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Videnskabelige Meddelelser

fra

Dansk naturhistorisk Forening i København

///

Bind 76.

Udgivne af Selskabets Bestyrelse.

Med 3 Tavler og 28 Figurer i Teksten.

Ottende Aartis fjerde Aargang. II.

København
I Kommission hos C. A. Reitzel.
1923.

Redaktionen af dette Bind er besørget af Professor, Dr. *Ad. S. Jensen.*

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Andelsbogtrykkeriet i Odense.

Indhold.

In Memoriam
Carl With

født 11. December 1877, død 16. Juni 1923.

Af

K. Stephensen.

Ved Carl Withs Død har dansk Zoologi lidt et meget smerteligt Tab. Ganske vist var han i de senere Aar blevet saa stærkt optagen af sin Lægegerning, at der ikke var Tid til at dyrke aktive zoologiske Studier; men Interessen derfor nærede han mindst ligesaa stærkt som tidligere, og hvis ikke Døden havde bortrevet ham, vilde han have fortsat sit afbrudte Studium. —

Carl Johannes With var født i Lemvig 11. December 1877 som Søn af Læge Nicolai Rasmus With og Hustru Rasmine Sophie Dorothea W., født Andrup; allerede i en Alder af 5 Aar mistede han begge sine Forældre. Efter at være blevet Student 1896 fra Frederiksborg Skole gav han sig til at studere Naturhistorie og Geografi og tog Skoleembedseksamen i disse Fag med Zoologi som Hovedfag efter kun $4^1/_2$ Aar i Januar 1901. I Juli—November 1904 foretog han med det Thottske Legat en zoologisk Studierejse til England (specielt British Museum) og fik næste Aar den Schibbyeske Præmie for Arbejdet om Notostigmata.

Men da han mente, at Kaarene som Zoolog her i Landet ikke kunde skabe ham en tilstrækkelig sikker Fremtid, gav han sig til at studere Medicin og deltog i den dansk-franske Lepra-expedition til Dansk Vestindien Januar—Maj 1909 efter først at have studeret nogen Tid i Institut Pasteur i Paris. 1911 tog han medicinsk Embedseksamen med Laud og virkede derefter som Dermatolog ved Rigshospitalet og Kommunehospitalet i København. 1915 nedsatte han sig som praktiserende Læge (Venerolog) og var desuden fra Juni 1915 til Juni 1921 først Assistent, derefter Afdelingslæge ved Finsens Lysinstitut. Siden 1. Juni 1921 var han Reservelæge ved Frederiksberg Hospital. 16. Juni 1923 afgik han ved Døden af en mangeaarig Nyrebetændelse, der pludselig havde forværret sig.

1. Juli 1909 blev Carl With gift med Inge Kiørboe (Datter af Direktør Frederik Rudolf Leopold K. og Hustru Augusta Dorothea K., f. Meinig), der sammen med tre Børn overlever ham. —

Ovenstaaende korte Data udgør Rammen om en ualmindelig rig zoologisk og medicinsk Virksomhed. Som Zoolog var With Elev af Dr. H. J. Hansen og var gennem denne præget af den Schiødteske Skoles bedste Egenskab: den overordentlige Grundighed, hvormed selv de mindste Detailler blev undersøgt, og det samme Karaktertræk præger, saa vidt jeg kan forstaa, ogsaa hans medicinske Produktion.

Indenfor den rene Zoologi har With arbejdet med Arachnider og Copepoder (se Literaturlisten). Efter et mindre Arbejde (om Phalangiider fra Indien) udgav han 1903 "The Notostigmata, a new suborder of Acari" (— en foreløbig Beskrivelse af en af Arterne var givet allerede Aaret i Forvejen). Dette, i Omfang ganske vist kun lille, Arbejde er et udmærket Eksempel paa, hvad en samvittighedsfuld Undersøgelse kan bringe ud af selv et meget slet Materiale: With havde ialt ca. 30 Eks. fordelt paa 3 Arter, hvoraf de to hver kun var repræsenteret med et enkelt Eksemplar, og alle var de meget daarligt konserveret, foruden at Dyrenes ringe Størrelse (højst 2,75 mm i Længde) ikke bidrog til at gøre Undersögelsen lettere. Ikke desto mindre lykkedes det at give en nogenlunde fuldstændig Beskrivelse endog af de indre Organer og at paavise 4 Par Trachéaabninger paa Abdomens Rygside, en Karakter saa mærkelig, at de paagældende Arter maa opstilles som en særlig Underorden, — hvis de overhovedet kan regnes for virkelige Midder.

Alle Arbejderne fra de følgende Aar (1905—08) handler (med en enkelt Undtagelse) om Pseudoskorpionerne, Chelonethi. Den første Afhandling om denne Gruppe er baseret paa Materiale fra den australske Region, tilhørende British Museum; foruden en systematisk Gennemgang af Slægten Chelifer gives der Beskrivelse af et hidtil ukendt sækformet Organ, „coxal sac“, fundet i coxa paa 4. Par Ben hos Chelifer socotrensis. Det næste større Arbejde er en Monografi af de indiske Arter af samme Gruppe, og Materialet stammer væsentlig fra danske Ekspeditioner (især Kiellerup paa „Galatea“ og Dr. Th. Mortensen i Siam). Gruppen er behandlet meget indgaaende, baade morfologisk, systematisk og geografisk, og der er givet Beskrivelse og Figurer af en Mængde nye Arter, foruden at alle de gammelkendte Arter fra Omraadet er underkastet en grundig Revision. I det morfologiske Afsnit vil man finde en fornyet og udvidet Undersøgelse af det ovenfor omtalte Coxalorgan, som det var lykkedes at paavise hos voksne ♂ af ikke mindre end 8 Arter. With's sidste Arbejde om denne Gruppe er meget omfangsrigt og handler om Arter fra S. Amerika.

En stor Del af With's ovenfor omtalte zoologiske Produktion blev udarbejdet samtidig med at han forberedte sig til medicinsk Eksamen. Efter at have fuldendt det lægevidenskabelige Studium 1911 blev hans Tid stærkt optaget af Lægegerningen; alligevel kunde han ikke helt slippe Zoologien og udgav 1915 det store Arbejde om en Del af „Ingolf“-Ekspeditionens fritlevende Copepoder, hvori han som noget ganske nyt har underkastet Arternes Svælgstruktur en meget indgaaende Undersøgelse.

Dette blev With's sidste zoologiske Arbejde. Da Lægegerningen efterhaanden tog mere og mere af hans Tid, afleverede han for nogle Aar siden til Museet hele det Materiale, som han havde haft hjemme til Bearbejdelse til Brug for sidste Del af Værket om „Ingolf“s fritlevende Copepoder, idet han indsaa, at han ikke i hvert Fald i de første 10—15 Aar vilde faa Tid til at arbejde paa saa stort et Værk. Derimod paatog han sig efter Dr. William Sørensen's Død i 1916 at fuldføre et af denne paabegyndt Arbejde om Phalangiidefamilien Gonyleptidæ, for en stor Del baseret paa et fortrinligt Materiale, indsamlet af Fea for Museet i Genua. Hvor langt Bearbejdelsen er fremskredet, og hvormeget der endnu staar tilbage, kan ikke konstateres med Sikkerhed paa det nuværende Tidspunkt; men forhaabentlig lykkes det at fuldføre dette af to saa fremragende Forskere paabegyndte Arbejde. —

Baade i sine Studenterdage og senere havde With arbejdet meget paa Zoologisk Museum, og han bevarede Interessen herfor — som for Museumsvæsen i det hele taget — usvækket til det sidste. Han var det eneste danske Medlem af British Museums Association, hvorfor man søgte overdraget ham at ordne de engelske Museumsmænds Besøg her i Byen i Sommer — et Hverv som han dog maatte overlade til andre.

With's videnskabelige zoologiske Produktion er i Følge Sagens Natur kun kendt af en snæver Kreds af Fagmænd, men har vundet stor Anerkendelse mellem disse. At han dog tillige havde Blik for de større Synspunkter, viste han ved sammen med daværende Underbibliotekar Svend Dahl i Januar 1918 at udsende en Pjese om „Vore naturhistoriske Museer og Biblioteker". Bortset fra Forslag om en Nyordning af Museernes og Bibliotekernes Forhold, idet samtlige naturhistoriske Institutioner (Museer, Laboratorier, osv.) foreslaas samlet til et stort Centralinstitut for Naturhistorie, indeholder Bogen i og for sig ikke meget nyt, idet den ellers væsentlig kun paaviser den af alle sagkyndige for længst anerkendte Pladsmangel og de daarlige Arbejdsforhold. Men den virkede som et forløsende Ord, der løsnede Penne og Tunger, og derpaa fulgte en maanedlang Avisdiskussion mellem en Mængde sagkyndige for tilsidst at resultere i Nedsættelsen af en Kommission. Desværre begyndte samtidig Krigstidens Guldstrøm at svinde, saa at Opgaven stadig er lige langt fra sin Løsning. —

Sidste Gang, jeg traf Carl With, var ude hos Dr. H. J. Hansen Store Bededagsaften. Han glædede sig over, at det medicinske Arbejde gik saa godt og talte meget om sine Planer for Fremtiden, den Fremtid, der kun halvanden Maaned senere saa brat skulde blive afbrudt. Det var nemlig hans Ønskers Maal at søge efterhaanden at faa sin Praksis ordnet saaledes, at der daglig kunde blive nogle Timer til overs til Zoologi, paa samme Maade som det virkelig var lykkedes afdøde Overlæge Rudolph Bergh at indrette sig. Den Nyrebetændelse, der lagde ham i Graven, havde han baaret paa i adskillige Aar, uden dog at have særlig Men deraf; men der er vel ikke megen Tvivl om, at han tildels er faldet som Offer for sin umaadelige Arbejdsenergi, idet han af sig selv har fordret meget mere, end selv en kraftigere Konstitution end hans kunde yde uden at tage Skade paa Helbredet.

Foruden sine videnskabelige Interesser, der altsaa væsentlig er delt mellem Zoologi og Medicin, studerede With med Iver Udenrigspolitik og havde et stort Kendskab hertil. Stærkt nationalt interesseret og med afgjorte Sympatier for Vesteuropa, specielt England, søgte han bl. a. at faa dannet en dansk-engelsk Forening, hvilket dog ikke lykkedes, maaske fordi Tidspunket (midt under Verdenskrigen) ikke var heldig valgt. Uden at anerkende vedtagne Autoriteter var han med sit usnobbede Væsen altid rede til at tage en Kamp op for, hvad han ansaa for Ret, selv om han derved udsatte sig selv for Vanskeligheder. I April 1918 lod han sig opstille som Folkethingskandidat for Partiet „Det nye Højre".

Arbejdet paa en Doktordisputats om Lupus var ved hans Død meget langt fremskredet. —

En flittig Videnskabsdyrker, for hvem Sandheden stod over alt andet; en glødende Idealist; en Ven, som man ikke forgæves henvendte sig til: det er det Minde, som vi, der har kendt Carl With, er lykkelige ved at bevare.

For Hjælp med Oplysninger til den foreliggende Nekrolog bringer jeg herved Fru Inge With og d'Hrr. Dr. phil. H. J. Hansen, Overlæge, Prof. Dr. med. C. Rasch og Afdelingslæge Dr. med. Svend Lomholt min bedste Tak.

Biografisk Literatur om Carl With.

Carl Johannes With. — Den danske Lægestand.

A. Kissmeyer: In Memoriam Carl With. — Ugeskrift for Læger 28. Juni 1923, S. 459.

Svend Lomholt: Nekrolog. Dr. Carl With, f. $^{11}/_{12}$ 1877, † $^{16}/_{6}$ 1923. — Hospitalstidende 4. Juli 1923, S. 487—88.

Liste over Arbejder om Zoologi eller beslægtede Emner.

