem Stachelpolster reducirten Innenästen. Anstatt dass nämlich die hinteren Cirren der Lepadiden im Allgemeinen — es machen hiervon nur Anelasma und Gymnolepas Ausnahmen — zwei lange vielgliederige Äste tragen, welche durch ihre Ausstülpbarkeit und den reichen Börstchenbesatz die Nahrungszufuhr besorgen, haben diejenigen der Alcippe dieses wie jenes eingebüsst, was wiederum ohne Zweifel von der Symbiose mit Paguriden in den Schneckengehäusen abhängt. Freilich können sie *innerhalb* des Mantelsackes einen Wasserstrom nach dem Munde zu veranlassen, jedoch scheinen die Mundcirren durch ihre Börstchenbüschel, welche immer von allerlei Unrath strotzen, vorzugsweise diese Aufgabe zu haben. Aber die eigentliche Funktion der hinteren Alcippe-Cirren wird durch *ihre Stellung den Mundcirren gegenüber* angegeben; *es wirken ihre Aussenäste sowohl als ihre durch die Knöpfchen oder Polster vertretenen Inneräste gegen die Mundcirren, und zwar auf verschiedene Weise, zu demselben Ziele: die Wohnung in der Schneckenschale zu vergrössern.* Durch das Anstemmen der Cirren gegen einander, durch die damit verbundenen Kontraktionen und Erweiterungen des Mantels und durch das abwechselnde Einziehen und Hervorstossen des Hinterkörpers kommen nämlich die Chitinstacheln des Mantels immer wieder mit den Höhlenwänden in nächster Berührung, somit ihre Abnutzung bewirkend.

Bei Musterung der vier Knöpfchen in der natürlichen Lage, die sie bei diesen Bewegungen einnehmen, stellt sich heraus, dass sie nicht nur dieselbe Höhe wie die Äste der Mundcirren erreichen, sondern unter sich dergestalt geordnet sind, dass jene Äste, wenn vorwärts schlagend, zwischen die Aussenäste der Hintercirren gefasst werden und zwar je ein Knöpfchen treffen. Es sind aber die Knöpfchen mit kurzen kammähnlichen Reihen winziger Stacheln versehen, die nach aussen oder unten gerichtet sind, und die Äste der Mundcirren sind ebenso ausgestattet. Bei der Berührung oder Anstemmung beider greifen offenbar diese Stachelreihen in oder gegen einander, somit einen Stützpunkt der genannten wichtigen Muskelbewegungen des Körpers und des Mantels darbietend. Es scheinen aber auch die unten an der Stielenbasis der Hintercirren vorkommenden Stachelpolster dieselbe Aufgabe zu haben und zwar wenn der Hinterkörper weit hinaus tritt, so dass die Stiele der Mundcirren, welche auch Stachelreihen tragen, dorthin reichen.

Meinestheils kann ich also nicht umhin *in der eigenthümlichen Gestaltung der Hintercirren bei Alcippe eine Anpassung auf einmal an die bohrende Lebensweise und an die Symbiose mit den Einsiedlerkrebsen zu sehen.*

Die Verhältnisse der Körperanhänge bei *Lithoglyptes*, dem Anscheine nach von denjenigen Alcippe's ganz abweichend, sind geeignet dieselben in einer sonderbaren Weise aufzuklären. Es versteckt sich Lithoglyptes in Korallen ganz wie Alcippe in Molluskenschalen, und zwar könnte erwartet werden, dass die von der bohrenden Lebensweise abhängigen Bildungen oder Rückbildungen dieser Gattung auch bei jener sich finden. Dies ist aber so wenig der Fall, dass im Gegentheil von den normalen sechs Cirrenpaaren der Cirripeden nur ein Paar fehlt, und zwar sind die vier im Ende des Hinterkörpers steckenden stark entwickelt mit langen Stielen und je zwei vielgliedrigen, dicht mit Börstchen besetzten Ästen. Bei eingezogenen Cirren, wo deren Spitzen dem Munde gegenüber sich befinden, liegt also das Körperende tief unten in der Höhle vom Munde weit entfernt. Auch sind die Schwanzanhänge, wie bei den Lepadiden, wenig entwickelt, ihre Länge nur diejenige der Cirrenstiele erreichend. Wegen ihrer morphologischen Ähnlichkeit mit denjenigen der höheren Cirripeden, besonders aber durch ihren reichen Börstchenbesatz muss die physiologische Aufgabe der hinteren Cirren die allgemeine sein die Nahrungszufuhr zu besorgen.

Die von Noll[1] beschriebene in Haliotis-Schalen bohrende Gattung *Kochlorine* besitzt ebenso wohl ausgebildete und gefiederte Rankenfüsse am Hinterkörper, obgleich nur 3 Paare da sind. Es liefern also die Gattungen *Lithoglyptes* und *Kochlorine* den indirekten Beweis, dass die Verkümmerung der *Alcippe*cirren nicht etwa eine Folge der bohrenden Lebensweise an und für sich ist, sondern anderswo begründet sein muss. Dieser Grund besteht, meiner Ansicht nach, in der Symbiose mit den Einsiedlerkrebsen, welche durch ihre Bewegungen innerhalb der Schneckenschale, sowie durch das Fortschleppen derselben auf befriedigende Weise für den Wasserwechsel in den Alcippehöhlen Sorge tragen.

Neben dieser allgemeinen Aufgabe scheint aber das vorderste Cirrenpaar des Hinterkörpers bei Lithoglyptes eine besondere Funktion zu haben; es sind nämlich dessen Stiele auf der Innerseite mit winzigen Stachelreihen versehen und der Innerast trägt auf der

[1] F. C. Noll, Kochlorine hamata N., ein bohrendes Cirriped. Zeitschr. wiss. Zool. Bd. 25, 1875.

Bauchseite aller Suturen eine kurze kammähnliche Reihe von etwas längeren, nach oben gerichteten Stacheln. Wenn die Cirren zurückgezogen sind, werden demselben vordersten Paare gegenüber zwei gerundet-konische wie Zitzen in der konvexen Bauchseite des Körpers steckende Höckerpaare bemerkt, deren ganze Oberfläche mit kurzen, nach aussen konvexen, kammähnlichen Stachelreihen bedeckt ist. Beim Strecken des Hinterkörpers stellen sich nun diese vier Höcker gegen die bestachelten Theile der vordersten Rankenfüsse ein, und zwar so, dass die zwei vorderen je gegen den Innerast, die zwei hinteren je gegen den Stiel ihrer Seite sich anstemmen. Es hat aber diese Einstellung dieselbe Bedeutung wie die ähnliche Erscheinung zwischen den zwei Paaren Hintercirren einerseits und den Mundcirren andrerseits bei Alcippe, nämlich durch den Mantel auf die Höhlenwände zu wirken. Die Aufgabe also, welche den Mundcirrenästen Alcippe's in dieser Beziehung obliegt, ist bei Lithoglyptes von besonderen Bildungen, den Höckern, übergenommen, ein Umstand, der an und für sich sehr beachtenswerth ist, indem daraus erhellt, dass *wo es um eine wichtige physiologische Funktion sich handelt, dieselbe nicht nur morphologisch in verschiedener Weise vermittelt, sondern auch zu besonderen Bildungen Anlass geben kann.* Und was diese, die zitzenähnlichen Höcker, betrifft, dienen sie ausserdem als Anzeiger der *Nothwendigkeit bei der Deutung mancher morphologischen Eigenthümlichkeiten auf die biologischen Verhältnisse Rücksicht zu nehmen.* Es ist das Beispiel der zu Stachelpolster verkümmerten Inneräste der *Alcippe*-Cirren hierbei belehrend; und was *Lithoglyptes* betrifft könnten vielleicht die zwei Höckerpaare, welche je in zwei angrenzenden Segmenten und in gleicher Entfernung von den Suturen stecken (Taf. VI, Fig. 2) als Fussrudimente gedeutet werden und zwar weitgehende phylogenetische Erörterungen veranlassen. Meinestheils bin ich so weit entfernt diese Höcker als rudimentäre Organe zu betrachten, dass ich sie einzig und allein für Anpassungen an die bohrende Lebensweise des Thieres halte.[1]

Es ist noch übrig *die im besonderen Dienste der Nahrungsfunktion stehenden appendikulären Organe* beider Gattungen zu vergleichen (Taf. VI, Fig. 1—2; Taf. VII, Fig. 1—5 im Vergleich mit Fig. 7—14). Hierher gehören 1:o) die *Mundcirren*, bei denen freilich noch die Cirrennatur gespürt wird und zwar durch den Unterschied zwischen einem 2-gliederigen Stiele und zwei bei Alcippe einfachen, bei Lithoglyptes 5—6-gliederigen Ästen; aber sie sind jedoch gewissermassen zu den übrigen Cirren in Gegensatz getreten und zwar sowohl dadurch, dass sie fast durch die ganze Körperlänge von ihnen getrennt sind, als weil ihre Äste gegen diejenigen der hinteren Cirren sich krümmen. Über die besondere Beweglichkeit der Äste bei Alcippe und die Bedeutung ihrer Stachelreihen ist schon oben gesprochen. Unter den eigentlichen Mundtheilen sind 2:o) die *hinteren Maxillen* im Ganzen ähnlich gebaut. Was aber 3:o) die *vorderen Maxillen* betrifft, erinnern sie bei Lithoglyptes sowohl durch den abgesetzten Basaltheil als durch die

[1] Bei der von DARWIN in »A monograph on the Cirripedia» vol. 2 beschriebenen, in *Concholepas Peruviana* bohrenden Gattung *Cryptophialus* findet sich am 1. Thorakalsegment, also vom Munde ziemlich entfernt und *durch die Segmentsutur davon getrennt* ein Paar Höcker. Es äussert der Verfasser davon; »each of these appendages bears four or five bristles on one side near the summit and a few on the other side, lower down: from their position I believe them to be rudiments of a first pair of maxillipeds (tetartognathites of MILNE EDWARDS), of which no trace occurs in any other Cirripede.» Leider bin ich nicht in Gelegenheit gewesen dieses Thier zu untersuchen. Es scheint mir aber schon wegen der Lage dieser Anhänge schwierig der Darwinschen Ansicht beizustimmen. Vielleicht liegt hier noch ein Beispiel einer der bohrenden Lebensweise angepassten Bildung vor.

starke Bewaffnung der Endkante an die Lepadiden im Allgemeinen, bei Alcippe sind sie durch ein trapezoidisches Stück vertreten, dessen Kaurand nur in der äusseren zahnähnlich auslaufenden Ecke einen einzigen Zahn trägt. 4:o) Tritt uns in den *Mandibeln* des Lithoglyptes die bei den Lepadiden gewöhnliche Beilenform der äusseren Hälfte nebst dem bezähnten Kaurande entgegen, diejenigen Alcippe's dagegen zeigen nur in Betreff der zahnähnlich ausgezogenen äusseren Ecke des Kaurandes mit jenen Ähnlichkeit, dagegen fehlt ganz eine innere Ecke sowohl als Bewaffnung und es geht die innere Seite in den Kaurand bogenförmig über. Endlich 5:o) haben die *Palpen* des Lithoglyptes einen an die Lepadiden, z. B. an Alepas, erinnernden Bau, bei Alcippe sind sie durch eine breit aufsitzende kurze, nach aussen breit gerundete Scheibe vertreten, welche mit winzigen Stachelreihen, aber nicht mit Börstchen versehen ist. In den meisten Fällen weicht also, was die Mundtheile betrifft, Alcippe von den höheren Lepadiden viel mehr als Lithoglyptes ab.

Der *Nahrungskanal* zeigt bei Lithoglyptes (Taf. VI, Fig. 2) einen sehr langen, nach oben bogenförmigen Oesophagus, der im Innern der Länge nach gefaltet ist; er schiesst ein wenig in den Mitteldarm herunter, welcher anfangs weiter, oval ist, sodann eine Strecke fast röhrenförmig verläuft um im Boden des Sackes, wo der Körper sich umbiegt, in den noch schmäleren Hinterdarm überzugehen, der zwischen den hinteren Cirren nach aussen mündet.

Generationsorgane. Die bohrenden Individen von Lithoglyptes und Alcippe, d. h. diejenigen, welche bisher die Gegenstände der Vergleichung gewesen, sind nur *weiblich*. Es finden sich die *Ovarien* beider Gattungen in dem von den Mantelfalten umgrenzten Raum, welcher nach aussen von der Haftscheibe begrenzt wird, und morphologisch dem Stiele der Lepadiden entspricht. Auf einem Seitenlängenschnitte des *Lithoglyptes* zeigt sich deren ein der Aussenwand genäherter Längenstamm, der seitwärts und bogenförmig nach innen—aussen Seitenzweige entsendet, welche ihrerseits wiederum kurze Zweige tragen. Wo und wie die Eierbefruchtung geschieht, ist eine Frage, welche ich bis auf Weiteres offen lassen muss. Die reifen Eier sind ausserhalb des »Pedunkels» im Zwischenraume zwischen diesem und dem Körperrücken gehäuft, wo die Embryonen ihre Entwicklung durchlaufen und die Nauplii frei werden.