1903. A new Acaride Opilioacarus segmentatus. — Förhandlingar vid Nordiska Naturforskare- og Läkaremötet i Helsingfors den 7 till 12 Juli 1902 (Comptes Rendus du Congrès des Naturalistes et Médicins du Nord tenu à Helsingfors), VI, Sektionen för Zoologi, 4—5.

1903. New and old Phalangiidæ from the Indian Region. — Linn. Soc. London, Journal, Zool. vol. 28, 466—509.

1903 (1904). The Notostigmata, a new suborder of Acari. — Vid. Medd. Naturh. Foren. Kbhv. 1904, 137—192, Pls. 4—6.

1905. On Chelonethi, chiefly from the Australian Region, in the Collection of the British Museum, with Observations on the "Coxal Sac" and on some Cases of Abnormal Segmentation. — Ann. Mag. Nat. Hist., London, ser. 7, vol. 15, 94—143, Pls. 6—10.

1905. Remarks on the Gagrellinæ Thor. A Group of Opiliones, with Descriptions of some new Species from Borneo. — Boll. Mus. Zool. Anat. comp. R. Univ. Torino, No. 509, vol. 20, 1—12.

1906. Chelonethi. An account of the Indian false-scorpions together with studies on the anatomy and classification of the order. (The Danish Expedition to Siam 1899—1900, III). — Kgl. Danske Vid. Selsk., 7. Række, naturvid.-math. Afd. III, 1, 1—214, 4 Pls.

1907. On some New Species of Cheliferidæ, Hans., and Garypidæ, Hans., in the British Museum. — Linn. Soc., London, Journal, vol. 30, 49—85, 3 Pls.

1908. Remarks on the Chelonethi. — Vid. Medd. Naturh. Foren. Kbhv., 1908, 1—25, 2 Pls.

1908. An Account of the South-American Cheliferinæ in the Collections of the British and Copenhagen Museums. — Zool. Soc. London, Transact. vol. 18 pt. 3, 217—340, 3 Pls.

1915. Copepoda I. Calanoida Amphascandria. — The Danish Ingolf-Exped., vol. III, 4, 1—260, 8 Pls.

1916. Dr. phil. William Sørensen. — Vort Land (København), 1—7—1916.

1917. Fnatmiddens Levedygtighed udenfor Organismen. — Ugeskrift for Læger Nr. 10, 1917.

1918. (Carl With og Svend Dahl). Vore naturhistoriske Museer og Biblioteker. Forslag til et Centralinstitut. København, Lybeckers Forlag. 40 Sider.

Oversigt over medicinske Arbejder.

With har skrevet ca. 100 medicinske Arbejder, næsten udelukkende om dermatologiske og venerologiske Emner, enkelte sammen med andre Forf.; at give en specificeret Fortegnelse med de fulde Titler er af Pladshensyn umuligt, hvorfor de er samlede i nedenstaaende Resumé.

Dansk Dermatologisk Selskabs Forhandlinger, 96. Møde (1913), 115.—173. Møde (1917—23): ialt 66 Meddelelser (heraf 1 sammen med H. Boas, 1 sammen med A. Kissmeyer).

Bibliotek for Læger 1922: 1 Meddel.

Festskrift i Anledning af Finsens medicinske Lysinstituts 25 Aars Jubilæum 23. Oktbr. 1921: 2 Meddel. (den ene sammen med K. A. Heiberg, den anden sammen med A. Kissmeyer).

Hospitalstidende 1914—21: 8 Meddel. (heraf 1 sammen med Svend Dahl).

Nordisk Dermatolog-Forenings 4. Møde (København 1922): 1 Meddel., og 5. Møde (Stockholm 1923): 1 Meddel. (sammen med Marie Krogh).

Nordisk Dermatolog-Kongres, Stockholm 1919: 2 Meddel.

Nordisk medicinsk Archiv 1915, Sect. II, Nr. 3. 1914: 1 Meddel. (sammen med H. Bang).

Ugeskrift for Læger 1913—18: 6 Meddel. (heraf 2 sammen med H. Bang).

Archiv für Dermatologie und Syphilis, Bd. 142, 1923: 1 Meddel.

Brain vol. 11, 1918: 1 Meddel.

British Journal of Dermatology 1920: 2 Meddel.

Bulletin de la Société Pathol. Exotique, Paris 1911: 1 Meddel. (sammen med Ehlers og Bourret) (ogsaa trykt i Archiv f. Dermatol. und Syphilis, Bd. 106, 1911).

Lektor, Mag. scient. Christian Petersen.

Nogle Mindeord

ved

C. M. Steenberg.

„Il est dans la nature humaine de placer son but trop haut, ou trop loin, ou bien, au contraire, de s'entourer de trop de liens et de restrictions, et le résultat de ces deux tendances opposées est souvent un piétinement sur place. Ce n'est que lorsqu'on aura pu passer en quelque sorte derrière la question, ou qu'un trait de lumière sera venu du dehors frapper le sujet, que la recherche pourra faire des progrès notables."

Saaledes skriver Chr. Petersen i sit Arbejde: „Une loi fondamentale de l'accroissement des organismes“, og han har i disse Linier selv givet en Karakteristik af sine Meninger, sin Arbejdsmaade og derigennem ogsaa af sig selv, thi der vil altid være en nøje Sammenhæng mellem Personen, Arbejdsmaaden og Arbejdsresultatet. Mag. Petersen stilede nok højt med Hensyn til sine Arbejder, men ikke højere end han kunde række, og han hadede alle uvidenskabelige Omsvøb og „aabne Bagdøre“. Kun faa har forstaaet som han „at komme bag om et videnskabeligt Spørgsmaal“ og gribe det an fra en ganske anden Side, end de fleste vilde gøre, idet han stadig under Arbejdet søgte at betragte Spørgsmaalet udefra, i dets Relationer til andre af Naturens Foreteelser. Ved disse Undersøgelser kom hans mange og alsidige Kundskaber baade paa det teoretiske og praktiske Omraade ham i høj Grad til gode. Kun faa kendte og beherskede saa mange Fag som han; han var en af Nutidens faa Polyhistorer. Ogsaa hans Liv bærer Vidne om hans mangesidige Interesser og Evner.

Christian Petersen blev født d. 17. Juni 1864. Hans Fader, der var Vognmand, boede nær ved Kollekolle ved Furesøen. Da hans Forældre døde, kom han paa Opfostringshuset, hvor han var fra sit 9. til 14. Aar. Paa Grund af hans store Interesse for Fysik kom han ind paa Underofficersskolen og fik Uddannelse som Søminør. Da Læretiden var overstaaet, tog han ud paa Togt til fremmede Egne og fik derved Lejlighed til at se saa meget interessant og nyt i Naturen. Under sine Ophold, navnlig i det daværende Dansk Vestindien, begyndte han at studere Sneglene og lagde Grunden til sin store Samling af Konkylier. Interessen for Naturen blev omsider saa stor, at han besluttede at ville være Student og studere Naturhistorie. 28 Aar gammel tog han Studentereksamen og begyndte straks derefter at manuducere i Matematik og samtidig at studere Naturhistorie. Interessen for Naturhistorien, navnlig Zoologien, var nok stor, men Matematikken, særlig Matematikkens Historie, og Fysikken havde dog ogsaa hans Interesse, og da han saa, at det naturhistoriske Studium var langsommeligt, kastede han resolut dette Studium over Bord som Brødstudium og tog med fuld Kraft fat paa Matematikken og Fysikken. 1896 tog han Magisterkonferens med Speciale baade i Matematik og Fysik, og kort efter blev han Lærer, først ved Borgerdydskolen i Helgolandsgade, derefter ved Borgerdydskolen paa Østerbro og senere paa Maskinistskolen. Han underviste fra tidlig Morgen til sen Aften, og dette anstrengende Arbejde har sikkert bidraget sit til at undergrave hans Helbred. I Efteraaret 1905 blev han alvorlig syg. Det følgende Aar mente dog Lægerne, at han var kommet over sin Sygdom, og der blev nu tilbudt ham Stillingen som Inspektør ved Ingrid Jespersens Pigeskole. Herved underviste han til sin Død. Skønt ofte pint af Sygdom passede han alligevel sit Arbejde med største Samvittighedsfuldhed og fik desuden Tid til overs til videnskabelige Arbejder. Han døde i sit Hjem d. 11. December 1922.

Mag. Petersen var gift med Anna Petersen, født Olsen.

Chr. Petersen har ikke skrevet meget. I sine tidligere Aar havde han ikke Tid dertil, og i de senere Aar forhindrede hans Sygdom ham delvis deri; men det havde ogsaa en anden Aarsag. Han elskede at give sig af med videnskabelige Problemer og at faa dem løst, men — naar de først var løst, havde de dermed for en stor Del tabt deres Interesse for ham, og han kastede sig med Iver over et nyt og helst beslægtet Problem. Vilde nogen benytte hans Resultater, saa han det gerne og gav dem rundhaandet sine Resultater, og kun paa hans Venners ihærdige Opfordringer lykkedes det at faa ham til at udgive de foreliggende Arbejder. Af disse har kun tre Betydning for den biologiske Videnskab, nemlig: „Den logaritmiske Spiral“ (Nyt Tidsskrift for Matematik 1916), „Une loi fondamentale de l'accroissement des organismes“, Copenhague 1919 og „Das Quotientengesetz. Eine biologisch-statistische Untersuchung“, Kopenhagen 1921.

I disse Arbejder, der er meget originale i Arbejdsmaade, Fremstilling og Resultater, ser man udmærket, hvorledes det er Matematikeren og Biologen i samme Person, der taler. Desværre er Fremstillingen ikke altid givet i en saadan Form, at Biologen umiddelbart kan forstaa den; meget bedre kan sikkert Matematikeren forstaa den biologiske Side. Det er med Vilje, at Christian Petersen har givet sine Arbejder denne korte, men vanskeligt tilgængelige Form, thi det var hans Hensigt senere at skrive en kort Lærebog for Biologer i den matematiske Behandling af biologiske Fænomener. De Resultater, hvortil han er kommet, kan af Pladshensyn og af andre Aarsager ikke nærmere behandles her. Kun nogle enkelte kan trækkes frem.

Ved talrige Undersøgelser, Tusindvis af Maalinger paa Snegleskaller og Sneglelaag samt paa Planter og ved kritisk Gennemgang af tidligere udgivne Tabeller over Vækst og Variationer hos Mennesker, Dyr, Træer og Samfund, er han naaet til at opstille een Hovedlov for Væksten af alle levende Organismer, nemlig den eksponentielle Lov, hvis matematiske Udtryk er $x = e^{a + bt + ct^2}$, hvor e er et bestemt Tal (den naturlige Logaritme), a, b og c Konstanter, der er lidt forskellige for de forskellige Individer, og t er Tiden. Denne Hovedlov indbefatter alle de Love, der paa mindre Omraader i Tidernes Løb er opstillet, f. Eks. af Moseley, Naumann og Grabow for Bløddyrskallens Vedkommende,[1]) af Malthus for Befolkningstilvæksten og af Riniker for Træernes Vækst. Et specielt Tilfælde af denne Vækstlov har han selv behandlet, nemlig den saakaldte Quotientlov,[2]) der viser sig særlig smukt ved Snegleskallens Vækst.

For at afgøre efter hvilke specielle Love Væksten foregaar eller et Materiale varierer, har han fundet et let Kriterium, der af Biologen ikke kræver nogen særlig matematisk Viden, kun en Række simple Divisioner er nødvendig (deraf Navnet Quotientlov). I flere Tilfælde, hvor en Maaling og Beregning ikke kan give noget Resultat eller er for besværlig, har han givet os et nyt Middel i Hænde til at kunne afgøre, efter hvilke Love Væksten foregaar, nemlig den saakaldte grafiske Metode, der kun benytter saadanne simple geometriske Begreber som Sammenligning af Vinkelstørrelser og Liniers Parallelisme. Indenfor Variationsstatistikken er hans vigtigste Paavisning den, at Variationskurven ofte ikke følger den binomiale Fejllov, men hyppig to andre Love, den exponentielle eller den logaritmisk exponentielle, og at de to Kurvestykker, et paa hver Side af Maximum, som Regel ikke følger samme Lov, men er fremkommen som Stykker af 2, oftest forskellige Kurver,

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[1]) Disse Forskeres Resultater er lettest tilgængelige i D'Arcy W. Thompson's interessante Bog: On Growth and Form. Cambridge. 1917.