Nervensystem. Auf Längenschnitten von Lithoglyptes, wo der Nahrungskanal in seiner ganzen Länge sichtbar ist, kommt rückwärts vom Oesophagus ein wenig hinter dessen grösster Krümmung ein ovales Ganglion vor, welches nach vorne zwei dicke Nerven aussendet, die im weiteren Verlauf bei Umbiegung nach hinten den Oesophagus umfassen und bauchwärts von diesem in ein grösseres elliptisches Ganglion eintreten. Es liegt dieses Ganglion theils mehr nach hinten als jenes, theils auch vom Oesophagus weiter entfernt.

B. Zwergmännchen.

Was zuerst den Anheftungsort anbelangt sind die Männchen beider Gattungen in der Nähe der Haftscheibe des Weibchens und zwar an deren äusseren Seite, befestigt. Obschon die erwachsenen Exemplare der äusseren Form nach verschieden sind, stimmen sie doch, was die inneren Organe betrifft, sehr genau mit einander. Es fehlen beiden Nahrungskanal und appendikuläre Organe, mit Ausnahme der *Haftantennen*. Diese sind beim erwachsenen *Alcippe-Männchen* in einer runden Hervorragung ungefähr mitten auf dem Thiere belegen, bei dem nicht ausgebildeten stecken sie aber im Ende oder in dessen Nähe, indem der später hinter den Antennen hervorwachsende, Testis und Vesicula seminalis enthaltende Theil noch nicht da ist.[1] Bei dem *Lithoglyptes-Männchen* stecken die Antennen, sogar wenn die Generationsorgane entwickelt sind, in dem vom Penis distalen Körperende.

Die einzigen *inneren* Organe gehören der Fortpflanzung und dem Nervensystem an. Die *Generationsorgane* bestehen bei beiden Gattungen aus einem im Boden des Sackes liegenden *Testis* und aus einer nach innen von diesem befindlichen *Vesicula seminalis*, welche nach dem distalen Ende des Mantels durch den von einer Scheide umschlossenen Penis sich fortsetzt. Auch haftet die Scheide beider auf ähnliche Weise an den Sackenwänden. Über das Verhältniss des Testis und der Vesicula habe ich besonders bei Alcippe nähere Auskunft bekommen. Bei jüngeren Exemplaren — vergl. Taf. VI, Fig. 7 — übergeht Testis die Vesicula viel in Länge und hat zwar eine elliptische oder gestreckt ovale Form. Falls die Spermatozoiden schon entwickelt sind, liegen sie bündelweise zusammen, die Bündel gegen die Vesicula konvergirend, ringsum aber, besonders nach hinten, von Spermazellen umgeben; die Vesicula ist leer. Bei mehr vorgeschrittenen Individen — vergl. Taf. VI, Fig. 6 — hat die Vesicula an Grösse bedeutend zugenommen und ist länglich oval, während dass der Testis kürzer, fast gerundet geworden. Die bedeutende Vergrösserung jener steht mit ihrer Erfüllung von Spermatozoiden in Zusammenhang, welche in bedeutender Menge aus dem Testis heraustreten und zwar auch hier, wenigstens im distalen Theile zu Bündeln vereinigt sind, die entweder der Länge oder der Quere nach liegen; im proximalen Theile, besonders da, wo die Vesicula bei Übergang in den Penis sich verengert, sind sie alle in der Richtung dessen Kanals gelagert; den Übergang in diesen vermitteln in der Wand der Vesicula dicht gelagerte Ringmuskeln. In dem beinahe runden Testis finden sich zugleich noch Bündel von verschiedener Lage zurück. Die *Spermatozoiden* (Taf. VI, Fig. 8, 9) sind fadenförmig, die ovale Spermacelle entweder kopfähnlich das Ende einnehmend oder auch kleiner, vom Ende mehr weniger entfernt. In den Bündeln finden sich die »Köpfchen» nach den divergirenden Enden zu.

Nervensystem. Auf oder ein wenig *vor* der Vesicula seminalis findet sich beim *Alcippe*-Männchen ein langgestrecktes Ganglion, in der Mitte durch eine seichte Querfurche eingeschnürt; die vordere ovale Abtheilung sendet nach der Penisscheide zu einen Nervenstamm aus, von den hinteren mehr gerundeten geht in entgegengesetzter Richtung

[1] Der andere, später Penis enthaltende Theil ist zugleich nur halb so lang und verhältnissmässig breiter als beim erwachsenen Thiere.

ein ebenso starker Nerv, von der Länge des genannten Ganglions. Er endigt in ein hinteres, durch zwei seichte Einschnürungen in der Quere abgetheiltes Ganglion, etwas schmäler aber fast ebenso lang als jenes. Mit diesem verbindet sich durch einen längeren oder kürzeren, von rothem Pigment umlagerten Stiel das schwarzpigmentirte Auge.

Was die Bezeichnung der beiden Ganglien betrifft, kann ich nicht umhin *dieses* als *Ganglion opticum* anzusehen und zwar zunächst bei Vergleichung mit dem z. B. bei den meisten Branchiopoden obwaltenden Verhältniss, wo nämlich ein vom Supraoesophagealganglion gesondertes Ganglion sich findet, welches entweder, wie bei *Leptodora hyalina* LILLJEBORG jenem unmittelbar aufsitzt, oder, wie bei *Podon intermedius* LILLJEBORG durch einen verhältnissmässig ebenso langen Nervenstrang wie im fraglichen Falle mit jenem verbunden ist. Auch ist eine Abschnürung in zwei Abtheilungen, z. B. bei Podon und noch mehr bei *Branchipus stagnalis* L. ausgesprochen.

Jenes Ganglion wiederum ist, nach dem Gesagten, als *Gehirnganglion* zu deuten, ein Name, der hier bei Mangel eines Oesophagus, sowie eines Nahrungskanals im Ganzen, um so mehr vor »Supraoesophagealganglion» vorzuziehen ist, als von einem oder mehreren *unteren* Ganglien hier keine Rede ist; wenigstens habe ich dergleichen nicht auffinden können. Bezüglich der Querfurchung desselben Ganglions findet sich z. B. bei einer grossen Zahl von Branchiopoden eine solche Duplicität angedeutet.

Was die übrigen Cirripeden betrifft liegt eine Vergleichung mit dem Nervensystem der Zwergmännchen gewisser Scalpellum-Arten am nächsten. Es hat D:r HOEK eine Darstellung desselben beim Zwergmännchen von *Scalpellum regium* (W. THOMSON) HOEK gegeben[1], und zwar besteht es aus einem Supraoesophagealganglion und einem unteren »Thorakal»ganglion, durch den Oesophagus umfassende Nerven unter sich verbunden, also aus denselben Haupttheilen, welche auch bei dem weiblichen Lithoglyptes — siehe oben — angezeigt worden. Beim Mangel eines Nahrungskanals sowie der Extremitäten scheint nun bei den Alcippe-Männchen auch ein unteres Ganglion zu fehlen.

Noch sei mit dem Nervensystem in Zusammenhang das kleine gerundete Organ erwähnt, welches in unmittelbarer Nähe des Gehirns liegt; in der Mitte eines feinkörnigen peripherischen Lagers liegt eine sackenförmige Bildung grobkörnigen gelben Inhalts. Ob die von HOEK erwähnten, auch in der Nähe des Supraoesophagealganglions beim Zwergmännchen des Scalpellum regium liegenden »glands of unknown nature» ähnliche Bildungen sind, muss ich zwar dahingestellt sein lassen, halte es aber nicht unwahrscheinlich.

Auch beim *Cypris*stadium des Zwergmännchens Alcippe's findet sich ein ähnliches Organ nach hinten-oben von dem zusammengesetzten Auge belegen.

[1] Voyage of H. M. S. Challenger. Zool. Report on the Cirripedia. Anatomical part. P. 28. 1884.

II.

DIE VON LINNÆUS IN SEINEM WERKE "MUSEUM LUDOVICÆ ULRICÆ" BESCHRIEBENEN CIRRIPEDEN.

Die einzige Quelle zur rechten Erkenntniss der in den Werken Linné's beschriebenen Naturalien, welche noch in seinem Vaterlande zurück bleibt, ist die ehemals in Ulriksdal und Drottningholm aufbewahrten Naturaliensammlungen des Königs Adolph Friedrich und seiner Gemahlin Lovisa Ulrica. Es enthielt jene Vertebraten, diese Evertebraten, und zwar Gliederthiere, Weichthiere, Röhrwürmer, Stachelhäuter und Korallen. Die Bestimmung und Anordnung beider wurde dem Linnæus anbefohlen, eine Arbeit, welcher er im Ganzen 5—6 Monate der Jahre 1751—1754 widmete[1], deren Resultate aber zuerst in den 1764 erschienenen »Museum Ludovicæ Ulricæ» und »Museum Adolphi Friderici» veröffentlicht wurden. Es besteht jenes Werk aus drei Abtheilungen, nämlich: *Pars I, Insecta*, die ausser Insekten auch Spinnen, Tausendfüssler und Krebse — die Rankenfüssler ausgenommen — umfasst; *Pars II, Testacea*, die nebst Weichthieren auch Rankenfüssler und Röhrwürmer mit einschliesst; und *Pars III, Vermes*, aus Seeigeln und Seesternen bestehend. Von der ganzen Evertebratensammlung hat der Verfasser in diesem Werke also nur die Korallen weggelassen[2].

Beide Sammlungen wurden vom Könige Gustav IV. Adolph im Jahre 1804 der Universität zu Upsala überlassen, wo sie noch heut zu Tage sich finden und zwar in solcher Weise aufbewahrt, dass, so weit bisher ausgemacht ist, nicht nur ganz wenig in der ursprünglichen Anzahl der Arten und Exemplare fehlt, sondern alles auch in demselben Zustande wie zur Zeit der Überreichung beibehalten ist. Es wurde nämlich, bei der Überreichung, von dem damaligen Vertreter der Zoologie zu Upsala, Professor C. P. Thunberg, nicht nur ein besonderes Namensverzeichniss derselben gemacht, sondern auch die Zahl der Exemplare — wo deren mehrere sich fanden — angegeben; es findet sich dieser von der Hand Thunbergs geschriebene in 4:o mit dem Titel: »Donatio Gustavi Adolphi» gebundene Katalog in der Bibliothek des hiesigen Universitätsmuseums. Für die Ächtheit der Specimina bürgt die ebenfalls von Thunberg einem jeden Exemplare beigefügte Etikette: »Mus. Gust. Ad.» oder »Mus. Ad. Fredr.», wozu kommt — was die Testacea betrifft

[1] Vergl. die eingehende Auseinandersetzung S. Lovén's dieser und anderer Fragen in der I. Abtheilung seines unten citirten Werkes.

[2] In der Vorrede zu »Museum Lud. Ulr.» sagt Linné: »den andra delen af Eders Majestäts rika samling, nämligen de präktige Coraller — — — har jag lemnat till ett annat dagsverk.»

— die von O. SWARTZ den Naturalien selbst aufgeklebten gedruckten Artennamen und eine von THUNBERG geschriebene auf der Baumwolle der Papierschächtelchen, wo die Specimina selbst haften, befestigte Namenetikette.

Die kritisch-vergleichenden Untersuchungen, welche bisher über diese Sammlungen zur Aufklärung der Synonymik der Linnéanischen Artennamen gemacht worden, sind:

1882. Recensio critica Lepidopterorum Musei Ludovicæ Ulricæ quæ descripsit CAROLUS A LINNÉ. Auctore CHR. AURIVILLIUS. K. Svenska Vetenskaps Akademiens Handl. Bd. 19. N:o 5. Stockholm.

1887. On the Species of Echinoidea described by LINNÆUS in his work Museum Ludovicæ Ulricæ. By SVEN LOVÉN. Bihang till K. Svenska Vetenskaps Akademiens Handl. Bd. 13. Afd. IV. N:o 5. Stockholm, in welcher Arbeit ausserdem der Geschichte der beiden Museen und der vielfachen Beziehung LINNÉS zu denselben eine eingehende Prüfung gewidmet ist.

Es hatte LINNÆUS schon im Spätsommer des Jahres 1752 die für seine künftigen Arbeiten so wichtige Bestimmung und Anordnung des königlichen Museums auf Drottningholm beendigt, und zwar geben, schon lange vor der Erscheinung des »Museum Ludovicæ Ulricæ» (1764), theils die grundlegende 10. Ausgabe des Systema Naturæ (1758), theils seine schon im Herbste 1752 in Upsala gehaltenen Vorlesungen über Vermes davon Zeugniss ab.

Was die Cirripeden betrifft wird in den *Vorlesungen* die Gattung *Lepas* unter den *Testacea*, der dritten Abtheilung der Klasse Vermes, eingereiht, und zwar am Ende der Cochleæ nach Cymbium — später Argonauta — gestellt. In *Systema Naturæ* 1758, wo Chiton die Reihe der Testacea öffnet, hat die Gattung *Lepas* ihren Platz zwischen Chiton und Pholas bekommen, ganz dieselbe Anordnung, welche später in *Museum Ludovicæ Ulricæ* sich wiederholt.

In Systema Naturæ Ed. 10 kommen 5 Arten der Gattung vor — balanus, tintinnabulum, testudinaria, mitella und anatifera —, gerade dieselben Namen, welche in Museum Ludovicæ Ulricæ sich finden und zwar auch in derselben Reihenfolge.