[2]) Det matematiske Udtryk for denne Lov er $x = e^{a + bt}$ eller $x = k(1 + r)^t$. Det er den samme Lov, hvorefter en Kapital, der er sat paa Rente i en Bank, vokser.

der skærer hinanden; derved faas en naturlig Forklaring paa de højtoppede (excessive) Kurver. Ved alle disse Undersøgelser pointerer han paa det bestemteste, at for ham er Matematikken kun Midlet ikke Maalet, og at Brugen af Matematikken maa ske med største Varsomhed under stadig Kontrol hentet fra Naturen.

Dette er kun nogle faa Hovedpunkter, i Virkeligheden findes der indenfor hver lille Del, for Fagmanden, en Guldgrube af Tanker og Resultater, hvorpaa der kan arbejdes videre.

Ogsaa paa et andet Omraade: Sneglesystematik og Skalanatomi, har Chr. Petersen arbejdet, og disse Emner har haft hans udelte Interesse fra Ungdommen af. I Aarenes Løb havde han skaffet sig en for en Privatmand enestaaende Samling, særlig af Slægterne Cypræa og Conus, og disse to Slægter, og da navnlig den førstnævnte, har han bearbejdet meget udførligt. I hans efterladte Papirer findes et omtrent færdigskrevet Manuskript, ledsaget af talrige smukke Tegninger (tegnet af Fru Strubberg); dette behandler hans aarelange Undersøgelser over disse Emner; det vil forhaabentlig lykkes at faa samlet og udgivet dette Arbejde.

Foruden en dygtig og genial Forsker var Magister Petersen en fortrinlig og samvittighedsfuld Lærer, der paa Grund af sine mange Kundskaber, sit store Menneskekendskab og sin lune Humor vandt, ikke alene sine Elevers, men ogsaa sine Medarbejderes Hjærter og Hengivenhed. Han var altid rede til at raade, altid villig til at hjælpe paa alle Maader. Derfor vil det smukke Minde om ham altid blive ved med at leve hos alle dem, der lærte ham nøjere at kende, og dette gælder i særlig Grad for den, som skriver disse Linier, og som først var hans Elev, og senere hans Kollega og gode Ven.

Oversigt
over
de videnskabelige Møder
i
Dansk naturhistorisk Forening
fra 1. April 1922 til 31. Marts 1923.

Den 21. April 1922. Mag. scient. **C. M. Steenberg** holdt Foredrag om husbærende Myggelarver.

Diskussion: Mag. Spärck.

Den 5. Maj 1922. Kommunelærer **E. Nielsen** foreviste Edderkoppen *Artanes fallax*' Rede og Ægkokon (se „Naturens Verden", 1923, S. 249) og gav derefter en Meddelelse om Hvepselarver (*Polysphincta*) som udvendige Snyltere paa Edderkopper (se Entomol. Meddel. 14. Bd., 1923, S. 137).

Diskussion: Prof. Ad. Jensen.

Den 27. Oktober 1922. Lærer **J. P. Kryger** gav en Meddelelse om Snyltehvepsefamilien *Mymaridae*.

Diskussion: Mag. Steenberg, Lektor Thomsen.

Mag. scient. **R. Spärck** gav en Meddelelse om Talforholdet mellem højre- og venstrevendte Loxia-Næb.

Diskussion: Prof. Ad. Jensen.

Den 10. November 1922. Dr. phil. **A. C. Johansen** gav en Meddelelse om Væksten af Sildens Yngel og dens Størrelse og Alder, naar Skællene anlægges.

Mag. scient. **P. L. Kramp** meddelte Iagttagelser og Nyheder fra „Dana"s Efteraarstogt 1922.

Den 24. November 1922. Forevisnings- og Referataften. Dr. phil. **V. Nordmann** foreviste Levninger af Mammuth-Liget fra Beresowka og knyttede nogle Bemærkninger dertil.

Mag. scient. **R. Spärck** refererede Prof. K. Brandts Afhandling: „Über den Stoffwechsel im Meere".

Diskussion: Mag. Jespersen, Dr. Mortensen, Prof. Ad. Jensen.

Den 19. Januar 1923. Dr. phil. **H. Blegvad** talte om Sandormens Yngleforhold og Udvikling. (Se dette Bind S. 1).

Diskussion: Dr. Mortensen.

Mag. scient. **Å. Vedel Tåning** gav en Meddelelse om *Lophius piscatorius*, dens Udvikling og dens nordeuropæiske Ynglepladser. (Se Rep. on the Dan. Oceanograph. Exped. 1908—10 to the Mediterranean and adjacent Seas, Vol. II, Biology, A, 10, 1923.)

Den 2. Februar 1923. Dr. phil. **Th. Mortensen** holdt et af Lysbilleder ledsaget Foredrag om sin Ekspedition til Kei Øerne. (Se dette Bind S. 55).

Efter Mødet afholdtes en selskabelig Sammenkomst til Ære for Dr. Mortensen.

Den 16. Februar 1923. Mag. scient. **P. Jespersen** og Mag. scient. **Å. Vedel Tåning** foreviste forskellige Dyreformer fra „Dana"-Ekspeditionerne og knyttede biologiske Bemærkninger dertil.

Cand. mag. **K. Stephensen** foreviste nogle Hundrede kolorerede Tegninger af Havdyr fra „Dana"s sidste Atlanterhavstogt.

Den 2. Marts 1923. Dr. phil. **H. Blegvad** holdt et af Lysbilleder ledsaget Foredrag om sit Besøg ved franske biologiske Stationer.

Lektor **M. Thomsen** meddelte Bidrag til *Trialeurodes vaporarium*'s Cytologi.

Diskussion: Prof. Ø. Winge, Stud. mag. C. A. Jørgensen.

Den 12. og 13. Marts 1923. Fællesmøde med Dansk Botanisk Forening og Biologisk Selskab.

Prof., Dr. **Paul Buchner**, München holdt Foredrag om moderne Symbioseforskning. I. Pflanzensäfte saugende Tiere. II. Blutsaugende und leuchtende Tiere. (Se „Naturens Verden", November 1923). — Den 14. Marts foreviste Prof. Buchner mikroskopiske Præparater i Tilknytning til Foredragenes Emner.

Efter Mødet d. 12. afholdtes en selskabelig Sammenkomst til Ære for Prof. Buchner.

Beretning om de i Aaret 1922 af Dansk naturhistorisk Forening foretagne Ekskursioner.

Den 7. Maj 1922. Ornithologisk Ekskursion til Amager under Ledelse af **J. Jørgensen**. Deltagernes Antal 12.

Deltagerne kørte med Rutebilen fra Sundby til Kongelunden, hvor man fulgte Skovens Nordøstrand mod Syd. Straks ved Ankomsten saa man to Gravænder trække hen over Træerne, endvidere en Dværgfalk. I det milde og smukke Vejr fortsattes Turen tilbage gennem Skoven til Restauranten, hvor den medbragte Frokost spistes. Lige før man naaede Restaurationen, viste Lederen i et kløftet Træ en Træpikkerrede med Æg; det er sjældent at finde Reden. Efter Frokosten gik man gennem Skoven mod Syd og videre langs Stranden; paa denne Tur blev et betydeligt Antal Fugle set og hørt, ligesom man fandt adskillige Reder af Præstekrave, Vibe og Rødben. Turens største

Oplevelse var tre Traner, som først iagttoges i Stranden og senere paa majestætisk Flugt mod Nord; for næsten alle Deltagerne, selv Ornithologerne, var det første Gang, de saa Traner. — Der saas ialt 55 Arter Fugle.

Adskillige Sæler laa og solede sig paa Stenene.

Efter en veltilbragt Dag skiltes man med Tak til den kyndige Leder, der bebor en Gaard ikke langt fra Stranden, hvorefter de fleste Deltagere spaserede til St. Magleby, hvorfra man tog med Toget hjem. *M. T.*

Den 28. Maj 1922. Ekskursion til Havelse og Bilidt under Ledelse af Statsgeolog, Dr. **V. Nordmann**.

Deltagerne (ca. 10) samledes paa Skævinge Station, og efter at have indtaget Frokost i den derværende Kro gik man over Grimstrup Aa og Lille Havelse til Havelse (Attemose) Aa, som man fulgte til Havelse Mølle. Paa Vejen forklarerede Dr. Nordmann Egnens geologiske Bygning, særlig Aasen, om hvis Dannelsesmaade Meningerne havde vekslet stærkt, idet den først opfattedes som Aas, senere som Randmoræne, for nu atter at anses for at være en Aas (se D. G. U. V. R. Nr. 3, S. 72): endvidere omtaltes Saltvandsalluviet, der efter den sidste Revision havde vist sig at have noget mindre Omfang, end man tidligere formodede. Det paa Rørdam's Kort fra 1892 afsatte Sund mellem Grimstrup og Hvedse Gaard, som skulde have forbundet Arresø med Roskildefjord, har saaledes ikke eksisteret (D. G. U. l. c. S. 161). Saltvandsalluviet omkring Havelse Aa er afsat i en smal Fjord, der fra Aaens nuværende Munding har strakt sig ind til lidt S.Ø. for Grimstrup. Paa Turen langs Aaen havde man Lejlighed til at studere den fossile Faunas Udvikling i denne gamle Fjord: længst inde tyndskallede *Cardium edule* og *Hydrobia ulvæ*, længere ude mod Mundingen Østersbanker og forholdsvis rige Tapeslag (disse saas i en lille Grusgrav ved Foden af Møllebakkens Nordside).

Efter at Køkkenmøddingen under Møllen var betragtet og Lejrekomiteens Viksomhed omtalt, gik man til Bilidt ved Frederikssund, idet man flere Steder paa Vejen, navnlig omkring Græse Aa, havde Lejlighed til at studere Tapeshavets Aflejringer og Kystklinter. Ved Bilidt kunde man paa det af Carlsbergfondet fredede Omraade studere Forskellen mellem den kunstig dannede Skaldynge, Køkkenmøddingen, og det derunder liggende, hævede Strandgrus med naturligt dannede Skallag. Disse indeholder en Tapesfauna, der tæller mindst 23 Arter, af hvilke Halvdelen endnu lever i Roskildefjord, men rigtignok i betydelig mindre Eksemplarer og mere tyndskallede. Ved 6-Tiden opløstes Ekskursionen i Frederikssund. *V. N.*

Den 5. Juni 1922. Ornithologisk Ekskursion til Bagsværd under Ledelse af Læge **K. Nørregaard**.

Mosedraget, som strækker sig mellem Hjortespring i Syd og Bagsværd Hareskov i Nord og bestaar af Smørmose, Kongemose, Tipperupmose, Fedtemose m. m., har, som Kortet viser, meget talrige Smaasøer og Vandhuller. Enkelte af de store Damme er vistnok Rester af en tidligere større Sø, som havde Forbindelse med Søndersø og Damhussøen, men de fleste Vandhuller skyldes mangeaarig planløs Tørvegravning. Endnu ses flere Ruiner af de talrige Vejrmøller, som benyttedes til Vandets Bortpumpning. — Det oprindelige Lyngmoseparti indskrænkes mere og mere, og Mosen omdannes til Engmose, Rørmose og Kratmose. Endnu trives Mosebøllen godt sammen med Hindbær og Brombær, mens Tyttebær, Rævling, Blaabær, Tranebær, Klokkelyng og Rosmarinlyng er døende. Af Floraen kan særlig bemærkes: Soldug, Vibefedt, Blærerod, Vandrøllike, Bukkeblad, Krebsklo, Frøbid, Vandaks, Dunhammer, Pindsvinsknop, Søkogleaks, Tagrør, Iris, Kæruld, Leverurt, Døgelilie, Hullæbe, Gøgeurter, Pyrola, Gyldenris, Aakander etc. Krattet bestaar af Vidiearter, krybende Pil, Asp, Vrietorn, Pilearter, men efterhaanden tager Birken Overhaand og findes som større Træer; ogsaa Ask, Røn, Hyld, Kirsebær breder sig. Der er ingen Pors og ingen El.

En Del Vildt holder til, men jages skamløst (Harer, Ænder, Vandhøns, Agerhøns, Viber, Bekkasiner, Krager, Skader og enkelte Rovfugle (Musvaage, Ugle). Fuglelivet er rigt og egner sig til Studier for Begyndere. I Marts høres Viben, Bekkasinen, Blishønen, Solsort, Stær, Lærken, Gulspurven, Tornirisk, Mejser, og ved Husene er der Kvidder af Spurve, Skovspurve, Bogfinker; Krager, Alliker og Maager flyver rundt, og Skaden bygger Rede (dette Aar lavt i en Tjørn, synes ikke overbygget). I April høres Rødkælk, Grønirisk, Bomlærke, en enkelt Drossel, og man ser Storken fra Herløv. Sidst i April kommer Løvsangeren (ret talrig), men efter 1ste Maj kommer Hovedtrækket, hvor ofte hver Dag bringer en ny Fuglestamme. Gærdesangeren indleder gerne (2.—3. Maj, enkelt Par), Nattergalen kommer 5.—7. Maj (bleven talrig siden 1910), Bynkefugl (5.—8. Maj, enkelt Par), Sivsangeren ca. 6. Maj, talrige Par; Svaler 6.—8. Maj, først en enkelt Forstuesvale, derpaa et Par Dage efter Flokke af de 3 Arter. Mursvalen ses først nogle Dage senere. Gøgen kommer mellem 5.—14. Maj (3—4 Stykker), broget Fluesnapper paa Gennemrejse (7.—15. Maj), Tornsanger (7.—11. Maj ret talrig), Rørsanger (12.—16. Maj, talrige Par), Rørspurv ca. 8. Maj, flere Par, Havesanger (12.—19. Maj, ret talrig), Gulbugen (24.—31. Maj, enkelte Par, Kærsangeren, 23.—28. Maj, mindst 3—4 Par.

Turen gik gennem Smørmose, Kongemose og endte i en stor Have ved Hareskoven; man saa og hørte adskillige af de nævnte Fugle (f. Eks. Bynkefugl, Sivsanger, Rørsanger, Kærsanger, Tornsanger, Havesanger, Rørspurv, Nattergal, Gerdesanger, Gulbug m. fl.). *K. N.*

Den 3.—5. Juli 1922. Ekskursion til Tidsvilde under Ledelse af Kommunelærer **E. Nielsen,** Mag. sc. **K. Henriksen** og Mag. sc. **K. Gram**. Deltagernes Antal 11.

Af forskellige Grunde blev d'Herrer Kryger og Worm-Hansen, der skulde have deltaget i Ledelsen, forhindret i at komme til Stede, hvorfor det oprindelige Program ikke kunde følges. Ligeledes kunde Mag. Henriksen kun være til Stede d. 4., saa det blev Kommunelærer E. Nielsen, som særlig maatte tage sig af Programmets zoologiske Del. De fleste Deltagere mødtes ved Sandkroen d. 3. Juli og benyttede den første Eftermiddag til en Tur til Kassemose Overdrev og Stængehuset. Paa Vejen foreviste Hr. E. Nielsen forskellige Edderkopper, deres Fangnet og Ægspind (*Epeira umbratica, quadrata, cornuta, cucurbitina, Meta merianae, segmentata, Zilla atrica, Tegenaria Derhamii, domestica, Theridium sisyphium, lunatum, riparium, Philodromus aureolus, Ocyale mirabilis, Prosthesima latitans, Dictyna arundinacea, Segestria senoculata*); der iagttoges ogsaa mange Myreløvetragte, og en Del Larver medtoges

Næste Formiddag aflagdes først et Besøg hos Hr. E. Nielsen, som foreviste de af ham Dagen før fundne meget interessante Larver til Fluen *Acrocera globulus,* snyltende i en Edderkop; dernæst foretoges en Tur i Hegnet, paa hvilket man saa talrige afløvede Træer, som tidligere havde været hærgede af Frostmaalere o. a. Mellem Fyrretræerne sværmede en Mængde *Bupalus piniarius,* Posthornsdannelser foraarsagede af *Tortrix buoliana,* og Harpiksgaller af *Tortrix resinana* iagttoges paa Fyrrene og *Rhynchites*-Ruller paa Birkebladene. Efter Frokost i Sandkroen drog man til Tibirke Bakker. Paa Væggen af et gammelt Hus saas *Hoplomerus*-Boer med de kunstfærdige Lertude, og i en mindre velholdt Kostald var Loftet besat med Hundreder af *Anopheles*-Myg. Angreb af Bladhvepsen *Hoplocampa fulvicornis* paa de umodne Blommer iagttoges ligeledes. Ogsaa Ferskvandsdyrelivet blev studeret i et Mosehul neden for Bakkerne. *Bembex,* der var det egentlige Maal for Turen, lod sig imidlertid ikke se den Dag, vistnok fordi det blæste lidt. Om Aftenen havde Hr. Proprietær Weis været saa elskværdig at bestryge en Del Træer i Sandkroens Nærhed med „Sukker", og disse afsøgtes senere ved Lygte, saa at Deltagerne fik Lejlighed til at se en Sukkerlokning.

Man overnattede — som første Nat — i Sandkroen, og spadserede næste Morgen over Tibirke Bakker til Tisvildeleje. Paa Bakkerne lykkedes det at faa den berømte Gravehveps *Bembex rostratus* at se; man havde en Overgang troet den forsvundet fra Tisvilde, men heldigvis har det vist sig, at det er lykkedes den at holde sig her.

I Tisvildeleje opløstes Ekskursionen. *M. T., E. N. & K. H.*

Den 8 Oktober 1922. Malakologisk og entomologisk Ekskursion til Bagsværd Sø samt Frederiksdal og Fiskebæk langs Furesøen under Ledelse af Mag. scient. **C. M. Steenberg.** Deltagernes Antal var 22.

Turen gik langs Grøfterne bag ved Kuranstalten, forbi Pavillonen og langs Bagsværd Sø. Paa denne Strækning fandtes følgende Mollusker: *Limax arborum, Agriolimax laevis, Arion ater, A. minimus, Vertigo moulinsiana, V. antivertigo, Succinea putris, Limnaea auricularia, Planorbis corneus, P. carinatus, P. umbilicatus, P. contortus* samt *Sphaerium corneum.* Frokosten indtoges i Frederiksdals Kro; derefter gik den øvrige Del af Turen langs Furesøen til Fiskebæk. Paa denne Strækning havde Lederen Lejlighed til at demonstrere tre Arter af Svampemyggelarver, der bygger et beskyttende Dække af Ekskrementer, nemlig *Phronia strenua, P. johannae* og *Epicrypta scatophora.* Da det var ret fugtigt i Vejret, fandtes talrige nøgne Snegle: *Limax maximus, L. cinero-niger, L. arborum, L. tenellus, Agriolimax reticulatus, A. laevis, Arion ater, A. subfuscus, A. circumscriptus* og *A. mini-*

mus. Af skalbærende Landsnegle var der særlig mange i Frederikdals Skov: *Vitrina pellucida, Hyalinia alliaria, H. nitidula, H. pura, H. radiatula, Vitrea crystallina, Euconulus fulvus, Zonitoides nitidus, Acanthinula aculeata, Vertigo substriata, Sphyradium edentulum*; desuden fandtes Æg af *Arion ater* og *Helix hortensis.* Langs Skrænterne ved Furesøen vistes: *Helicigona lapicida, Hygromia incarnata, H. hispida, Pyramidula rotundata, Ena obscura, Cochlicopa lubrica, Clausilia laminata, C. ventricosa, C. pumila, C. plicatula, C. bidentata, Succinea putris, S. pfeifferi.* Ved Bredden af Furesøen og i Vandpytter i Nærheden vistes: *Limnaea stagnalis, L. auricularia, L. ovata, L. palustris, L. truncatula, Neritina fluviatilis, Anodonta cygnea, Unio pictorum, U. tumidus, Dreissensia polymorpha* og flere *Pisidium*-Arter. Sammesteds var der under Sten talrige Planarier: *Bdellocephala* (*Dendrocoelum*) *punctata* og *Polycelis nigra* var. *brunnea.* Desuden forevistes flere Ferskvandsinsektlarver: *Molanna angustata, Goëra, Leptocerus, Anabolia, Sialis* o. a., samt paa forskellige Steder — foruden Snegle — en Del Leddyr, der er karakteristiske for Bøgeskovbunden: *Obisium muscorum, Polydesmus complanatus; Julus* og Edderkopper.

Kommunelærerne J. P. Kryger-Jensen og E. Nielsen samt Lektor M. Thomsen gav værdifulde Oplysninger om forskellige entomologiske Fund. Som en højst interessant Begivenhed kan nævnes, at Lektor Thomsen ved Furesøen under Træbark fandt Eksemplarer af den sjældne *Miastor*-Larve. Denne Larve, der for over et halvt Aarhundrede siden blev taget ved Hulsø, og som blev beskrevet af Meinert, har ikke været fundet her i Landet i de senere Aar. Desuden blev den sjældne Mycetophilidelarve *Macrocera* taget.

C. M. S.

Den Schibbye'ske Præmie.

Da de til Konkurrencen indsendte Arbejder af forskellige Grunde ikke syntes Bestyrelsen ganske at opfylde de Betingelser, som Præmiens Stifter havde tænkt sig fulgt ved Tildelingen, og da Bestyrelsen yderligere ønskede at fastslaa en Praksis, der mere var i Overensstemmelse med Stifterens Hensigter end den i de senere Aar fulgte, besluttede man ikke at uddele Præmien for 1922.

Som en Vejledning for fremtidige Uddelinger og for at gøre Konkurrencedeltagerne bekendt med Dr. Schibbyes Mening med Legatets Stiftelse vedtog man for dets Uddeling omstaaende Regler, der er affattede paa Grundlag af de af Dr. Schibbye ved forskellige Lejligheder fremsatte Tilkendegivelser.

REGLER
for
Uddelingen af den Schibbye'ske Præmie,
vedtagne af
Dansk naturhistorisk Forenings Bestyrelse
d. 21. December 1923.

1. Præmien (500 Kr.) uddeles hvert Aar i Maj Maaned, skiftevis til et i i Løbet af de 3 foregaaende Aar (regnet fra 1. Maj) publiceret videnskabeligt zoologisk, botanisk eller mineralogisk-geognostisk (eller palæontologisk) Arbejde af en dansk Forfatter, — uanset om han er Medlem af Dansk naturhistorisk Forening eller ej —, der ikke er fyldt 35 Aar d. 1. Maj i det Aar, Præmien uddeles.
2. Der kan ved Tilkendelsen af Præmien foruden til Arbejdets Fortrinlighed tages Hensyn til den Bekostning og Tid, som dets Udførelse skønnes at have forvoldt Forfatteren. Saa vidt muligt vil Præmien kun blive givet for Arbejder, der er udførte i Vedkommendes Fritid, og for Arbejder, som ikke i for høj Grad har Forbindelse med Vedkommendes lønnede Virksomhed. Arbejder, der paa anden Maade allerede er honorerede, præmierede eller benyttede som Disputatser, vil som Regel ikke kunne komme i Betragtning.
3. Præmien tilkendes af Bestyrelsen med simpel Stemmeflerhed; kun i det Tilfælde, at Stemmerne staar lige ved et eller flere Bestyrelsesmedlemmers Forfald, gør Formandens Stemme Udslaget.
4. I Marts Maaned indbydes til Præmieæskning, dels ved en Bekendtgørelse i et eller andet københavnsk Dagblad, dels ved Opslag paa dertil egnede Steder.
5. Som Regel uddeles kun én Præmie paa 500 Kr. Skulde særlige Grunde tale derfor, vil den undtagelsesvis kunne deles i 2 Præmier.
6. Skønner Bestyrelsen, at der i et Aar ikke er Anledning til at uddele nogen Præmie, vil den i det følgende Aar kunne udsættes igen i det samme Fag ved Siden af Aarets normale Fagpræmie.
7. Det er ikke absolut forment, at samme Forfatter kan erholde Præmien 2 Gange. Bestyrelsens Medlemmer deltager ikke i Præmieæskningen.
8. Dennes Udfald meddeles Foreningens Medlemmer paa den ordinære Generalforsamling i Maj Maaned, hvorpaa Udbetalingen finder Sted.