Es werden im Folgenden diese Arten in der Ordnung behandelt wie dies von LINNÆUS in Museum Ludovicæ Ulricæ geschehen ist, unter Ergänzung zugleich der Hinweisungen mit *allen* Autorennamen, die in den verschiedenen Schriften LINNÉS citirt, sowie mit Erwähnung alles dessen, was übrigens in denselben von jeder Art gesagt worden ist. Nach den zu jeder Art gemachten Bemerkungen folgt in kursiver Rubrikschrift der Gattungs- und Artenname, welcher einer jeden der Linnéanischen Species nach der jetzigen Kenntniss dieser Thiere beizulegen ist, unter Angabe der auf dieselbe einpassenden Namen früherer und späterer Autoren.

Upsala im März 1893.

1. Lepas balanus L.

Lepas testa conica sulcata, operculis acuminatis.

Fauna suecica ed. 1. 1746:[1]
Argenv. nat. 364, t. 30, f. A.

Prælectiones 1752:
Iter WestG. p. 170.

Systema Naturæ ed. 10. 1758:
Leuwenh. epist. 82, p. 472, t. 465.
Lister Angl. tract. 3, 196, t. 5 (2), f. 41.
Conch. t. 444, f. 287.
Argenv. conch. t. 30, f. D.
Klein ostr. t. 12, f. 94, 95.

Museum Ludovicæ Ulricæ 1764:
Acta angl. t. 34, f. 17. 1758.
Baster subs. 127, t. 12, f. 7—10.

Systema Naturæ ed. 12. 1767:
Gualt. test. 106, f. P.

Fauna suecica ed. 1. 1746:
Habitat in ostreis et lapidibus frequens in mari Atlantico.

Iter WestG. 1747:
»Denna Balanus satt här och där på sjelfva taskkräftorna.»

Prælectiones 1752:
»Finnes vid Wästerhafvet, der han sitter på stenar, ostror, taskkräftor etc.»

Systema Naturæ ed. 10. 1758 et ed. 12. 1767:
Habitat ad littora oceani Europæi.

[1] Hier steht: »operculo acuminato» in der Diagnose.

Testa conica, truncata: valvulis pluribus conniventibus; extus inæqualiter sulcata interjectis rugis compressis.

Operculum valvulis quatuor, obliquis, acuminatis; superioribus 2, latioribus, brevioribus, transverse striatis; inferioribus 2, angustioribus, longioribus.

In *Fauna suecica ed. 1,* 1746 lautet die Descriptio des N:o 1349, in Systema Naturæ ed. 10. 1758 *Lepas Balanus* genannt, folgendermassen: Differt a præcedenti — Lepas testa conica truncata, operculo obtuso (= L. balanoides L. Faun. suec. 1761) — quod 1. major sit; 2. testa ad latera sulcis variis inæqualibus exsculpta; 3. quod operculum, quatuor valvulis compositum, acumine longo claudatur oblique mucronato. Über sein Vorkommen wird daselbst bemerkt: habitat in ostreis et lapidibus frequens in mari Atlantico.

Von der Gattung Balanus sind gegenwärtig 5 Arten aus der Nordsee bekannt, nämlich: B. balanoides L., B. crenatus Brug., B. porcatus da Costa, B. improvisus Darw. und B. Hameri Asc. Bei der Identificirung mit der fraglichen Species Linnés N:o 1349 der Fauna suec. kommen die beiden letztgenannten, schon durch die ungefurchten Schalen, ausser Betracht; gegenüber der erstgenannten Art ist die Beschreibung gerade abgefasst; es erübrigt also nur an B. crenatus und B. porcatus zu denken. Wiewohl das Operculum — die Terga — beider »spitz» genannt werden können, zeigt jedoch der Zusatz »longo, oblique mucronato» unzweifelhaft auf *B. porcatus* da Costa hin.

Während seiner im Sommer 1746 ausgeführten Reise nach Wester Göthland besuchte Linnæus auch die Westküste Schwedens und zwar machte er bei Marstrand in 24 Stunden Frist Beobachtungen und Aufzeichnungen sowohl über die Meeresfauna als -flora. Unter Meeresthieren wurden ihm auch Taschenkrebse gebracht, auf deren Schalen sich Balanen fanden. Auf diese Art wird zwar, unter Hinweisung auf Fauna suec. N:o 1349, die dort stehende Diagnose bezogen, aber die Descriptio lautet: Testa constans valvulis sæpius VI, coni truncati forma; apertura superiore tecta valvulis IV, acuminatis, rhombi forma, quarum 2 inferiores majores.

Schon der Fundort könnte zu der Vermuthung Anlass geben, es sei hier die Frage von dem an unseren Küsten besonders auf Dekapoden — z. B. Hyas araneus — häufig auftretenden *Balanus crenatus* Brug., und in der That wird dies durch die Beschreibung noch wahrscheinlicher. Es findet sich nämlich darin nichts, das gegen eine solche Deutung spricht. Es stehen die beiden Arten einander ziemlich nahe, und zwar besteht der wichtigste Unterschied in der Form der Terga, welche bei B. porcatus eine karakteristische gekrümmt-ausgezogene Spitze haben; *es ist aber gerade dies Merkmal in dem Iter WestG. ausgelassen.*

In den *Vorlesungen über Vermes* im Herbste 1752[1] wird, nebst Hinweisung zur Fauna suecica N:o 1349 und Iter WestG. p. 170, unter dem Gattungsnamen Lepas zuerst »*Lepas conica, operculis acuminatis*» vorgeführt, mit der Bemerkung über sein Vorkommen: »Findet sich in Wästerhafvet (= der Nordsee), wo er auf Steinen, Austern, Taschenkrebsen u. s. w. aufsitzt». Bemerkenswerth ist das Auslassen des Wortes *sulcata* in dieser Diagnose. Es hängt dies wahrscheinlich nicht von einer Ungenauigkeit des Aufzeichners ab,

[1] Codex D, 160, in 4:o, in der Universitätsbibliotek zu Upsala.

sondern der Vorleser selbst hat in der Zwischenzeit (1751 und 1752) während seines Aufenthaltes in Drottningholm in dem Museum der Königin einen Balaniden gefunden — später im M. L. U. Lepas Balanus genannt — welcher zwar durch den allgemeinen Habitus den soeben citirten schwedischen Formen ähnlich, jedoch *ohne Furchen* war. Es wurde die für M. L. U. niedergeschriebene Diagnose, weil umfangreicher, auch für jene anwendbar befunden, somit die Verschiedenheit der Skulptur als unwesentlich gehalten.

In dem *Systema Naturæ ed. 10.* 1758, wo der Artennamen: *Balanus* — N:o 5, p. 667 — zum erstenmal vorkommt, findet sich die Diagnose der Fauna suecica N:o 1349 vollständig wieder, und zwar wird unter den Hinweisungen Iter WestG. p. 170 *nicht* genannt, ein Umstand, der vielleicht andeutet, es sei bei dem Verfasser einiger Zweifel über die Identität jener Art mit dem Marstrandfunde entstanden. Mag das Auslassen dieses Citats auch durch einen Zufall geschehen sein, ist es gewiss ein glücklicher gewesen, denn *es steht dadurch unwidersprechlich fest, dass, wo Linnæus zuerst die binominale Nomenclatur einführt, mit dem Lepas Balanus den späteren Balanus porcatus* DA COSTA (1778) *bezeichnet wird.*

In *Fauna suecica ed. 2.* 1761, N:o 2122, ist sowohl die Diagnose als das Vorkommen und die Descriptio aus der ed. 1. 1746, N:o 1349, wörtlich wiederholt, jedoch wird hier zugleich auf Iter WestG. 1747, p. 170 hingewiesen, indessen ohne Zufügung des Fundortes auf den Taschenkrebsen. Es durfte also hier entweder das Weglassen in Syst. Nat. ed. 10. 1758 der Hinweisung auf Iter WestG. in Vergessenheit gerathen oder vielleicht auch der Unterschied nunmehr als unwesentlich betrachtet worden sein.

In *Museum Ludovicæ Ulricæ*, Pars II. Testacea, steht von den Lepas-Arten obenan: *Lepas Balanus.* In der »Donatio Gustavi Adolphi»[1] ist — unter den übrigen Cirripeden — nur *ein* Schächtelchen von dieser Art verzeichnet. Es findet sich diese auch noch richtig da, eine Kolonie von ungefähr 55 Exemplaren enthaltend, die mit einer gedruckten Etikette versehen ist; wie gewöhnlich sind nebenbei auf der Baumwolle zwei Etiketten — »balanus» und »Mus. Gust. Ad.» — in der Handschrift THUNBERGS aufgeklebt.

Ausserdem findet sich aber eine grosse Balanenkolonie auf einem ausgehöhlten und in der Vertiefung mit Sand gefüllten Holzstück, sowie sie zu Trägern von Korallen angewendet worden sind. Auf einer der Aussenseiten des Holzfusses steht: »Lepas Balanus». »Mus. Gust. Ad.», von der Hand THUNBERGS geschrieben. Es fehlt aber eine der Kolonie aufgeklebte gedruckte Etikette.

Dass indessen diese Balanus-Gruppe wirklich unter die Augen LINNÉS gekommen ist, finde ich aus folgenden Gründen wahrscheinlich: 1:o) die Wörter der Descriptio in Mus. Lud. Ulr.: *extus inæqualiter sulcata interjectis rugis compressis* treffen besser auf die Exemplare dieser als jener Gruppe ein, in so fern nämlich nicht die keilförmigen Vertiefungen zwischen je zwei Parietes damit gemeint seien; diese sind aber theils *æqualiter* — bei Allen und gleichförmig — da, theils nicht von zusammengedrückten »rugæ» getrennt. 2:o) Das Erwähnen eines Operculum zeugt an und für sich, dass die erstgenannte Gruppe nicht zu Grunde der Descriptio gelegen hat, denn es kommen dort gar keine

[1] Handschrift in 4:o von C. P. THUNBERG, in der Bibliotek des Zoologischen Instituts zu Upsala aufbewahrt.

Scuta und Terga zum Vorschein, vielmehr sind die Exemplare mit einer harten Sandmasse gefüllt, deren Entfernung jedenfalls sehr schwierig ist und nur ausnahmsweise ein Stück des Operculum an den Tag bringt. Aber auch wenn solches gelingt, zeigen die so gewonnenen Terga den Karakter der Descriptio: *angustioribus*, *longioribus* nicht, während dass bei den Scuta eine Querstreifung zwar vorhanden ist, jedoch keineswegs ein gegenüber der Skulptur der Terga besonders hervortretendes Kennzeichen ausmacht.

Wenn aber anzunehmen ist, dass der Verfasser die grosse dem Holzstück aufsitzende Gruppe mit der Descriptio des M. L. U. zunächst beabsichtigt, könnte vielleicht der Umstand einen Zweifel erregen, dass eine gedruckte Etikette fehlt. Dabei muss aber theils daran erinnert werden, dass der Verfasser selbst erweislich bei der Bestimmung keine Namen oder Numeros im Museum zurückgelassen hat, dass aber später gedruckte Etiketten von O. SWARTZ den Arten aufgeklebt sind *nach der Reihe, in welcher Linnæus sie geordnet hatte*. Was nun die Cirripeden betrifft ist es nicht eine blosse Muthmassung, dass die kleinen in Pappschächtelchen liegenden Exemplare — sämmtlich 7 — auf einer und derselben Stelle verwahrt gewesen, die grosse Gruppe auf dem Holzfusse dagegen anderswo gestanden sei. Denn es zeugt die »Donatio Gustavi Adolphi», dass diese Gruppe unter den sogenannten grösseren Paradenschnecken, zu denen z. B. Chama gigas, Chama hippopus und Turbo olearius gehörten, gerechnet worden, welche aber nicht unter den übrigen, sondern am Ende des Verzeichnisses für sich abgesondert stehen. Dieser Anordnung zufolge hat die grosse Gruppe sowie die Paradenschnecken im Allgemeinen, übrigens auch die Korallen, keine gedruckte Etikette bekommen.

Die weitläufige Erörterung dieser Frage hat darin ihren Grund, dass hier zwei verschiedene Arten vorliegen. Die *grosse* Kolonie, in deren Schalenkränzen ich mehrere Operculumplatten angetroffen habe, hat sich als *Balanus concavus* BRONN erwiesen. Es lebt diese Art in der Jetztzeit im Stillen Ocean nicht nur in dessen östlichen Theile bei der Küste Amerikas — Peru, Panama, California —, sondern auch westlich und südlich — Philippinen, Australia —; fossil ist sie angetroffen: in *quartären* Ablagerungen — Peru —, in *tertiären* — N. Amerika (Virginia, Maryland) und Europa (Portugal, Italien) sowie im Coralline Crag Englands. Die hie und da mit einer gehärteten Kalkmasse gefüllten Schalenkränze der fraglichen Kolonie geben unzweideutig an, dass sie fossil gefunden ist.

Balanus concavus BRONN.