Aarsberetning for Aaret 1923
afgivet af Udvalget for Naturfredning.

Fra Staatliche Stelle für Naturdenkmalpflege in Preussen har Naturfredningsraadet modtaget en Anmodning om Tilvejebringelsen af en Fortegnelse over Literatur vedrørende Naturfredning i Danmark. Raadet har ladet denne Opfordring gaa videre til Udvalget, og der er truffet den Ordning, at Udvalgets Sekretær udarbejder et Seddelkatalog over denne Literatur; 1 Eksemplar tilstilles Staatliche Stelle für Naturdenkmalpflege, 1 Eksemplar tilstilles Naturfredningsraadet, medens Udvalget faar det 3dje Eksemplar. Omkostningerne af de to første bæres af Naturfredningsraadet. Dette Register er under Udarbejdelse.

Viceinspektør Winge modtog i Juni 1923 et Brev fra Læge Rosenius i Malmø angaaende Muligheden for Oprettelsen af en Statsinstitution for Naturfredning for de skandinaviske Lande. Sagen har været behandlet paa Udvalgets Møde, men vandt ingen Tilslutning, særlig da et i lignende Retning gaaende Forslag fra anden Side er modtaget. Dette Forslag, som tager Sigte paa en skandinavisk Sammenslutning, vil blive nærmere drøftet i 1924.

Udvalget har virket som Mellemled ved Iværksættelsen af Fredning af Vaarkobjælde, *Pulsatilla vernalis*, paa en Hede i Hollund Sogn, idet det, efter at Sagen var bleven rejst ved Skovrider Axel Horneman, Tolne, har sendt Fredningsnævnet for Hjørring Amt Opfordring til at faa denne Fredning iværksat. Under 3 November 1923 har Fredningsraadet meddelt Udvalget, at det for sit Vedkommende tiltræder Fredning af nævnte Plante paa det omtalte Areal.

Fra Konferensraad Vilh. Jørgensen har Udvalget gennem Inspektør Petersen modtaget Anmodning om at søge et ham tilhørende Hedeareal i Salten Bakker fredet. Efter at have korresponderet med Inspektøren for Ejendommen, og efter at Medlem af Udvalget Professor Mentz har beset Arealet og fundet det særdeles værdifuldt som Fredningsobjekt, har Udvalget besluttet at indlede nærmere Forhandlinger med Ejeren om de Vilkaar, hvorpaa Udvalget mener at kunne anbefale Fredning.

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31. December 1923.

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Rettelser og Forandring af Bopæl bedes indtrængende meddelte til Kassereren, Mag. sc. R. Hørring, Zoologisk Museum, Krystalg. K.

Dansk naturhistorisk Forenings Bestyrelse.

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Kammerherre, Dr. phil. P. E. Müller.
Docent R. H. Stamm.
. . . .

Preliminary Note on the Eggs and Larvae of *Arenicola marina* L.

By

H. Blegvad.

(Danish Biological Station, Nyborg.)

After several unsuccesful attempts I succeeded last year in observing the deposition of eggs and in following the early developmental stages of *Arenicola marina* in an aquarium in Nyborg. On August the 6th I found upon the surface of the sand in which some adult Arenicolas lived, a thin, reddish-yellow layer of eggs, deposited within a circle of about 20 cm in diameter. The eggs rested loose upon the sand, but whirled up like a cloud by the slightest movement in the water. One of the eggs is represented in Fig. 1 (a); they are discoidal and resemble very nearly, as to size and shape, the eggs found in the body cavity of ripe Arenicolas (see I. H. Ashworth „Arenicola". Proc. and Trans. Liverpool Biol. Soc. Vol. XVIII. 1904, Fig. 68). — On the same day some of the eggs were found in the first stage of cleavage (b), and the next day some of them reached the morula stage (c—d). On August the 10th the first larvae (e), $0{,}207$ mm long, were hatched and swam actively about in the aquarium by means of their cilia; they are telotroch, have two brownish-red eyes and long sense-hairs upon the front part of the body. Between the two bands of cilia they have a longitudinal band of short cilia on the ventral surface. Colour of the body yellowish-white; no setæ. Two days later one pair of spatulate setæ (i) appeared; the larva (f) is now very nearly like the larva of *Arenicola claparedii* as hatched from artificially fertilized eggs (Ashworth l. c. Fig. 76). On the 14th of the same month another segment acquired its setæ (g), and the chaetigerous segment in front of this now had two setæ, viz. one spatulate and another with a long, drawn-out tip (k). The animal has now two pairs of eyes, one pair of smaller eyes having appeared dorsally to the original ones. The next stage

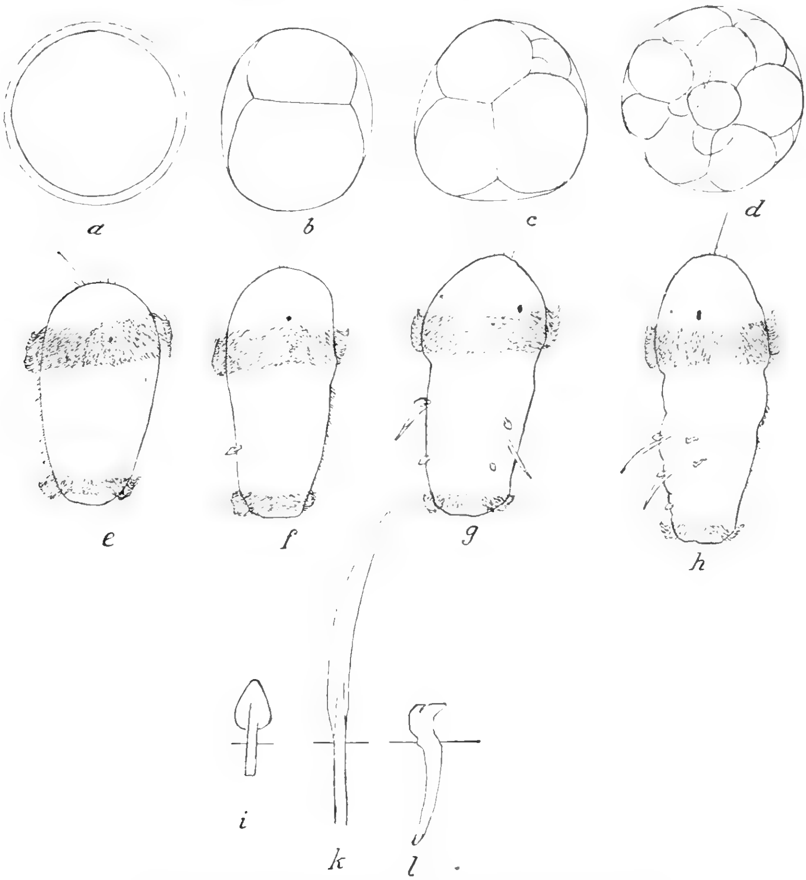

Fig. 1. Eggs and Larvae of *Arenicola marina* L. × 180.

(h), with 3 chaetigerous segments, was found on August the 17th; the larva had attained a length of 0,248 mm. The two first chaetigerous segments bore crotchets (l), one pair on each.

Having reached this stage many of the larvae died, and the remaining were still on August the 21st mostly in the same stage. Only one specimen had 3 fully developed chaetigerous segments with 2 pairs of setae and one pair of crotchets each; some few days later no living larvae were to be found.

During several years I have known these larvae of Arenicola, and in the free nature I have caught such larvae with 5 chaetigerous segments (in September), but between this stage and the „post-larval“ Benham-stage (see Ashworth l. c. page 268) which I have found occurring in numbers in early spring (April—June) by Nyborg, I miss the transitional stages. But my experiences appear to prove that Arenicola by us breeds during the autumn (Ashworth [l. c. page 211—212] says in the spring), and that the duration of the pelagic life of the larva is very considerable, extending, perhaps, over the whole winter time. Further investigations are, however, necessary to solve this question. —

24—3—1923.

Revideret Fortegnelse
over
Danmarks Arter af Amphipoda
(1. Del).
(Hyperiidea; Gammaridea: Lysianassidæ).

Af
K. Stephensen.

For 13 Aar siden paabegyndte Dr. H. J. Hansen i nærværende Tidsskrift (Bindet for 1909, S. 197—262) en Revision af de danske marine Arter af Malacostraca; Arbejdet omfattede Isopoda, Tanaidacea, Cumacea, Mysidacea og Euphausiacea. I samme Bind fortsatte jeg med en Liste over Decapoda (S. 263—89).

Tilbage stod saaledes Bearbejdelsen af den største af alle Dyregrupperne, Amphipoda, men forskellige sammenstødende Omstændigheder har bevirket, at saa mange Aar er forløbet, inden 1. Del af denne Gruppe kunde offentliggøres.

Om Planen for Arbejdet og om Grænserne for Omraadet kan henvises til Dr. H. J. Hansens ovenfor citerede Arbejde S. 197—99.

Skønt nærværende Liste udelukkende er baseret paa Materiale, der tilhører Zoologisk Museum i København, er der dog (uden Nr. og i [ ]) efter Literaturen optaget enkelte Arter, der endnu ikke er kendt fra de egentlige danske Farvande, men fra Omraader, der ligger saa nær ved Danmark (S. Norge, Bohuslän), at det utvivlsomt kun er et Tidsspørgsmaal, naar de paagældende Arter vil blive fundet nærmere ved vore egne Kyster.

Nogen Oversigt over Faunaens Sammensætning, Artsantal o. lg. kan ikke gives nu, men maa vente, til Bearbejdelsen af hele Gruppen foreligger færdig. Der kan dog ikke være Tvivl om, at Tallet af kendte danske Arter vil blive mere end fordoblet.

Følgende Forkortelser er benyttede i Literaturhenvisningerne:

Meinert, Crust. Dan. = Meinert, Crustacea Isopoda, Amphipoda et Decapoda Daniæ: Fortegnelse over Danmarks Isopode, Amphipode og Decapode Krebsdyr. — Naturhistorisk Tidsskrift, 3. Række, 11. Bind, 1877, S. 57—248; 12. Bind, 1880, S. 465—512.

Meinert, „Hauch" = Meinert, Crustacea Malacostraca. — Det videnskabelige Udbytte af Kanonbaaden „Hauch"s Togter, 1890, S. 147—232, med Atlas.

G. O. Sars 1895 = G. O. Sars, An Account of the Crustacea of Norway, vol. 1, Amphipoda, 1895.

Stebbing 1906 = Stebbing, Amphipoda I. Gammaridea. — Das Tierreich, 21. Lief., 1906.

En Stjerne * foran en Art betyder, at den er ny for Danmarks Fauna.

I. Hyperiidea.

A. Filicornia.

Fam. **Hyperiidæ.**

1. *Hyperia galba* Mont.

Hyperia galba G. O. Sars 1895, p. 7, Pl. 2, Pl. 3 fig. 1.
— Galba Meinert, Crust. Dan. p. 91.
— — — , „Hauch" p. 151.

I de ca. 30 Aar, der er forløbet siden Udgivelsen af „Hauch"s Togter, har Museet kun faaet forholdsvis lidet af nyt Materiale af denne Art, og vort Kendskab til Artens Udbredelse er ikke blevet udvidet der igennem. Den gaar gennem Skagerak og Kattegat til Øresund S. f. Helsingør, til Storebelt ved Nyborg, og gennem Lillebelt helt ind i Kielerfjord. Desuden er den fundet i Isefjord, Odensefjord og den vestlige Del af Limfjorden (Sallingsund, Løgstør).

* 2. *Hyperia medusarum* O. Fr. Müll.

Hyperia medusarum G. O. Sars 1895, Pl. 3 fig. 2.

Af denne Art, der ikke tidligere er taget i danske Farvande, foreligger der Exemplarer fra 4 Lokaliteter: i Skagerak er den taget af „Thor“ (9—10—1904, 640 m) 42 Kv.mil N.V$^{3}/_{4}$N. for Hirshals, i Kattegat fra $2^{1}/_{2}$ Kv.mil S.S.V. f. Trindelen, 34 m („Thor“ 11—10—1904) og det „nordlige Kattegat“ uden nærmere Lokalitet (Dr. Johs. Petersen 1899); endvidere fra Storebelt: Hvidegrund ved Nyborg, mellem *Cyanea* 17—9—1917 (Dansk Biol. Stat.). Højst 2 Ex. er taget paa en Gang.

* 3. *Hyperoche medusarum* Kr.

Hyperoche Kröyeri G. O. Sars 1895, p. 9, Pl. 4.

Denne Art er ny for danske Farvande. Der foreligger 3 Fund: 57° 09' N., 7° 46' Ø., 44 m (25 Kv.mil N.N.V.$^{1}/_{2}$V. f. Lodbjerg Fyr) („Thor“ St. 1563, 20—6—1911), Skagens Rev 16—6—1899, og 2 Kv.mil S.S.V. f. Hals Fyrskib, 7 m („Thor“ St. 1587, 30—6—1911). At den kunde findes i disse Farvande var at vente, da den er fundet ved Norges Sydkyst.

* 4. *Themisto abyssorum* Boeck.

Parathemisto oblivia G. O. Sars 1895, p. 10, Pl. 5 fig. 1.

Af denne Art, der hører hjemme i Nordhavets kolde Area med tilhørende Grænseomraader og kun undtagelsesvis træffes længere mod Syd, er der fundet et stort Antal Exemplarer i Skagerak og nogle faa i det nordlige Kattegat; Arten er ny for den danske Fauna. Medens Arten i de arktiske Farvande bliver indtil 17—21 mm, er de danske Exemplarer kun indtil 9 mm, oftest lidt mindre. Alle de danske Exemplarer er taget af „Thor“ med Undtagelse af to Træk (fra „Ingolf“).

Fra Skagerak foreligger den fra ikke mindre end 36 Træk; Havdybden er som Regel > 200 m (200—670 m), kun i enkelte Tilfælde mindre (70, 90, 105, 108, 130, 175, 180 m). Dybden under Overfladen er som Regel ikke noteret, saa at Arten vist oftest er taget nær Bunden; i et enkelt Tilfælde er den dog taget med kun 25 m wire.

4 Gange er den taget i Kattegat (af „Thor“): 10 Kv.mil SØ. t. S. f. Trindelen, 56 m, 25—10—1904; 3 Kv.mil S. t. V. f. Trindelens Fyrskib, 32 m, 22—3—1906; N.Ø. f. Læsø, 70—0 m, 12—3—1903, og 6 Kv.mil Ø. t. N. $^{1}/_{2}$ N. f. Hjelm, (10) 21 m, 8—3—1906. I Kattegat er der kun taget nogle faa Ex. i hvert Træk, i Skagerak derimod ofte i stort Antal, indtil ca. 1000.

De fleste af Ex. er i begge Havomraader taget i den kolde Aarstid (i enkelte Tilfælde var Datoen ikke noteret). Aarstiden for Ex. fra Kattegat er angivet ovenfor; for Skagerak er Datoerne følgende: 17. Feb. (2 Træk); 7.—25. Marts (5 Træk); 3.—7. April (3 Træk); 4. Maj (1 Træk); 20. Juni—8. Juli (8 Træk); 6.—7. Sept. (4 Træk); 9.—21. Okt. (6 Træk); 1.—19. Nov. (4 Træk). ♀ med Æg eller Unger er 7—9 mm; de er fundet paa følgende Aarstider: 17. Feb., 7. Marts, 4. April, 25. Juni, 9.—14. Okt. (4 Træk).

B. Recticornia.

Fam. **Scinidæ**.

* 5. *Scina borealis* G. O. Sars.

Scina borealis G. O. Sars 1895, p. 20, Pl. 8.

Denne Art, der er ny for den danske Fauna (men tidligere er taget ved Mundingen af Christianiafjord), foreligger fra 14 Lokaliteter i den dybe Del af Skagerak, 210—640 m (kun i et enkelt Tilfælde kun 65 m). Dybden under Overfladen er kun noteret en enkelt Gang (600 m w.). 2 Træk er foretaget 29. og 30. April, et enkelt Træk 16. Maj og et 7. Sept.; alle de andre er fra Vinterhalvaaret: 9.—14. Okt. (5 Træk); 17. Feb. (2 Træk); 7. og 19. Marts (2 Træk). I flere Tilfælde har Nettet truffet en Stime.

II. Gammaridea.

1. Fam. **Lysianassidæ**.

[* *Trischizostoma Raschii* Esmark & Boeck.

Trischizostoma Raschii G. O. Sars 1895, pp. 31, 674, Pl. 12.
— nicæense (partim) Stebbing 1906, p 13.
— raschii E. W. Sexton, On the Amphipod Genus Trischizostoma; Proc. Zool. Soc. London, 1908, pp. 385—98; Pl. 17 fig. 13; Pls. 18, 19 figs. 2—11; Pls. 20, 21 figs. 1—13, 15—18 (Lit. og Syn.).

Af denne Art, der tidligere er kendt fra forskellige Steder ved Norges Kyst (Sars l. c.) og fra 50° 37' N., 11° 12' V., 250—542 Fv. (Sexton l. c.), har „Thor" taget et Ex. (20 mm) i Skagerak udfor Hallö, 244—338 m, 9—3—1904. Skønt dette Fund ligger uden for, hvad der selv i videre Forstand kan kaldes dansk Havomraade, anføres det dog her, idet Arten utvivlsomt senere vil blive fundet ogsaa i den midterste Del af Skagerak (den er ikke tidligere kendt fra Skagerak).]

6. *Acidostoma obesum* Bate.

Acidostoma obesum G. O. Sars 1895, p. 38, Pl. 14 fig. 2.
— — Stebbing 1906, p. 14 (Lit. og Syn).
— — Meinert „Hauch", p. 157.

Udbredelsen af denne Art angives i Meinert „Hauch" saaledes: „fra Skagerak gaar den i den østlige Del af Kattegat helt op forbi Anholt til en 8 Kv.mil S. f. denne Ø; Dybden har været fra 110—12 Fv., som oftest nærmere den sidste Dybde, og Bunden ren Slik eller sandblandet Slik".

Af bestemt Materiale af denne Art fandtes fra Danmark kun et enkelt Glas med 9 Ex.; det havde Lokaliteten „Skagerak—Kattegat, 12—110 Fv." og synes altsaa at indeholde det Materiale, som ligger til Grund for Meinert's ovenfor citerede Angivelse. Denne maa imidlertid opfattes med et vist Forbehold; af de 9 Ex. tilhører kun 5 den foreliggende Art, medens 4 temmelig sikkert er *Acidostoma laticorne*.

Materiale, bestemt til Brug for foreliggende Arbejde, haves fra følgende Lokaliteter: 6 Kv.mil N. f. Skagens Fyrskib, 70 Fv., 14—11—1903, 1 Ex. („Thor" St. 156) og 12 Kv.mil N.N.Ø. f. Skagens Fyrskib, 85 Fv., 19—11—1903, 2 Ex. („Thor" St. 164, Dr. A. C. Johansen). Fra Kattegat haves den fra Hjelmens Fyrtaarn i S.V. t. V.$^1/_4$V., 11.8 Kv.mil, 15 Fv., Slik og Sand, Temp. 5.9^0, 1 Ex. („Hauch" St. 370) og Torekov Kirke i N.$^1/_4$Ø., 5.3 Kv.mil, 17 Fv., Slik med lidt Sand, Temp. 5.8^0, 1 Ex. („Hauch" St. 421); desuden haves 3 Ex. fra Kattegat uden Special-lok. Størrelsen er op til 5—7 mm.

Ved Grænsen af det danske Udbredelsesomraade er den fundet spredt ved Sydnorge (Sars l. c.) og ved Bohuslän (Lilljeborg, N. Acta Soc. Upsal., ser. 3, vol. 6, No. 1, 1865, p. 34).

Paa de danske Ex. er 3. Par Uropoder lidt længere end vist paa Sars' Figur.

7. *Acidostoma laticorne* G. O. Sars.

Acidostoma laticorne G. O. Sars, Norske Nordhavs Exp., Crust., vol. 1, 1885, p. 152, Pl. 13 fig 3, 3a.
— — Stebbing 1906, p. 14 (Lit. og Syn.).
non — — Meinert, „Hauch", p. 157.
partim — obesum — — p. 157.

Der kan ikke være megen Tvivl om, at 4 af de af Meinert omtalte Ex. af *A. obesum* (se denne) i Virkeligheden tilhører *A. laticorne*. Lokaliteten er „Skagerak—Kattegat, 12—110 Fv." Bestemmelsen af disse Ex. er paa Grund af den ringe Størrelse (op til ca. 6 mm) ikke absolut sikker; men i hvert Fald er der ingen dyb Indskæring, kun en ringe Indbugtning, i Bagkanten af Telson.

* 8. *Acidostoma nodiferum* K. St.

Acidostoma nodiferum K. Stephensen, Amphip ; „Ingolf"-Exped., vol. III, 8, 1923 (gaar nu i Trykken).
— laticorne Meinert, „Hauch", p. 157.

Af denne Art, der adskiller sig fra *A. obesum* ved at have en Knude paa Ryggen af 1. Urosomesegment, har „Hauch" taget et Ex., ca. $4^1/_2$ mm langt, N.Ø. f. Skagen, Skagetønden i S.S.V. 6 Kv.mil, 132 m, Slik med fint Sand („Hauch" St. 58). Arten er ikke tidligere angivet fra danske Farvande, og Exemplaret er af Meinert bestemt som *A. laticorne*.

[*Opisa Eschrichtii* Kr.

Opisa Eschrichtii G. O. Sars 1895, p, 36, Pl. 14 fig. 1.
— — Stebbing 1906, p. 20 (Lit. og Syn.).

Angives af Stebbing (l. c.) fra Skagerak, uden at det er lykkedes mig at paavise Kilden. Vort Museum indeholder intet Ex. fra danske Farvande.]

9. *Onisimus Edwardsii* Kr.

Onesimus Edwardsii G. O. Sars 1895, p. 105, Pl. 35 fig. 1.
Onisimus — Stebbing 1906, p. 25 (Lit. og Syn.).
— — Meinert, „Hauch", p. 153.

Museet har ikke modtaget Materiale af denne Art siden de faa Ex., der af Meinert er omtalt fra Kattegat (uden nærmere Oplysninger).

* 10. *Onisimus Normani* G. O. Sars.

Onesimus Normani G. O. Sars 1895, p. 106, Pl. 36 fig. 2; p. 686.
Onisimus — Stebbing 1906, p. 26 (Lit.).

Af denne for danske Farvande ny Art har „Thor" (8—7—1907, Dr. Johs. Schmidt) taget 2 Ex., ca. 8 mm, $58^0 20'$ N., $9^0 0'$ Ø., 350 m. At den vilde blive taget i Skagerak kan ikke undre, da den er taget ved Soon i Christianiafjord, 80 Fv.

[*Onisimus plautus* Kr.

Onesimus plautus G. O. Sars 1895, p. 107, Pl. 37 fig. 1.
Onisimus — Stebbing 1906, p. 26 (Lit.).