1764. Lepas balanus L. pro parte M. L. U. p. 464 (non = L. balanus L., Syst. Nat. ed. 10. 1758.)
1814. » tintinnabulum BROCCHI, Conchiol. Subappennina t. 2, p. 597.
1818. Balanus cylindraceus var. C. LAMARCK, Animaux sans vertèbres.
1831. » concavus BRONN, Italiens Tertiärgebilde p. 127, N:o 729.
» » » 1838. Lethæa geognostica bd. 2, s. 1155, tab. 36, fig. 12.
» » » 1854. DARWIN, a Monograph on the Subclass Cirripedia, the Balanidæ, p. 235. Pl. 4, fig. 4 a—4 e. —

Nach dem Auffinden von 2—3 bestimmbaren Operculumplatten bei den Exemplaren der *kleinen* Gruppe habe ich entscheiden können, dass diese dagegen mit der späteren

Balanus amphitrite DARWIN identisch ist und zwar, unter den vielen Formen dieser Art, mit den Figuren 2 b, 2 l (Tergum) und 2 i (Scutum) auf Pl. 5 bei DARWIN am besten stimmt. Wahrscheinlich stammen die Exemplare also aus Ostindien; die grössten Exemplare sind 15 Mm. hoch, mit schwach rothen Querbändern, die kleineren etwa 6 Mm. hoch, entweder gelblich weiss oder blassroth getüncht.

Balanus amphitrite DARWIN.

BONANNI, Rerum naturalium in Musco Kircheriano Historia, Classis I, tab. 6, fig. 34, 35 (veris.); 1709.

1764. Lepas balanus L. pro parte M. L. U. p. 466 (non = L. balanus L., Syst. Nat. ed. 10. 1768).
1791. » balanoides POLI, Test. utriusque Siciliæ p. 23, tab. 5, fig. 2—7.
Balanus » 1826. RISSO, Hist. Nat. de l'Europe Merid. T. 4.
1815. Lepas radiata WOOD, General Conchology, Pl. 7, fig. 7.
?1815. » minor » » » Pl. 7, fig. 6.
1854. Balanus amphitrite DARWIN, Monograph on the Subclass Cirripedia, the Balanidæ p. 240. Pl. 5, fig. 2a—2o.

Was die von LINNÉ für Lepas balanus citirten Autoren betrifft, so kann in den meisten Fällen wegen Mangel an besonderen Figuren oder Beschreibungen des Operculum die Identität nicht sicher festgestellt werden. So z. B. in Argenv. conch., Lister angl. und Lister conch., Klein ostr., Baster subs. Bei dem Citat von Lister angl. ist, anstatt tab. 5, tab. 2 angegeben worden.

Als ein Appendix mag nach der oben gemachten Auseinandersetzung der Hinweisungen zu früheren Autoren die Synonymik des *ursprünglichen Lepas Balanus* L. folgen, so wie sie zum ersten Mal in Systema Naturæ ed. 10. 1758 bekannt worden ist. Weil sie dort von dem einzigen Citate — aus den Schriften LINNÉS — der Fauna suecica ed. 1. 1746, N:o 1349 begleitet wird, wo die gegenüber allen anderen schwedischen Balanen kennzeichnende Descriptio sich findet, kann nicht der geringste Zweifel über die Bezeichnung derselben entstehen. Nach HANLEY[1] bleibt in der LINNÉ'schen Sammlung des Linnéan Society Museum of London noch ein Balanide zurück, dessen Karakter und Fundort mit der Beschreibung des Lepas balanus in Fauna suecica ganz überein kommen. Bei Anwendung des Gattungsnamens Balanus durfte aber kein Hinderniss gegen das Beibehalten des gleichen Artennamens sich finden, indem theils mehrere Beispiele dergleichen Fälle aus der jetzigen Nomenclatur angeführt werden können, theils, innerhalb der fraglichen Gattung, die allgemein anerkannte Art *balanoides* geradezu eine Art *balanus* — sowie die beiden Arten zuerst in Fauna suec. ed. 2. 1761 genannt werden — voraussezt. Es ist also:

[1] S. HANLEY, Ipsa Linnæi Conchylia, London 1855.

Balanus balanus L.

Linnæus, Fauna suecica ed. 1, p. 385, N:o 1349, 1746. — Ellis, Philos. Transact. vol. 50, Tab. 34, fig. 18, 1758. Balanus arctica patelliformis.

1758. Lepas balanus L. Syst. Nat. ed. 10, p. 667.
» » 1780. Born, Test. Mus. Cæs. descr., Tab. 1, fig. 4.
» » 1785. Chemnitz, Syst. Conch., 8. Band, tab. 97, fig. 820.
1778. Balanus porcatus da Costa, Hist. Nat. Test. Britanniæ p. 249, N:o 69.
» » » 1854. Darwin, Monogr. on Cirripedia p. 256, pl. 6, fig. 4 a—4 e.
1789. » sulcatus Bruguière, Encyclop. Method., tab. 164, fig. 1.
1802—4. Lepas costata und balanus Donovan, British shells, tab. 30, fig. 1, 2.
1815. » scotica W. Wood, Gener. Conchol. pl. 6, fig. 3 (sed non Lepas balanus, pl. 7, fig. 3).
1818. Balanus angulosus Lamarck in Chenu, Illustr. Conch. tab. 11, fig. 11.
1818. » tessellatus Sowerby, Mineral Conchol. tab. 84.
1827. » scoticus Brown, Illustr. Conchol. Great Britain pl. 7, fig. 2, (sed non pl. 6, fig. 9—10); 2. Aufl. pl. 53, fig. 1—3, 22, 23 und pl. 54, fig. 1—3.
1830. » geniculatus Conrad, Journ. Acad. Philad., vol. 6, pars 2, p. 265, tab. 11, fig. 16.
» » » 1841. A. Gould, Rep. on the Invertebrata of Massachusetts, fig. 9.

2. Lepas tintinnabulum L.

Lepas testa conica, rugosa, obtusa.

Systema Naturæ ed. 10. 1758:
Lang. Test. 4. Balanus tintinnabuliformis, lævis.
Rumph. Mus. t. 41, f. A.
Gualt. Test. t. 106, f. H.
Argenv. conch. t. 30, f. A.

Museum Ludovicæ Ulricæ 1764:
Act. angl. v. 2, t. 34, f. 8. 1758.

Systema Naturæ ed. 12. 1767:
Habitat in O. Europæo.

Testa conico-gibba, extus sulcata, sulcis obtusis; areis valvularum apicibus interjectis senis, transverse striatis.

In *Syst. Nat. ed. 10.* 1758 wird unter den Synonyma angefügt: valde affinis præcedenti (= L. balanus), sed pollice crassior.

Nach dem Kataloge Thunbergs: »Donatio Gustavi Adolphi» fanden sich in der Sammlung 3 mit diesem Namen signirte Schächtelchen. Sie sind alle noch gut bewahrt und zwar finden sich in allen die gewöhnlichen Etiketten, nämlich die gedruckte (Swartzische) auf den Exemplaren selbst befestigt und zwei mit der Hand Thunbergs geschriebene — die eine den Artennamen, die andere »Mus. Gust. Ad.» enthaltend — auf der Baumwolle

angeklebt. In einer Schachtel findet sich eine Gruppe aus 1 grossen — 47 Mm. hohen, 43 Mm. dicken — und 10 kleineren Exemplaren bestehend; das grosse ist roth, die kleineren entweder deutlich oder schwach rothgestreift. In der zweiten Schachtel ist nur ein Exemplar — 20 Mm. hoch, 19 Mm. in Quermass über Carina —, rothgestreift. In der dritten finden sich 3 Exemplare — 10 Mm. hoch, 14 Mm. in Quermass — auf einem Holzstückchen und einer Muschel aufsitzend, sämmtlich mehr dunkelroth als jenes Exemplar. In keinem Exemplar ist das Operculum aufbewahrt, was übrigens schon zur Zeit der Abfassung der Diagnose der Fall gewesen sein möchte; es fehlt somit der sicherste Anhaltspunkt der Vergleichung. Jedoch spricht, was die Exemplare der beiden erstgenannten Schächtelchen betrifft, Alles, Bau der Platten und Farbe, dafür, dass sie identisch sind. Diejenigen der letztgenannten Schachtel (3 Ex.) muss ich bei Seite lassen; durch die, wie es scheint, nicht durchgebohrten Radii sind sie von jenen verschieden und wahrscheinlicherweise der späteren Balanus amphitrite angehörig.

Jene aber sind:

Balanus tintinnabulum L.

Rumphius, Amboin. t. 41, f. A. 1705. — Gualtieri, Index testarum Conchyliorum t. 106, f. H, I (verisim.); 1742. — Ellis, Philos. Transact. vol. 50, tab. 34, fig. 8, 9, 1758.

1758. Lepas tintinnabulum L. Syst. Nat. ed. 10, p. 668, N:o 6.
» » » 1764. Linnæus, Mus. Ludov. Ulr. p. 466, N:o 3.
» » » 1767. » Syst. Nat. ed. 12, p. 1108, N:o 12.
» » » 1785. Chemnitz, Neues Syst. Conch., 8B., tab. 97, fig. 828—831.
» » » 1815. W. Wood, Gener. Conchology, Pl. 6, fig. 1, 2.
Balanus » » 1843—45. Chenu, Illustr. Conchol. Pl. 2, fig. 1, 8; Pl. 3, fig. 1—5; Pl. 5, fig. 1.
1783(—86). Lepas crispata var. Schröter, Einleit. Conch. vol. 3, tab. 9, fig. 21.
» » (non var.) 1815. W. Wood, Gener. Conchol.
1788. » spinosa var. Gmelin, Linnæi Syst. Nat.
» » (non var.) 1815. W. Wood, Gener. Conchol.
1789. Balanus tulipa Brugière, Encyclop. Meth. (non = B. tulipa Chemnitz, necnon = B. tulipa O. F. Muller, Zool. Dan. necnon = B. tulipa Poli, Test. utr. Sic.).
» » 1820—25. G. B. Sowerby, Genera of recent and fossil Shells, Tab. Genus Balanus.
1815. Lepas porcata W. Wood, Gener. Conchol.
1818. Balanus crassus (foss.), Sowerby, Miner. Conchol. Tab. 84.
1843—5. » d'Orbignii var., Chenu, Illustr. Conchol. Pl. 6, fig. 10 (sed non Pl. 4, fig. 13).

3. Lepas testudinaria L.

Lepas testa plano-convexa, radiis sex excavatis, striatis.

Prælectiones 1752 (Verruca testudinaria):
Gualtieri test. t. 106, f. M. N. O.
Planc. conch. t. 5, f. 2, 3. Balanus compressus major.

Systema Naturæ ed. 10. 1758:
Bonanni kirch. I, Tab. VI, f. 36—37.
Rumphius Mus. t. 40, f. K. Verruca testudinaria.
Petiver gaz. t. 9, f. 9.
» amboin. t. 1, f. 11.
Klein ostr. tab. 12, f. 99. Astrolepas: pediculus testudinarius, Schildpadt-Luis.

Museum Ludovicæ Ulricæ 1764:
Ginan. adr. 41, t. 30, f. 175.

Systema Naturæ ed. 12. 1767:
Act. angl. v. 2, t. 34, f. 12, 13. 1758.

Systema Naturæ ed. 10. 1758:
Habitat in Pelago, sæpe in Testudinibus.

Systema Naturæ ed. 12. 1767:
Habitat in Pelago, sæpe in Testudinibus, in M. adriatico.

Testa ovali-suborbiculata, leviter convexa, glabra, albida, radiata; radiis sex, ab apertura ad marginem subulatis, excavatis, transverse striatis. Subtus constans laminulis numerosis, inæqualibus, serrulatis.

Apertura clausa valvulis quattuor, obtusis, conniventibus in rimam longitudinalem.

Was die »Descriptio» betrifft, ist die Anzahl der Schliessplatten der Öffnung in M. L. U. zu *sechs* angegeben. Es ist dies offenbar ein Schreibfehler, denn wie überall bei den Balaniden besteht das Operculum nur aus 4 Platten. Diese sind sogar in dem einen Exemplare beibehalten. Auch heisst es ganz richtig in den Prælectiones 1752[1]: »Har 6 valvulæ sammanväxta i ett; ganska litet upphöjd, utan merendels flat, utholkad med 6 strimmor; är täckt med 4 valvulæ, de andre utgöra sidorna.»

In »Donatio Gustavi Adolphi» sind von der fraglichen Art 2 Exemplare aufgezeichnet. Ganz richtig finden sich auch zwei mit gedruckten Etiketten versehene Exemplare, die

[1] Codex D, 160 in der Universitätsbibliotek zu Upsala.

aber beide in demselben Pappschächtelchen liegen, von THUNBERG in gewöhnlicher Weise auf der Baumwolle signirt. Das eine hält im grössten Durchmesser an der Basis 36 Mm., im kleinsten 32 Mm., das andere bezw. 29 und 22 Mm.

Chelonobia testudinaria L.

RUMPHIUS, Amboin. t. 40, f. K., 1705. — BONANNI, Rerum natur. in Museo Kircheriano Historia, classis I, tab. VI, fig. 36—37, 1709. — PETIVER, Gazophylacii naturæ decad. t. 9, fig. 9, 1702—11. — PETIVER, Aquat. anim. Amboinæ icones t. 1, f. 11, 1713. — PLANCUS, de Conchis minus notis t. 5, fig. 2, 3, 1739. — GUALTIERI, Index testarum conchyliorum t. 106, fig. M. N. O., 1742. — LINNÆUS, Prælectiones 1752 Ms. Verruca testudinaria. — KLEIN, Tentamen methodi ostracologicæ t. 12, fig. 99, 1753. — GINANNI, Opere postume, 41, tab. 30, f. 175, 1755. — Acta angl. v. 2, t. 34, f. 12, 13, 1758. — ELLIS, Philos. Transact., vol. 50, Pl. 34, fig. 12, 1758: Verruca testudinaria.