Angives af Sars fra Bohuslän; vort Museum har intet Ex. fra danske Farvande].

[*Lysianella petalocera* G. O. Sars.

Lysianella petalocera G. O. Sars 1895, p. 51, Pl. 18 fig. 2.
— — Stebbing 1906, p. 31.

Er af Sars taget i Lyngdalsfjord ved Farsund (mellem Mandal og Lister, S. Norge), 100 Fv., men er ikke taget af nogen dansk Expedition i danske Farvande].

11. *Perrierella audouiniana* Bate.

Perrierella audouianiana G. O. Sars 1895, p. 678, Suppl. Pl. 2 fig. 2.
— — Stebbing 1906, p. 41.
Aristias Audouiniana Meinert, „Hauch", p. 152.

Vort Museum ejer kun de faa Ex., der er omtalt af Meinert fra sydlige Kattegat fra Anholt til Hesselø, 10—12½ Fv., Bunden Slik med lidt Sand eller rent Sand med eller uden Smaasten.

[*Normanion Sarsii* Stebb.

Normania quadrimana G. O. Sars 1895, p. 33, Pl. 13 fig. 1.
Normanion quadrimanus — — p. 674.
— stebbingi Stebbing 1906, p. 42.

Angives af Stebbing l. c. fra Skagerak, men er ikke taget af nogen dansk Expedition i danske Farvande].

* 12. *Orchomene serrata* Boeck.

Orchomene serratus G. O. Sars 1895, pp. 62, 682, Pl. 23 fig. 1, Suppl.-Pl. [IV fig. 1.
— serrata Stebbing 1906, p. 44 (Lit.).

„Thor" har taget 3 Ex. i Skagerak: 44 Kv.mil N.V. t. N. f. Højen, 660 m; ny for danske Farvande.

13. *Orchomene Batei* G. O. Sars.

Orchomene Batei G. O. Sars 1895, p. 60, Pl. 22.
— batei Stebbing 1906, p. 45 (Lit.).
Socarnes Vahlii Meinert, „Hauch" p. 151.

Det Exemplar, som Meinert omtaler fra Ø. f. Læsø, Sømærket i Syrodden i N.V.$^1/_2$N. 2.8 Kv.mil, 10—12 Fv., Sand og Slik, og henfører til *Socarnes Vahlii*, har Dr. H. J. Hansen senere undersøgt og vist, at det i Virkeligheden er *Orch. Batei*, der altsaa hermed for første Gang indføres i Danmarks Fauna (*Socarnes Vahlii* bør paa den anden Side stryges, da den aldrig er paavist i danske Farvande).

14. *Orchomene Hanseni* Meinert.

Orchomene Hanseni Meinert, „Hauch" p. 154, Pl 1 figs. 18—24.
— — G. O. Sars 1895, p. 681, Suppl.-Pl. III fig. 2.
— hanseni Stebbing 1906, p. 46.

Af denne Art foreligger stadig kun de 3 Ex. (hvert Ex. fra sin Lok.), som er nævnt i „Hauch"s Togter. De nøjagtige Lokaliteter er ikke angivet af Meinert; de er: (St. 72) Flyndergrundens Vager i V., $1^1/_2$ Kv.mil, $12^1/_2$ Fv., fint Sand og Slik; (St. 120) Anholt Fyrtaarn i S.Ø., 5.9 Kv.mil, $7^1/_2$ Fv., fint Sand med Tang, og (St. 407) Hesseløs Fyrtaarn i S.S.V., 14.2 Kv.mil, 16 Fv., Slik med lidt Sand.

[*Orchomene crispata* Goës.

Orchomene crispatus G. O. Sars 1895, p. 63, Pl. 23 fig. 2
— crispata Stebbing 1906, p. 46 (Lit. og Syn.).

Denne Art er ganske vist aldrig taget paa dansk Havomraade; men den er fundet ved Väderöerne i Bohuslän (Goës: Öfvers. Kgl. Svenska Vet. Akad.s Förhandl., 1865 (1866), vol. 22, p. 519; Zool. Mus. har et Par Ex. herfra), saa at den utvivlsomt ogsaa vil blive fundet i den danske Del af Skagerak. Lever paa dybt Vand, 188—276 m.]

15. *Orchomenella nana* Kr.

Orchomenella ciliata G. O. Sars 1895, p. 69, Pl. 25 fig. 2.
— nanus Stebbing 1906, p. 81 (Lit. og Syn.).
Tryphosa nana Meinert, „Hauch" p. 155.
? — erosa — — p. 155, Pl. 1 figs. 25—29.
? — — Stebbing 1906, p. 741.

I danske Farvande er denne Art mærkelig nok ikke truffet, siden den blev omtalt af Meinert; i „Hauch"s Togter angives den fra Skagerak, Kattegat, Øresund. Dybden er oftest lidt over 10 Fv. (Ydergrænserne er 4 og 125 Fv.), Bunden som Regel slikblandet Sand.

Tryphosa erosa Mein. anføres med Rette ikke af Stebbing 1906 under genus *Tryphosa*, men er henflyttet til p. 741 under Gammarider af usikker Stilling. Imidlertid fremgaar det tydeligt af Meinert l. c., at den hører til Lysianassidæ, om end den ikke kan henføres til genus *Tryphosa*. Ved at undersøge Type-exemplaret mener jeg at kunne fastslaa, at det i Virkeligheden er en *Orchomenella nana*, som er blevet beskadiget (i levende Live?) paa Epimeraldelen af 3. Metasomesegment, saa at den af Meinert særlig fremhævede Artskarakter, der synes at have givet Anledning til Artsnavnet, kun skyldes en tilfældig Beskadigelse.

Den meget kraftige P. 1, hvis Form ikke klart fremgaar af Meinerts Fig. 26, henviser den tydeligt til *Orchomene* eller *Orchomenella*. *Orchomene* er imidlertid alligevel udelukket, da Epistomet (ikke tegnet af Meinert) hos i hvert Fald alle de danske og norske Arter træder mer eller mindre frem foran Overlæben, medens dette absolut ikke er Tilfældet hos det foreliggende Exemplar. Derimod synes der at være fortrinlig Overensstemmelse med *Orchomenella nana*, bl. a. m. H. t. en saa karakteristisk Karakter som den mærkelige accessoriske Flagellum i Ant. 1; Epistomet passer ogsaa aldeles med Sars' Fig., og overhovedet synes der efter en Sammenligning af Meinerts Type-ex. med Sars' Figurer og Tekst ikke at være nogen Tvivl om Rigtigheden af Identificeringen.

Meinerts Type-ex. var taget i det østlige Kattegat: Trindelens Fyrskib i N.V.$^1/_2$N., $1^1/_2$ Kv.mil, $13^1/_2$ Fv., groft brunt Grus.

16. *Orchomenella minuta* Kr.

Orchomenella minuta G. O. Sars 1895, pp. 66, 683, Pl. 24 fig. 1.
— — Stebbing 1906, p. 82 (Lit. og Syn.).
Orchomene minutus Meinert, „Hauch" p. 154.

Heller ikke denne Art er truffet igen, siden den blev omtalt af Meinert (fra Hellebæk).

* 17. *Orchomenopsis obtusa* G. O. Sars.

Orchomenopsis obtusa G. O. Sars 1895, pp. 26, 684, Pl. 26 fig. 2.
— — Stebbing 1906, p. 85.

Taget som ny for danske Farvande af „Thor" St. 285 (14—10—1904) 44 Kv.mil N.V. t. N. f. Højen, 660 m, 1 Ex.

* 18. *Menigrates obtusifrons* Boeck.

Menigrates obtusifrons G. A. Sars 1895, p. 111, Pl. 38 fig. 1.
— — Stebbing 1906, p. 49 (Lit.).

Af denne for Danmark nye Art har „Thor“ (27—6—1911, St. 1575) taget et Ex., ca. 11 mm, 31 Kv.mil N.V.$^3/_4$ V. f. Hirshals, 140 m, Yngeltrawl nær Bund.

19. *Aristias neglectus* H. J. H.

Aristias audouinianus G. O. Sars 1895, p. 48, Pl. 17 fig. 2.
-- neglectus — — p. 675.
— — Stebbing 1906, p. 50 (Lit. og Syn.).
— — Meinert, „Hauch“ p. 153.

Foruden det Ex., der er omtalt af Meinert fra østlige Kattegat („Hauch“ St. 243: Fladens østlige Vager i N.Ø. t. Ø.$^1/_2$Ø. 6.2 Kv.mil, 23 Fv., Grus og lidt Slik, af *Phallusia venosa*), har vort Museum Ex. fra 3 andre Lok. (1 i Skagerak, 2 i Kattegat), nemlig 57° 24' N., 7° 25' Ø., 108 m, 20—6—1911 („Thor“ St. 1566); Anholt Fyrtaarn i N.Ø.$^1/_2$Ø., 15.8 Kv.mil, 10 Fv., Sten, i *Myxilla* sp. („Hauch“ St. 327), og St. Middelgrund: Anholt Fyrskib i N. t. V.$^1/_2$V., 13 Kv.mil, 14$^1/_2$ Fv., Sand med Slik.

* 20. *Ambasia Danielsseni* Boeck.

Ambasia Danielsseni G. O. Sars 1895, p. 46, Pl. 17 fig. 1.
— — Stebbing 1906, p. 51 (Lit.).

Af denne for Danmark nye Art har „Thor“ (St. 285, 14—10—1904) taget et ganske lille Ex. 44 Kv.mil N.V. t. N. f. Højen, 660 m.

* 21. *Anonyx nugax* Phipps.

Anonyx nugax + A. Lilljeborgii G. O. Sars 1895, pp. 88, 90, Pl. 31, 32 fig. 1.
— — — + A. lagena Stebbing 1906, pp. 54—55.

„Thor“ har taget denne Art som ny for Danmark 57° 24' N., 7° 25' Ø., 108 m (St. 1566, 20—6—1911), 5 Ex. op til 14 mm.

22. *Hippomedon denticulatus* Bate.

Hippomedon denticulatus G. O. Sars 1895, p. 56, Pl. 20.
— — Stebbing 1906, p. 59 (Lit.).
— — Meinert „Hauch“ pp. 151—52.

Meinert angiver, at „den udbreder sig fra Skagerak over hele Kattegat indtil den nordligste Del af Sundet og af Storebelt.“ De enkelte Lokaliteter fra hans Materiale er desværre ikke bevaret.

Siden Meinerts Tid har Museet modtaget Materiale af denne Art fra 19 Lok., de fleste fra „Thor“, nogle faa fra Dansk Biol. Stat. Fra Nordsøen foreligger den fra 7 Lok., fra 43 Kv.mil V. f. Horns Revs Fyrskib til 42 Kv.mil N.V.$^3/_4$N. f. Hanstholm; Dybderne er 17, 26 (to Gange), 40, 44, 50 og 108 m. Fra Skagerak foreligger den fra 8 Stat., indtil 16 Kv.mil N.N.Ø. f. Skagens Fyrskib; Dybderne er: 13, 70, 90, 105—115, 130, 140, 150 og 180 m. I Kattegat er den taget paa følgende 4 Lokaliteter: $2^1/_2$ Kv.mil S.S.V. og 10 Kv.mil S.Ø. t. S. f. Trindelen, 34 og 56 m; N. f. Anholt, 19 m, og Hesselø 22 m.

Størrelsen er op til 13 mm, oftest lidt mindre. Næsten altid er der taget flere Ex. paa en Gang, en enkelt Gang (i Nordsøen) over 50. Meget ofte findes den sammen med *Tryphosites longipes* (Nr. 37).

* 23. *Hippomedon propinqvus* G. O. Sars.

Hippomedon propinqvus G. O. Sars 1895, p. 57, Pl. 21 fig. 1.
— — Stebbing 1906, p. 59 (Lit. og Syn.).