1758. Lepas testudinaria L. Syst. Nat. ed. 10, p. 668, N:o 7.
» » » 1764. LINNÆUS, M. L. U., p. 467, N:o 4.
» » » 1767. » Syst. Nat. ed. 12, p. 1108, N:o 14.
» » » 1791. POLI, Test. utriusque Sicil., Tab. 5, fig. 8—11.
Coronula » » 1820. RANZANI, Mem. di Storia Naturale Dec. 1.
» » » 1825. DE BLAINVILLE, Manuel de la Malacologie, p. 600, pl. 86, fig. 2.
Chelonobia » » 1854. DARWIN, Monogr. on Cirripedia, the Balanidæ, p. 392, pl. 14, fig. 1, 5; pl. 15, fig. 1.
1778. Balanus polythalamius BOCK, Naturforscher, St. 12, fig. 9.
1824. Chelonobia Savignii ? LEACH, Encyclop. Brit., Suppl., vol. 3.
1825. Astrolepas rotundarius J. E. GRAY, Annals of Philos. (new ser.), vol. 10.

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4. Lepas mitella L.

Lepas testa compressa erecta difformiter striata, basi imbricata.

Prælectiones 1752: Lepas mitella:
Argenv. Conch. t. 30, f. E.
Rumph. t. 47, f. M (A).
Petiver gaz. t. 6, f. 10. Balanus chinensis striatus.

Systema Naturæ ed. 10. 1758:
Lang test. 4. Balanus tulipæformis striatus.
Klein ostr. t. 12, f. 100. Mitella; »myterje».

Museum Ludovicæ Ulricæ 1764:
Seba Thesaur. 3, t. 16, f. 3.
Acta angl. v. 2, t. 34, f. 4. 1758.

Systema Naturæ ed. 12, 1767:
Gesn. Aqu. 121. Balanus rondeletii.

Systema Naturæ ed. 10 et 12:
Habitat .....

Testa compressa: valvulis octo, quarum 4 interiores bifariam conniventes, 2 anteriores majores, 2 posteriores breviores.

Exteriores quattuor, quarum anterior posteriorque cymbiformes incurvæ. Posterior brevis. Laterales duæ triangulares adpressæ. Insuper squamæ plurimæ, parvæ, basin testæ cingentes. Basis tubulosa, imbricata, squamis minutis.

Valvulæ omnes difformiter, fere ad angulum acutum striatæ.

Ein einziges Exemplar — ohne Pedunkel; das Capitulum 28 Mm. lang, 30 Mm. breit — vorliegt, mit der gewöhnlichen Signirung.

In den Prælectiones 1752 wird von Mitella gesagt: »Drakekronan; ty den är hopkramad som en tuppkam, hvarföre somliga af de gamla trott, att det ej vore någon snäcka utan en drakes kam. Den är mest alltid röd; består af 8 valvulis, af hvilka de 4 inre äro bifariam conniventes; de som äro vid basen äro som små fjäll: alla valvulæ äro striatæ ad angulum acutum». Vergl. die Ähnlichkeit der Ausdrücke: »8 valvulis ... acutum» mit der Descriptio in Mus. Lud. Ulr.!

Was das Citat aus *Seba* betrifft, stellt die fragliche Fig. 3, Tab. 16 zwar die Capitula von Pollicipes mitella dar; die Pedunculi dagegen gehören dem P. polymerus an. Es sagt der Verfasser davon: »concharum anatiferarum species tertia, coronaria, ex Indiis orientalibus» — — — longis quoque collis sive fistulosis funiculis uti priores N:o 1» (= Lepas anatifera mit sehr langen Pedunkeln) »instructæ sunt; — — color est cinereo-flavus et albicans: colla tamen obscure grisea sunt».

Pollicipes mitella L.

Linnæus, Prælectiones 1752 Ms. (Lepas) Mitella. — Klein, Tentamen methodi ostracologicæ, tab. 12, fig. 100, 1753. — Seba, Rerum naturalium thesauri descriptio, tom. 3, tab. 16, N:o 3 (Obs. tamen: *capitula* P. mitellæ, *pedunculi* P. polymeri), 1758.

1758.	Lepas mitella L.		Syst. Nat. ed. 10, p. 668, N:o 8.	
	» » »	1764.	Linnæus, Mus. Lud. Ulr. p. 467, N:o 5.	
	» » »	1767.	»	Syst. Nat. ed. 12, p. 1108, N:o 15.
	Pollicipes mitella L.	1820—25.	G. B. Sowerby, Genera of Shells, fig. 2.	
	» » »	1851.	Darwin, Monogr. on the Cirripedia, the Lepadidæ p. 316, pl. 7, fig. 3.	
	Polylepas » »	1825.	De Blainville, Manuel de Malacologie p. 595, pl. 84, fig. 5.	
	Capitulum » »	1825.	J. E. Gray, Annals of Philos., new ser., vol. 10.	

5. Lepas anatifera L.

Lepas testa compressa quinquevalvi lævi intestino glabro insidente.

Fauna suecica ed. 1. 1746, p. 385, N:o 1350: Lepas testa compressa, basi membrana cylindracea.
Argenv. nat. 364, t. 30, f. F. Concha anatifera adhærens.
Petiv. mus. 82, n. 862. Balanus anatifera.
Barth. cent. 6, p. 271. Concha anatifera major.
Worm. mus. 256. Concha anatifera.
List. hist. 23, t. 440, f. 283. Concha anatifera margine lævi.
» exerc. t. 7, f. 4, 5.
Stalpart. obs. 2, p. 458, t. 15. Conchæ falsis gravidæ anseribus.
Bonanni, Mus. Kirch. classis 2, f. 2. Tellina pedata.[1]
Sennert. hypomn. 2, c. 8. Concha anatifera.
Sibb. mus. 170, N:o 2.[2]
» scot. 2, l. 3, c. 12, t. 18, f. 1. Concha anatifera.
Aldr. exsang. 543. Conchæ anatiferæ ex arbore dependentes.
Grew. mus. 148. Balanus compressa.
Lob. ic. 2, p. 250. Conchæ anatiferæ britannicæ.
Bauh. pin. 513, n. 1, 2, 3.[3]
— hist. 3, p. 803.[4]
Hoffn. ins. 3, t. 6. Concha anatifera vulgo Branta et Bernicla.
Chabr. sciagr. 580, f. 3, 4. Arbores conchiferæ et anatiferæ dictæ.

Prælectiones 1752:
Gualt. test. t. 106, f. A, (B, C,) D.
Planc. conch. t. 5, f. 4.

Systema Naturæ ed. 10. 1758:
Aldr. orn. c. 20, f. 548. Concha anatifera.
Marcgr. bras. 188.
Osb. iter 82. Lepas anatifera c. Tritone.
List. conch. t. 440, f. 283.
Argenv. conch. pl. 7, f. I—P.
Column. phytob. 110, t. 30.
Needh. micr. t. 7, f. 1, 2 et t. 6.

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[1] Der Name kommt zuerst in Syst. Nat. ed. 10 vor.

[2] »Concha quinquevalvis compressa, tubulo quodam ligneis aut algæ marinæ adhærens; animal sui generis multis cirrhis instructum continens, falso dicta anatifera».

[3] »Arbor ex cujus ligni putredine vermes. Arbores anatiferæ.»

[4] Anates conchiferæ vel anatiferæ, falso dictæ aut Tellinæ aut Balani.

Museum Ludovicæ Ulricæ 1764:
Fauna Suec. Ed. 2, 1761, N:o 2120.
Seba Thesaur. 3, t. 16, fig. 1 (2).
Act. angl. v. 2, t. 34, f. 6. 1758.

Systema Naturæ ed. 12. 1767:
Imperat. Nat. 904. Concha pedata.

Fauna suecica ed. 1. 1746:
Habitat in mari atlantico super ligna.

Systema Naturæ ed. 10. 1758 et ed. 12. 1767:
Habitat in Pelago.

Fauna suecica ed. 2. 1761:
Habitat in Oceano super ligna frequens.

Testa compressa valvulis duabus majoribus, subtriangularibus, conniventibus; singulis acutis, latere altero versus apicem, valvula oblonga.
Valvula insuper quarta lanceolata, cymbiformis, loco carinæ.
Basis cylindrica membranacea intestiniformis.

In den *Vorlesungen* von 1752 findet sich ausser den oben angeführten Citaten folgendes: »Ser ut som en mussla, men består af 6 delar, af hvilka 2:ne äro stora och formera större delen af sidorne, en på hvardera sidan vid spetsen och en på hvardera sidan der den öppnar sig; finnes alltid på något flytande trästycke, hvarvid den fäster sig med sitt intestinum, som ser ut som ett finger. När man rörer henne, drar hon ihop den helt kort. Om denna hafva de gamle haft åtskilliga underliga meningar: hon har varit för dem ett stort skäl till generatio æquivoca. De trodde att den skulle växa på ruttna trästycken som flöte i hafvet just som svampar på träden som de ock trodde ske per generationem æquivocam. Men som de sågo att denna var mest luden af fjäder, d. ä. af Polyper, så trodde de att häraf måtte födas en fogel. Nu var Anser scoticus eller Bernicus, Faun. suec. 91, en fogel som alltid kläckte ut sina ungar up vid Ishafvet, så att de ej fingo se dess ägg. Dermed beslöto de, att denna måtte häraf framkomma. Somliga trodde att det var frukten af ett trä, hvaraf desse slags gäss härflöto. Dertill lärer väl gifvit anledning att de alltid finnas fästade vid trä; tör ock hända att något trä stått vid hafsstranden, hvars qvistar böjt sig ned i hafvet och de då sett att denne sutit fästad vid dem. Sennertus de generatione æquivoca skrifver rätt mycket härom.»

In *Systema Naturæ ed. 10.* 1758 steht nach dem Fundorte: *duplex* varietas: *lævis* quæ frequentior, *striata* quæ sæpius fossilis observatur. Da aber »lævi» von der Testa in der ursprünglichen Diagnose gebraucht wird, ist jene Varietas somit als Hauptform zu betrachten.

In Fauna suec. ed. 2. 1761 ist in der Diagnose zwischen intestino und insidente *glabro* eingeschoben.

Über die Citaten sei bemerkt, dass in Gualtieri, test. nur die Figuren A und D auf Taf. 106 wahrscheinlich hierher gehören; weshalb B und C eingeklammert worden. In Seba, Thesaurus 3, t. 16 bezeichnet Fig. 1 die fragliche Art, Fig. 2 dagegen scheint Lepas Hillii zu sein.

Das vorliegende Exemplar hat ein 25 Mm. langes, 22 Mm. breites Capitulum.

Lepas anatifera L.

Linnæus, Fauna succica ed. 1, p. 385, N:o 1350, 1746. — Prælectiones 1752. Ms. Concha anatifera. — Seba, Rerum naturalium thesauri descriptio, tom. 3, tab. 16, N:o 1; 1758.

1758. Lepas anatifera L. Syst. Nat. ed. 10, p. 668, N:o 9. Die Hauptform »lævis».
» » » 1761. Linnæus, Fauna Suec. ed. 2, p. 514, N:o 2120.
» » » 1764. » Mus. Lud. Ulr., p. 468, N:o 6.
» » » 1767. » Syst. Nat, ed. 12, p. 1109, N:o 18.
» » » 1851. Darwin, Monogr. on Cirripedia, the Lepadidæ, p. 73, tab. 1, fig. 1.
1789. Anatifa dentata var. Brugière, Encycl. Meth. (des Vers).
1825. Pentalepas lævis De Blainville, Manuel de la Malacologie, p. 594, pl. 84, fig. 3.
1827. Pentalasmis dentatus var. Brown, Illustr. Conch. Pl. 52, fig. 5.
1835. Anatifa sp. Martin S:t Ange, Mém. sur l'organisation des Cirripèdes.
1837. » engonata Conrad, Journ. Acad. Nat. Sc. Philad., vol. 7, p. 262, pl. 20, fig. 15.
1847. » lævis Chenu, l'Histoire natur. des Animaux p. 350, fig. 1216.

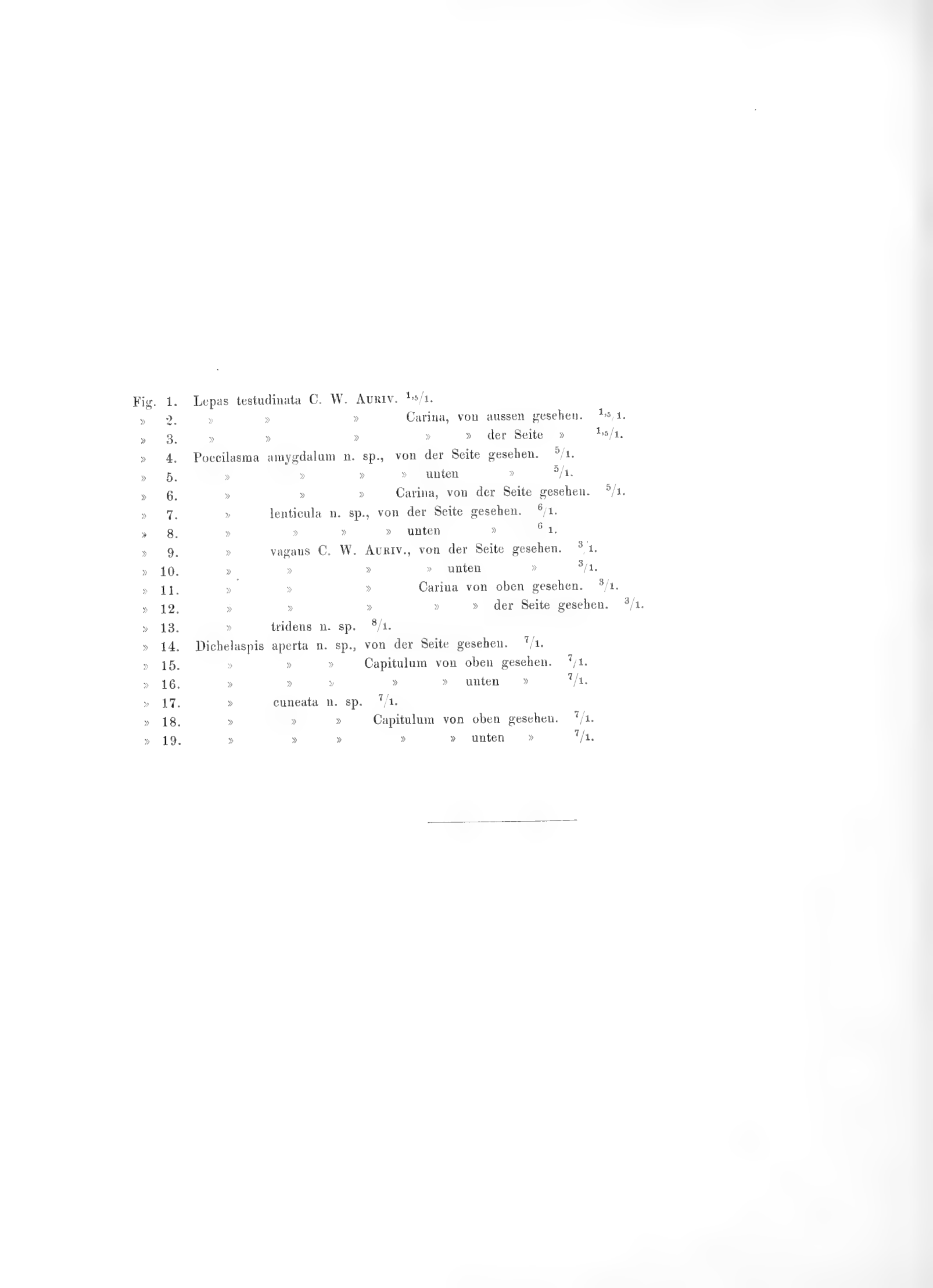


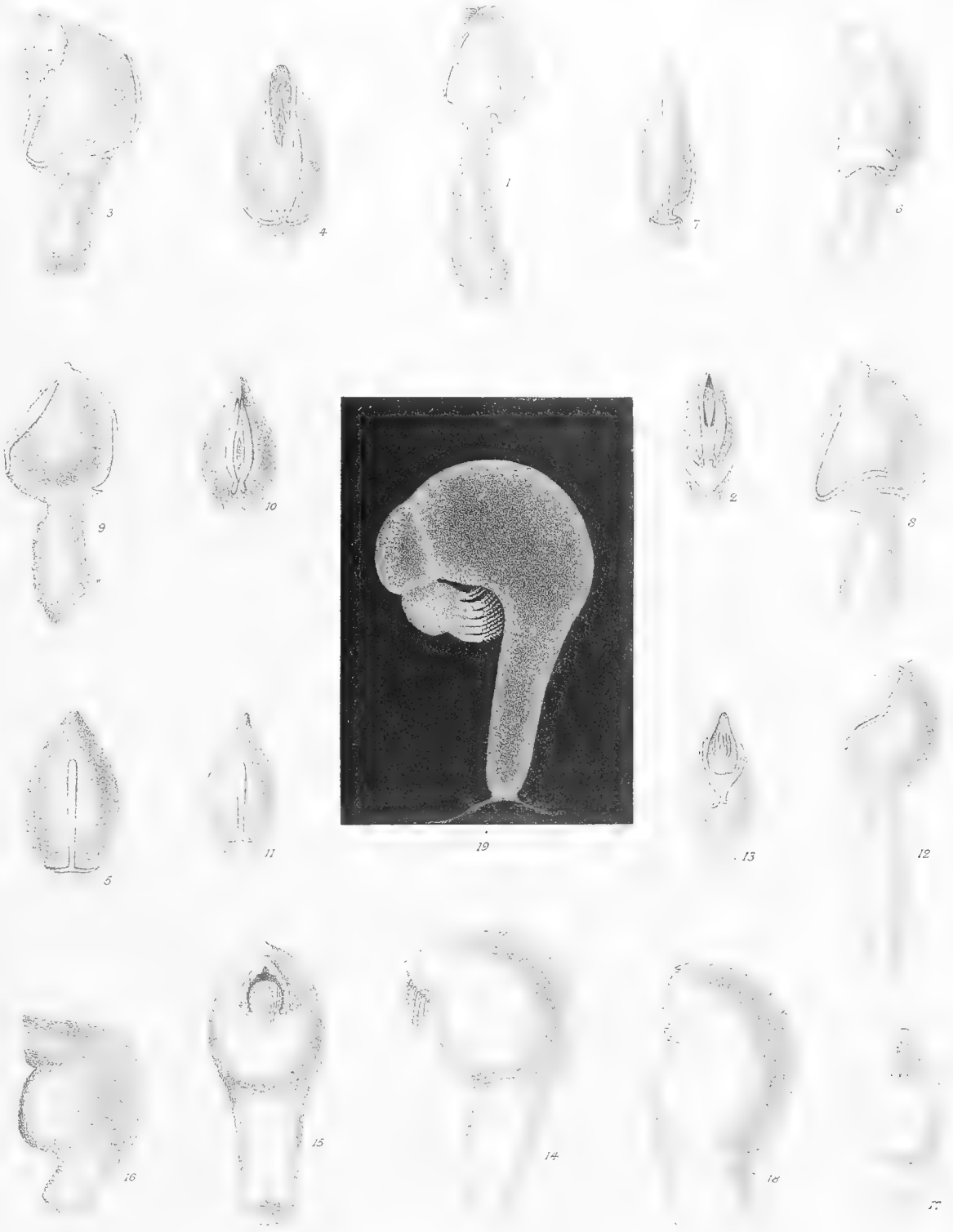
Fig. 1. Lepas testudinata C. W. Auriv. 1,5/1.
» 2. » » » Carina, von aussen gesehen. 1,5/1.
» 3. » » » » » der Seite » 1,5/1.
» 4. Poecilasma amygdalum n. sp., von der Seite gesehen. 5/1.
» 5. » » » » unten » 5/1.
» 6. » » » Carina, von der Seite gesehen. 5/1.
» 7. » lenticula n. sp., von der Seite gesehen. 6/1.
» 8. » » » » unten » 6/1.
» 9. » vagans C. W. Auriv., von der Seite gesehen. 3/1.
» 10. » » » » unten » 3/1.
» 11. » » » Carina von oben gesehen. 3/1.
» 12. » » » » » der Seite gesehen. 3/1.
» 13. » tridens n. sp. 8/1.
» 14. Dichelaspis aperta n. sp., von der Seite gesehen. 7/1.
» 15. » » » Capitulum von oben gesehen. 7/1.
» 16. » » » » » unten » 7/1.
» 17. » cuneata n. sp. 7/1.
» 18. » » » Capitulum von oben gesehen. 7/1.
» 19. » » » » » unten » 7/1.

A. Ekblom del. et lith.

Schlachter. Stockholm

TAFEL II.

Fig. 1. Dichelaspis cor C. W. Auriv. $^{6}/_{1}$.
» 2. » » » Capitulum von unten. $^{6}/_{1}$.
» 3. » sinuata n. sp. $^{8}/_{1}$.
» 4. » » » Capitulum von unten. $^{8}/_{1}$.
» 5. » » » » » oben. $^{8}/_{1}$.
» 6. » alata n. sp. $^{10}/_{1}$.
» 7. » » » Capitulum von oben. $^{10}/_{1}$.
» 8. » trigona n. sp. $^{10}/_{1}$.
» 9. » angulata n. sp. $^{8}/_{1}$.
» 10. » » » Capitulum von unten. $^{8}/_{1}$.
» 11. » » » » » oben. $^{8}/_{1}$.
» 12. » bullata C. W. Auriv. $^{6}/_{1}$.
» 13. » » » Capitulum von unten. $^{6}/_{1}$.
» 14. Alepas japonica C. W. Auriv. $^{1,5}/_{1}$.
» 15. » » » von unten. $^{1,5}/_{1}$.
» 16. » quadrata n. sp. $^{6}/_{1}$.
» 17. » » » von unten. $^{6}/_{1}$.
» 18. » » » junior, (verisimiliter), dem Scutalrande von Poecilasma vagans angeheftet.
» 19. Gymnolepas pellucida n. gen. et sp. $^{3}/_{1}$.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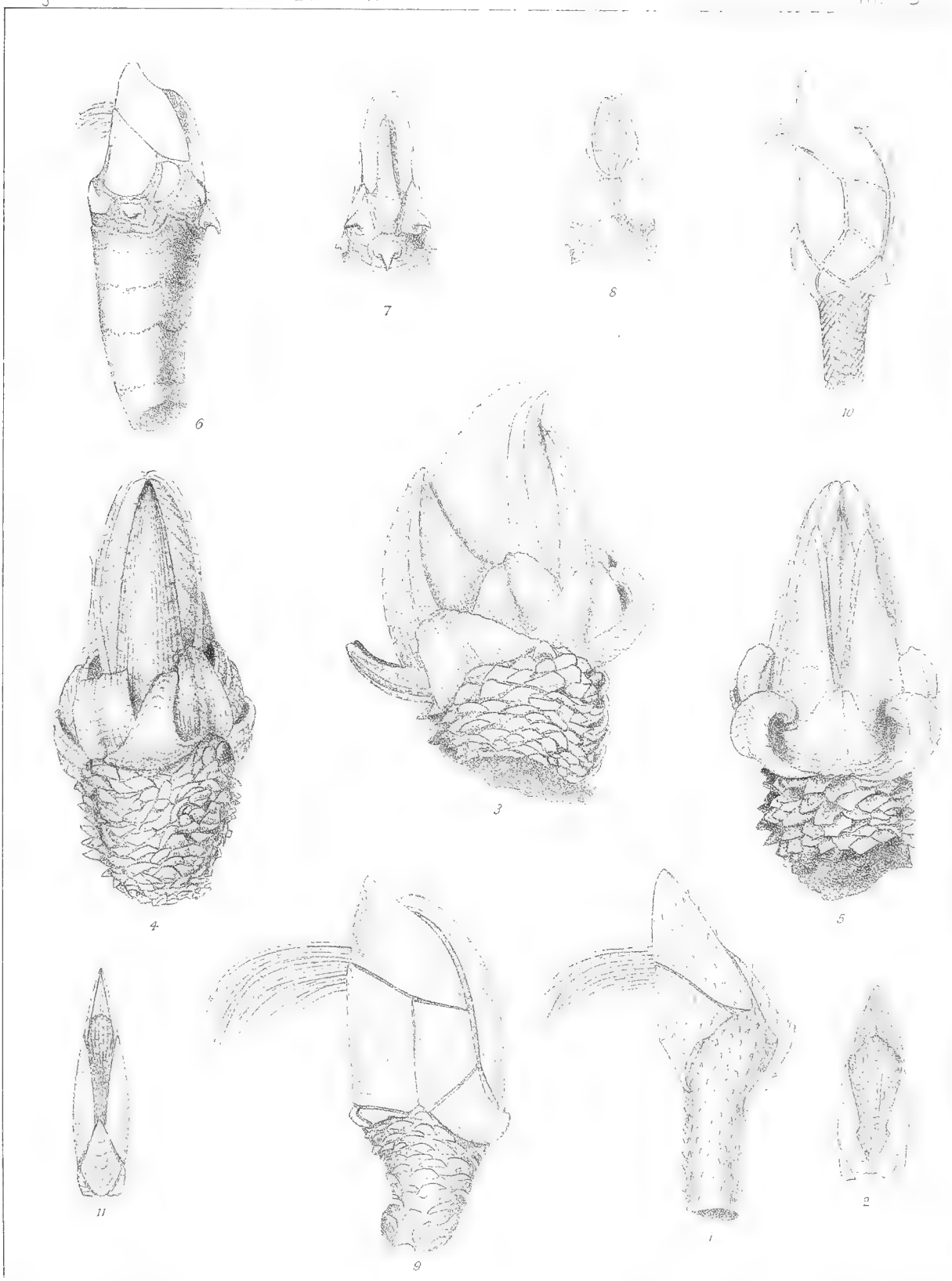
TAFEL III.

Fig. 1. Oxynaspis patens C. W. Auriv. $^{6}/_{1}$.
» 2. » » » Capitulum von unten. $^{6}/_{1}$.
» 3. Scalpellum gemma C. W. Auriv.
» 4. » » » von oben.
» 5. » » » » unten.
» 6. » scorpio » $^{1,5}/_{1}$.
» 7. » » » Capitulum von oben. $^{1,5}/_{1}$.
» 8. » » » » » unten. $^{1,5}/_{1}$.
» 9. » galea »
» 10. » stratum »
» 11. » » » Capitulum von unten.



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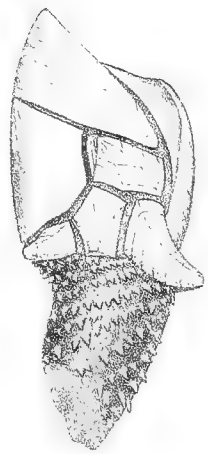
TAFEL IV.

Fig. 1. Scalpellum galea C. W. Auriv., Capitulum von oben.
» 2. » » » » » unten.
» 3. » gibberum »
» 4. » » » Capitulum von unten.
» 5. » calcaratum
» 6. » » » Capitulum von unten.
» 7. » septentrionale »
» 8. » » » Capitulum von unten.
» 9. » obesum »
» 10. » » » Capitulum von unten.
» 11. » erosum »
» 12. » » » Capitulum von unten.
» 13. » luridum »
» 14. » » » Capitulum von unten.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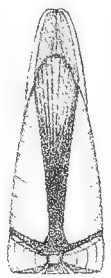
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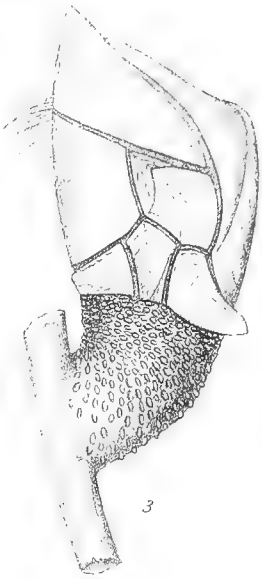
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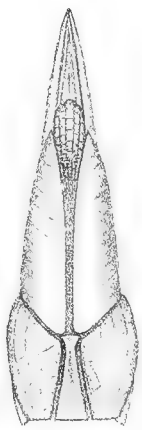
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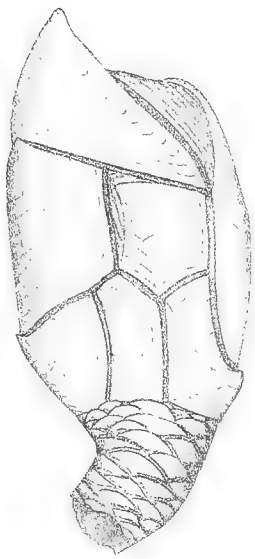
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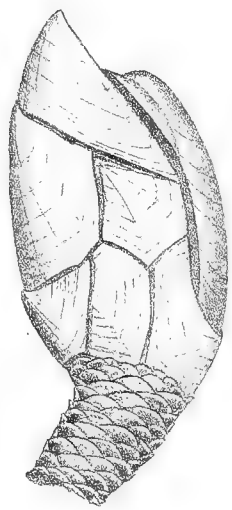
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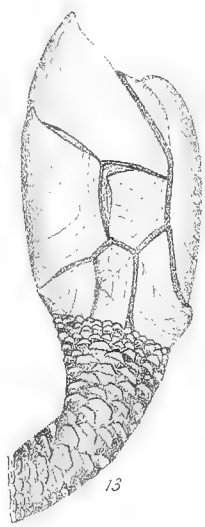
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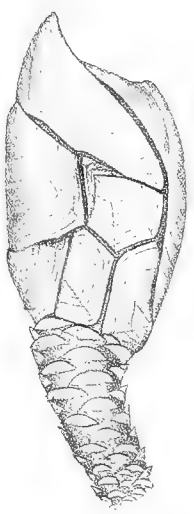
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TAFEL V.

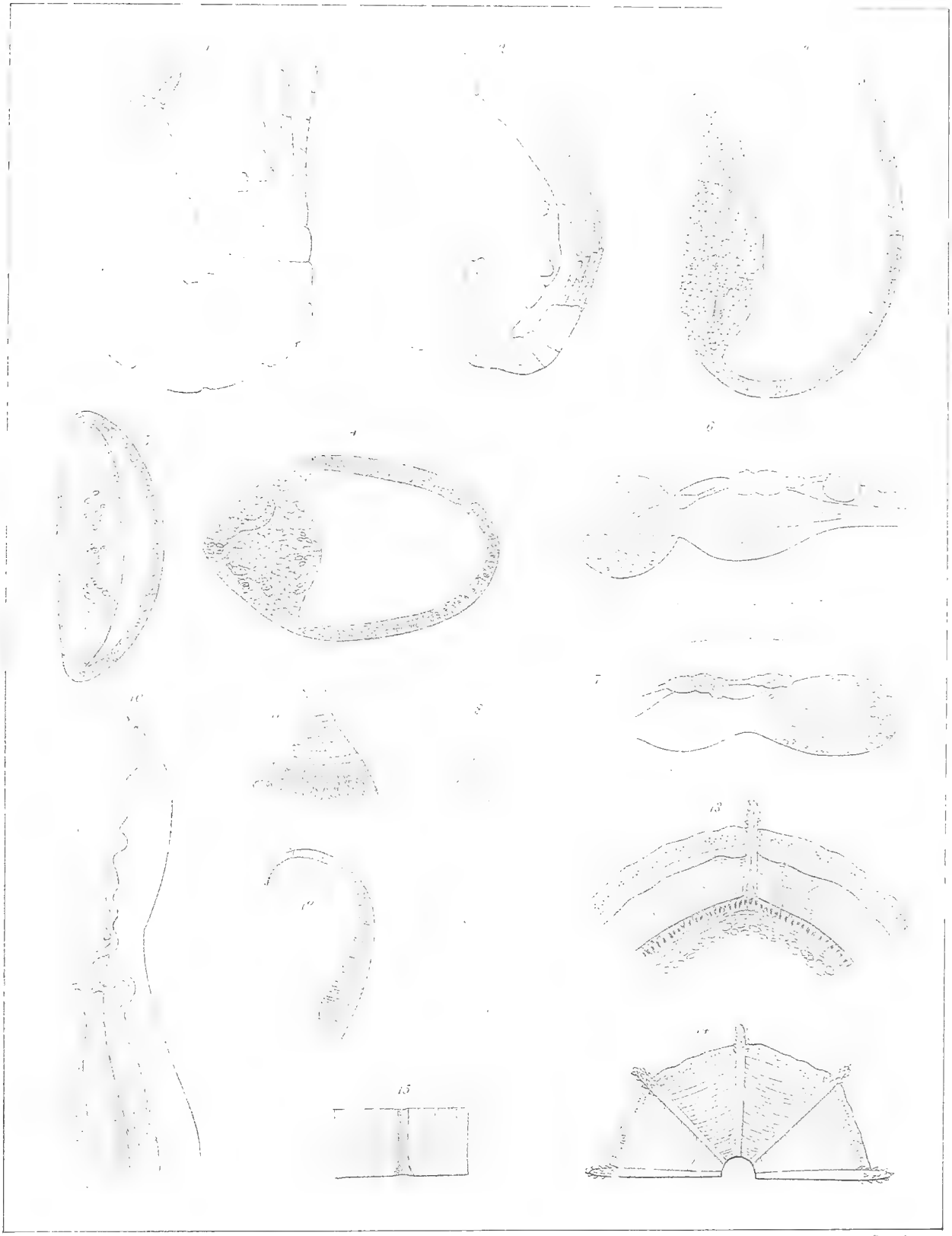
Fig. 1. Scalpellum grönlandicum C. W. Auriv.
» 2. » » » Capitulum von unten.
» 3. » prunulum »
» 4. » » » Capitulum von unten.
» 5. » aduncum »
» 6. » » » Capitulum von unten.
» 7. » gemma » Diagram des Capitulum.
» 8. Octomeris angulosa G. B. Sowerby, » » Schalenkranzes.
» 9. Lithoglyptes indicus C. W. Auriv., Weibchen von der Seite.
» 10. » » » » Mantelmündung, die Scuta getrennt. Stück des Musculus retractor scutorum.
» 11. » » » » Stück der Oberfläche eines Scutum und der verbindenden Haut.
» 12. » » » » Kammbörstchen, um die hintere Hälfte der Mündung.
» 13. » » » Zwergmännchen.
» 14. » ampulla » Weibchen, von der Seite.
» 15. » bicornis » » » » » »
» 16. » indicus » Höhle des Weibchens in Porites sp. ausgegraben. Längendurchschnitt. $^5/_1$.
» 17. » » » Höhle des Weibchens in Sagittalschnitt. $^5/_1$.
» 18. » » » Mündungen von sechs Höhlen in einem von einer Kalkalge überzogenen Porites sp. $^5/_1$.

Author del. A.Ektlom lith

W. Schlachter Stockholm

TAFEL VI.

Fig. 1. Alcippe lampas Hancock, Körper des Weibchens, aus dem Mantel genommen.
» 2. Lithoglyptes indicus C. W. Auriv., Körper des Weibchens, aus dem Mantel genommen.
» 3. » » Längsschnitt durch den Mantel und die Fussscheibe (= Pedunkel) des Weibchens.
» 4. » » Querschnitt durch den Mantel und die Fussscheibe, ein wenig oberhalb der Mitte.
» 5. Alcippe lampas Hancock, Querschnitt durch den Mantel und die Fussscheibe des Weibchens.
» 6. » » » Zwergmännchen, das eine Körperende mit Testis, Vesicula seminalis und Nervensystem.
» 7. » » » Zwergmännchen, dieselben Organe bei einem jüngeren Individ.
» 8. » » » » Spermatozoidbündel.
» 9. » » » » zwei Spermatozoiden.
» 10. Dichelaspis bullata C. W. Auriv., Hinterende des Körpers. o.o. Testes mit Vas deferens. c. Ventriculus und Darm mit Anus an der Basis des Penis.
» 11. » » » Ende des Penis.
» 12. Poecilasma tridens n. sp., Penis.
» 13. Oxynaspis patens C. W. Auriv., Stück eines Querschnittes durch den Pedunkel, mit einem Dörnchen.
» 14. Antipathes sp., auf welchem Oxynaspis patens befestigt ist; Hälfte des Querschnittes eines Astes mit den Dörnchen.
» 15. Oxynaspis patens C. W. Auriv., Schleifschnitt quer durch Tergum, mit dem Kanal eines Dörnchens.



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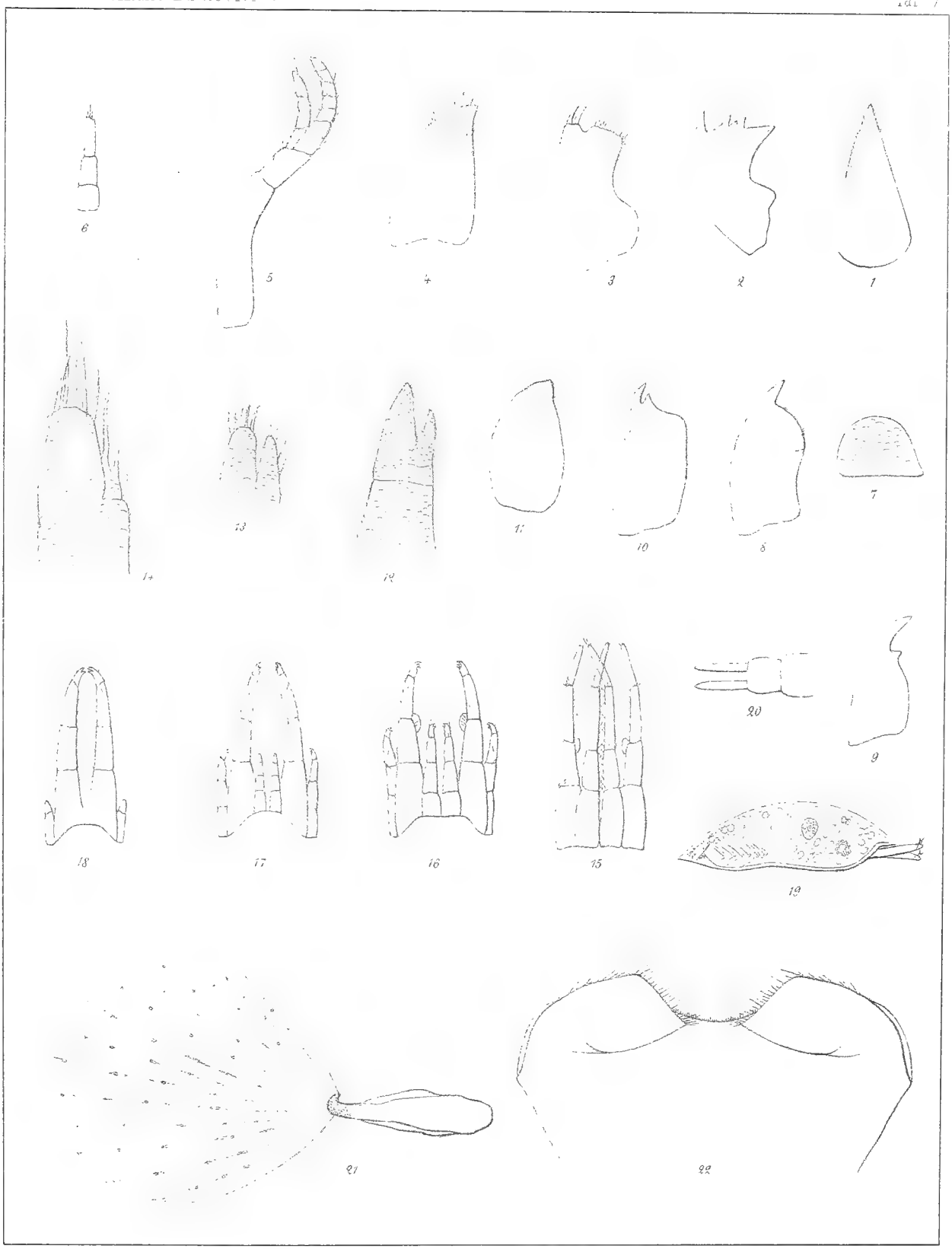
TAFEL VII.

Fig. 1. Lithoglyptes indicus C. W. Auriv., Palp.
» 2. » » » Mandibel.
» 3. » » » vordere Maxilla.
» 4. » » » hintere »
» 5. » » » 1. Cirrus = »Mundcirrus».
» 6. » » » Schwanzanhang.
» 7. Alcippe lampas Hancock, ♀ Palp.
» 8. » » » » Mandibel des erwachsenen.
» 9. » » » » » eines 1 Mm. grossen Exemplares.
» 10. » » » » vordere Maxilla.
» 11. » » » » hintere »
» 12. » » » » 1. Cirrus des erwachsenen (2,5 Mm. lang).
» 13. » » » » d:o eines 1,5 Mm. langen Exemplares.
» 14. » » » » d:o » 1 » » »
» 15. » » » » das letzte Cirrenpaar und die Schwanzanhänge eines erwachsenen.
» 16. » » » » die Abdominalanhänge eines 1,5 Mm. langen Exemplares.
» 17. » » » » » » 1 » » »
» 18. » » » » » » 0,5 » » »
» 19. » » » ♂ Cyprisstadium.
» 20. » » » » » Körperende.
» 21. » » » ♀ Mündung der Höhle und von dieser ausstrahlende Furchen mit Löchern.
» 22. Gymnolepas pellucida n. gen. et sp., Oberlippenrand und Palpen.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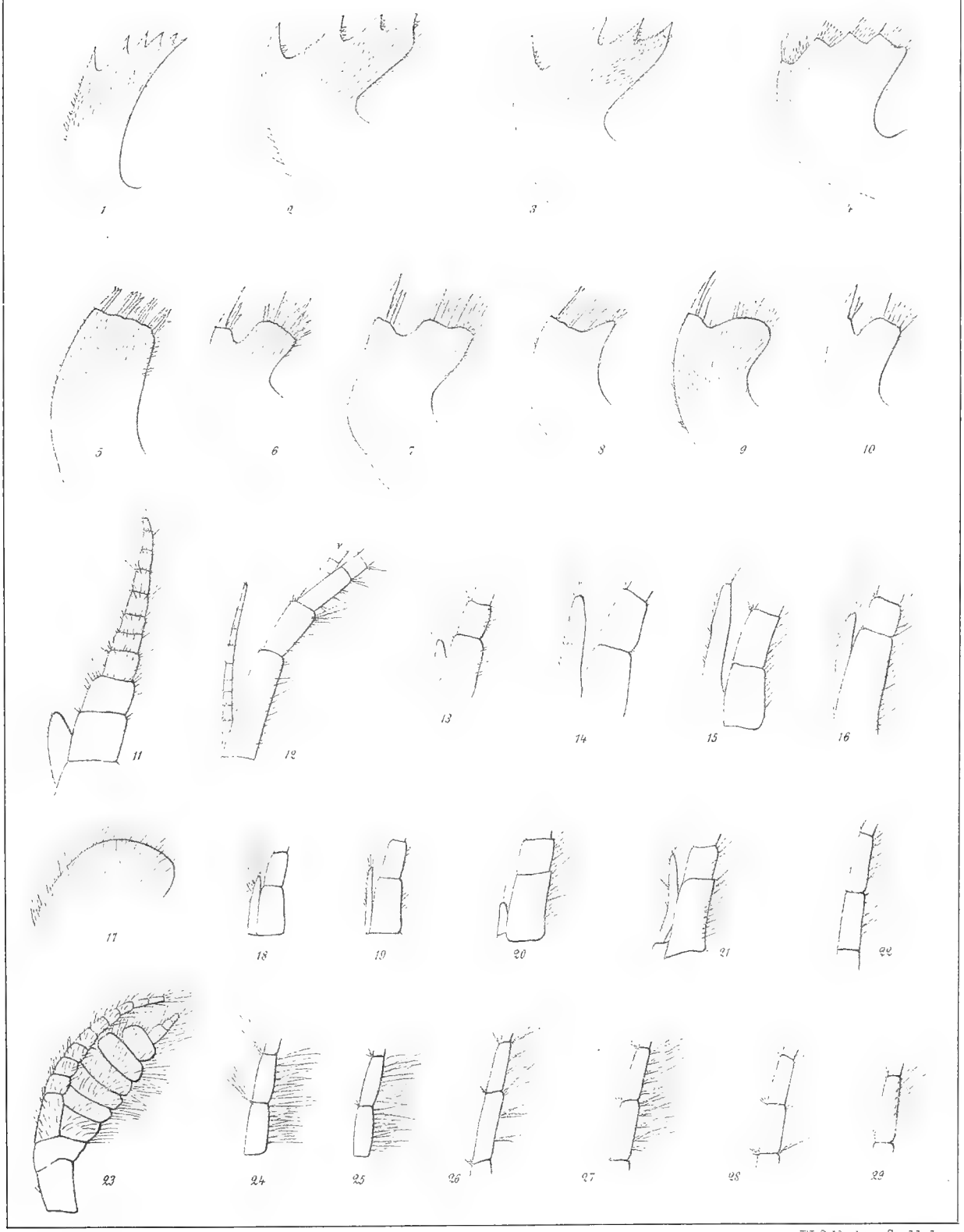
TAFEL VIII.

Fig. 1. Gymnolepas pellucida n. gen. et sp., Mandibel.
» 2. Alepas quadrata n. sp., Mandibel.
3. » japonica C. W. Auriv., Mandibel.
» 4. Lepas testudinata » vordere Maxilla.
» 5. Gymnolepas pellucida n. gen. et sp., vordere Maxilla.
» 6. Alepas quadrata n. sp., vordere Maxilla.
» 7. » japonica C. W. Auriv., vordere Maxilla.
» 8. Scalpellum stratum » d:o.
» 9. Oxynaspis patens » d:o.
» 10. Poecilasma vagans » d:o.
» 11. Gymnolepas pellucida n. gen. et sp., 6. Cirrus und Schwanzanhang.
12. Alepas quadrata n. sp., d:o d:o.
» 13. Poecilasma tridens n. sp., d:o d:o.
14. » amygdalum n. sp., d:o d:o.
» 15. » lenticula n. sp., d:o d:o.
» 16. » vagans C. W. Auriv., d:o d:o.
» 17. Gymnolepas pellucida n. gen. et sp., hintere Maxilla.
» 18. Dichelaspis angulata n. sp., 6. Cirrus und Schwanzanhang.
19. » bullata C. W. Auriv., 6. Cirrus und Schwanzanhang.
» 20. » Warwicki J. E. Gray, 3—4 Mm. lang, aus dem Indischen Ocean, 6. Cirrus und Schwanzanhang.
» 21. » » » 15 Mm. lang aus dem Chinesischen Meere, bei Borneo, 6. Cirrus und Schwanzanhang.
» 22. Poecilasma vagans C. W. Auriv., 2 mittlere Segmente des Innerastes des 6. Cirrus.
» 23. Scalpellum galea » 1. Cirrus.
» 24. Dichelaspis angulata n. sp., mittlere Segmente des 6. Cirrus.
» 25. » bullata C. W. Auriv., d:o d:o.
» 26. » Warwicki J. E. Gray, 3—4 Mm. lang, mittlere Segmente des 6. Cirrus.
» 27. » » » 15 » » d:o d:o.
» 28. Poecilasma lenticula n. sp., mittlere Segmente des 6. Cirrus.
» 29. » tridens n. sp., d:o d:o.



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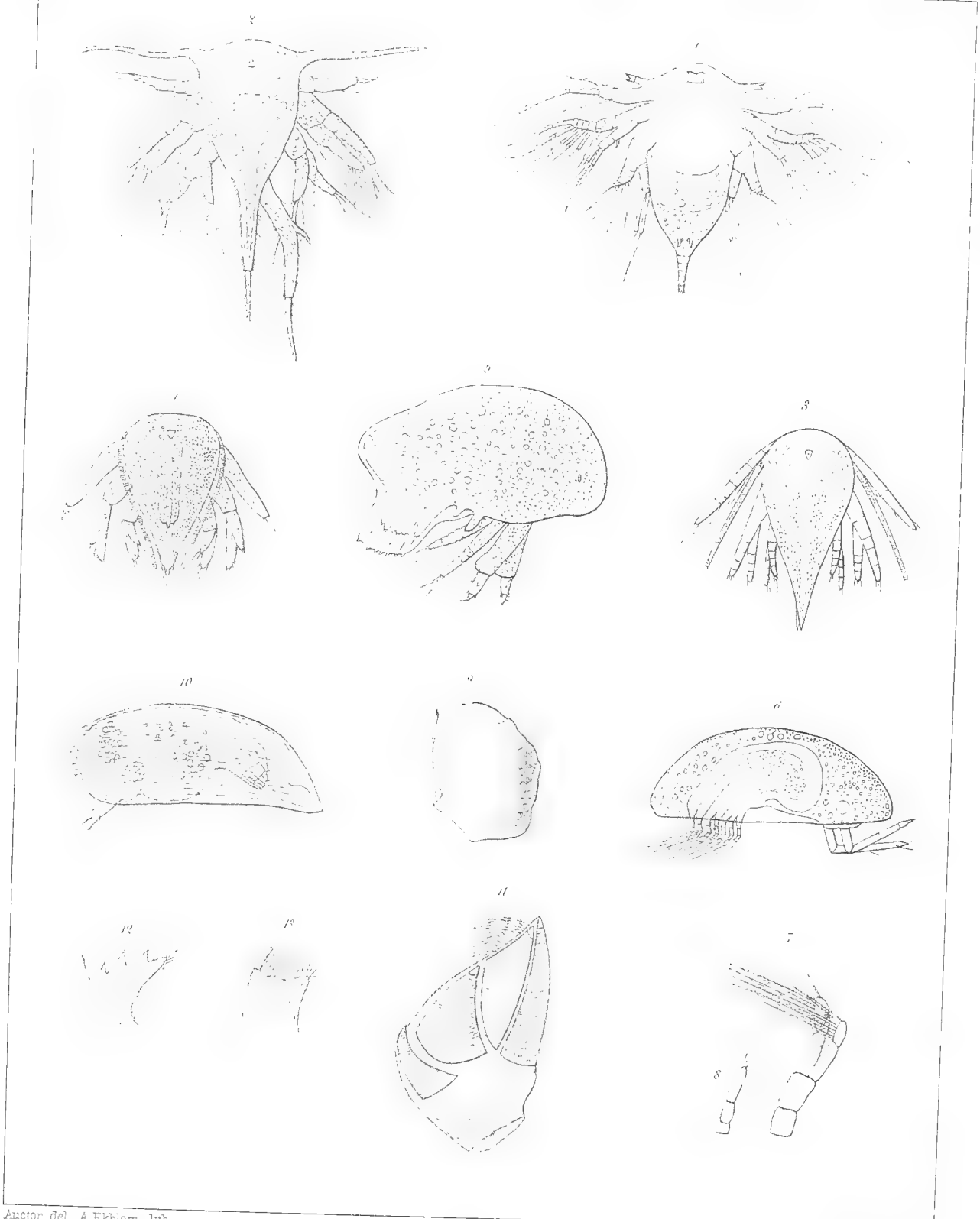
TAFEL IX.

Fig. 1. Nauplius von Conchoderma virgatum Spengler, soeben aus dem Eie entschlüpft, 0,2 Mm. lang.
2. » » » » » in einem späteren Stadium.
3. » » Alepas japonica C. W. Auriv., soeben aus dem Eie entschlüpft.
4. » » Alcippe lampas Hancock, ♀, in einem kurz auf die Entschlüpfung folgenden Stadium.
5. Metanauplius von Scalpellum erosum C. W. Auriv., frei innerhalb des mütterlichen Capitulum.
6. Cyprislarve von Scalpellum obesum C. W. Auriv., frei innerhalb des mütterlichen Capitulum.
7. » » » » » 6. Cirrus.
8. » » » » » Schwanzanhang.
9. Alcippe lampas ♀, 1 Mm. lang.
10. Cyprispuppe des Komplentär-Männchens von Scalpellum scorpio C. W. Auriv., 0,5 Mm. lang.
11. Komplementär-Männchen von Scalpellum scorpio.
12. » » » » » Mandibel.
13. » » » » » vordere Maxilla.



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