Som ny for Danmark har „Thor“ taget denne Art to Gange i Skagerak, nemlig 42 Kv.mil N.V.$^3/_4$V. f. Hirshals, 640 m, 9—10—1904 (1 ♀ med Æg, 8 mm), og V. for Väderöerne, 470 m, 10—3—1904 (nogle mindre Ex.). Den er ikke ny for den svenske Del af Skagerak; efter Stebbing er den nemlig synonym med *Anonyx Holbølli* Bruzelius 1859 (non Kröyer 1846), og denne er taget ved Bohuslän.

* 24. *Hippomedon robustus* G. O. Sars.

Hippomedon robustus G. O. Sars 1895, p. 679, Suppl.-pl. 3 fig. 1.
— — Stebbing 1906, p. 59.

Denne Art, der hidtil overhovedet kun er kendt fra Trondhjemfjord, 94 m, har Dansk Biol. Stat. taget 53 Kv.mil N. t. V.$^1/_4$V. f. Thyborøn Kanal, 105—115 m, 13—7—1911, 1 Ex., og „Thor“ paa 58° 54‘ N., 10° 37‘ Ø., 246 m, 3—7—1907, ca. 10 Ex. Desuden foreligger 2 Ex. fra Danmark uden nærmere Oplysninger. Størrelsen er op til ca. 11 mm.

* 25. *Scopelocheirus Hopei* Costa.

Callisoma Kröyeri G. O. Sars 1895, p. 54, Pl. 19 fig. 2.
Scopelocheirus hopei Stebbing 1906, p. 62 (Lit. og Syn.).

Taget af „Thor“ (ny for Danmark) paa 6 Stat. I Nordsøen er den fundet 32 Kv.mil V.$^1/_4$S. f. Horns Revs Fyrskib, 44 m; i Skagerak 5 Gange i den østlige Del, Dybderne er 130, 200, 240, 246 og 660 m. Størrelsen op til ca. 7 mm.

Den er tidligere kendt fra Bohuslän (Bruzelius 1859, p. 45); Kilden til Stebbings Angivelse „Baltic" har jeg ikke kunnet finde.

26. *Scopelocheirus crenatus* Bate.

Callisoma crenata G. O. Sars 1895, p. 53, Pl. 19 fig. 1.
Scopelocheirus crenatus Stebbing 1906, p. 62 (Lit. og Syn.).
Callisoma crenata Meinert, „Hauch" p. 151.
Tryphosa serra Meinert, „Hauch" p. 156, Pl. 1 figs. 30—38 (teste Stebbing l. c.).

Efter Meinert findes Arten i Skagerak og Kattegat, helt op forbi Anholt. Dybden er 16—110 Fv., Bunden Slik eller sandblandet Slik.

Efter Meinerts Tid har Museet faaet den fra 5 Lok. i Skagerak; Dybderne er 108, 150, 180, 400 og 440—460 m. I flere Tilfælde er der taget flere Ex. paa en Gang.

* 27. *Uristes umbonatus* G. O. Sars.

Pseudotryphosa umbonata G. O. Sars 1895, pp. 83, 686, Pl. 29 fig. 2.
Uristes umbonatus Stebbing 1906, p. 64 (Lit. og Syn.).

Et lille Ex., kun 6 mm (Sars's Ex. er 11 mm), der med nogèn Tvivl er henført til denne Art, er af „Thor" taget i Skagerak V. f. Väderöerne, 470 m. Det adskiller sig fra Sars' Beskrivelse og Figurer især ved den mindre spidse Sidelap paa Hovedet og ved at mangle umbo; men dette er muligvis kun ungdommelige Karakterer. Arten er tidligere taget en Gang i Skagerak paa ca. 270 m (Sars).

* 28. *Centromedon pumilus* Lilljb.

Centromedon pumilus G. O. Sars 1895, p. 100, Pl. 34 fig. 2.
— — Stebbing 1906, p. 66.

Ny for Danmark. „Thor" har taget et Ex. i Skagerak 44 Kv.mil N.V. t. N. f. Højen, 660 m. Er tidligere kendt fra Bohuslän (Lovèn, teste Sars).

29. *Tryphosa Sarsii* Bonnier.

Tryphosa nana G. O. Sars 1895, p. 76, Pl. 27 fig. 1.
— sarsi Stebbing 1906, p. 70 (Lit. og Syn.).
— Hørringii Meinert, „Hauch" p. 156.
— nanoides — — p. 156.

Alle de Exemplarer, der i „Hauch"s Togter er bestemt som *T. Hørringii*, tilhører i Virkeligheden nærværende Art. Den største

Del af Materialet har nu ikke mere den oprindelige Lokalitetsbetegnelse bevaret. Kun ved 5 Tuber (fra Kattegat) er Lokalitetsbetegnelserne endnu bibeholdt; de er følgende: (St. 232) Sømærket paa Syrodden i N.V.$^1/_2$N., $2^1/_2$ Kv.mil, 8 Fv.; (St. 74) Trindelens Fyrskib i N.Ø. t. Ø.$^1/_2$Ø., 4 Kv.mil, 11 Fv.; (St. 106) Trindelens Fyrskib i Ø.$^3/_4$N., 4.6 Kv.mil, $10^1/_2$ Fv.; (St. 141—142) Fjellerup Kirke i S.S.Ø., 4 Kv.mil, 4 Fv., og Udbyhøj Landbaake i V. t. N.$^3/_4$N., 4 Kv.mil, 4 Fv.; (St. 200) Fornæs Fyr i S. t. V.$^1/_2$V., 14 Kv.mil, 7 Fv. Bunden er ren eller blandet Sandbund.

Se iøvrigt nedenfor ved *T. Hørringii.*

Ogsaa Meinerts Ex. af „*T. nanoides*" tilhører *T. Sarsii;* de er fra „Hauch" St. 106, Trindelens Fyrskib i Ø.$^3/_4$N., 4.6 Kv.mil, $11^1/_2$ Fv.

* 30. *Tryphosa Hørringii* Boeck.

Tryphosa Hørringii G. O. Sars 1895, p. 77, Pl. 27 fig. 2.
— høringii Stebbing 1906, p. 71 (Lit. og Syn.).
non — Hørringi Meinert, „Hauch", p. 156 (er *T. Sarsii*).

Til Trods for, hvad Meinert skriver om sine tidligere Fejltagelser m. H. t. nærværende Art, er det ikke lykkedes i vort Museum at finde et eneste Ex., som Meinert kan have benyttet; alt vort Materiale er nyere, og Arten maa derfor vistnok anses for ny for Danmarks Fauna.

Arten er kun taget i Skagerak og kun af „Thor"; Lokaliteterne er: (St. 1569, 21—6—1911): 52 Kv.mil N.N.V.$^1/_4$V. f. Hanstholm, 440—460 m; (St. 273, 9—10—1904) 42 Kv.mil N.V.$^3/_4$N. f. Hirshals, 640 m; (St. 294, 9—9—1904) 57° 54' N., 7° 38' Ø., 400 m; (St. 1566, 20—6—1911) 57° 24' N., 7° 25' Ø., 108 m; (St. 1569, 21—6—1911) 57° 48' N., 7° 48' Ø., 440—460 m; (14—10—1904) 39 Kv.mil N.V. t. N. f. Højen, 525 m; (14—10—1904) 33 Kv.mil N.V. t. N. f. Højens Fyr, 395—425 m.

31. *Tryphosa nanoides* (Lilljb.?) G. O. Sars.

Tryphosa nanoides G. O. Sars 1895, p. 79, Pl. 28 fig. 2.
— — Stebbing 1906, p. 71 (Lit. og Syn.).
non — — Meinert, „Hauch" p. 156 (er *T. Sarsii*).

De af Meinert anførte Ex. af *T. nanoides* tilhører i Virkeligheden *T. Sarsii.* Alligevel hører Arten til den danske Fauna, idet „Thor" (St. 285, 14—10—1904) har taget et enkelt Ex. i Skagerak, 44 Kv.mil N.V. t. N. f. Højen, 660 m.

(*Tryphosa erosa* Meinert er utvivlsomt et beskadiget Ex. af *Orchomenella nana* Kr., se denne [Nr. 15, p. 12]).

* 32. *Tmetonyx cicada* Fabr.

Hoplonyx cicada G. O. Sars 1895, p. 92, Pl. 32 fig. 2.
Tmetonyx — Stebbing 1906, p. 74 (Lit. og Syn.).

Som ny for danske Farvande (men kendt fra Norge lige fra Kristiania til Vadsø) er denne Art taget i stort Antal af „Thor" paa en enkelt Station i Skagerak: „Thor" St. 1575 (27—6—1911), 31 Kv.mil N.V.$^3/_4$V. f. Hirshals, 140 m (Materialet indeholder flere ♀ med Æg), og i et enkelt Ex. paa en anden Station (St. 1566, 20—6—1911): 42 Kv.mil N.V.$^3/_4$V. f. Hanstholm, 108 m. Exemplarerne adskiller sig fra Sars' Figur (l. c.) ved, at den nederste Del af Coxalpladen paa 4. Par Ben er noget sværere end vist af Sars.

* 33. *Tmetonyx similis* G. O. Sars.

Hoplonyx similis G. O. Sars 1895, p. 93, Pl. 33 fig. 1.
Tmetonyx — Stebbing 1906, p. 76.

Denne Art er ny for danske Farvande. „Thor" har taget den 4 Gange i Skagerak: 58° 32' N., 4° 18' Ø., 280 m, 2 Ex.; 57° 24' N., 7° 25' Ø., 108 m, 1 Ex.; 6 Kv.mil N. f. Skagens Fyrskib, 130 m; en Stat. uden nærmere Angivelse af Lokalitet, 140 m, 1 Ex. Af Dansk Biol. Station er den taget 2 Gange i Kattegat: S.S.V. f. Anholt, 20 m (Kattegat St. 30, 8—6—1912), 1 Ex., og i det dybe Parti omtrent midt imellem Læsø og Varberg, 30—34 m (Kattegat St. 40, 6—8—1912), 1 Ex.

* 34. *Tmetonyx acutus* G. O. Sars.

Hoplonyx acutus G. O. Sars 1895, p. 95, Pl. 33 fig. 2.
Tmetonyx — Stebbing 1906, p. 75.

„Thor" har (St. 1575, 27—6—1911) 31 Kv.mil N.V.$^3/_4$V. f. Hirshals, 140 m, taget 2 Ex., der maa henføres til denne Art; men de adskiller sig fra Sars' Figur ved, at Coxalpladen i 4. Par Ben (Sars: p. 2) ikke er saa jævnt buet i det nederste Forhjørne, idet Forkanten er omtrent lige, saa at den under en tydelig Vinkel støder til den ligeledes omtrent lige Underkant. Ny for danske Farvande (er heller næppe taget ved Sydnorge).

* 35. *Tmetonyx leucophthalmus* G. O. Sars.

Hoplonyx leucophthalmus G. O. Sars 1895, p. 97, Pl. 34 fig. 1.
Tmetonyx — Stebbing 1906, p. 76.

„Thor“ har taget et lille Ex. af denne Art (ny for Danmark) 39 Kv.mil N.V. t. N. f. Højen, 525 m.

* 36. *Tmetonyx cæculus* G. O. Sars.

Hoplonyx cæculus G. O. Sars 1895, p. 98, Pl. 35 fig. 1.
Tmetonyx — Stebbing 1906, p. 76.

Skønt denne Art tidligere kun er kendt fra Trondhjemsfjord (ialt i 2 Ex.), har „Thor“ taget den, delvis i stort Antal, paa 7 Stationer i Skagerak, fra 42 Kv.mil N.V.$^3/_4$N. f. Hirshals helt ind til Väderöerne; Dybden er 350—660 m.

37. *Tryphosites longipes* Bate.

Tryphosa longipes Meinert, „Hauch“ p. 157.
Tryphosites — G. O. Sars 1895, p. 81, Pl. 28 fig, 3, Pl. 29 fig. 1.
— — Stebbing 1906, p. 77 (Lit.).

Denne Art kendtes tidligere fra et enkelt Fund i Vesterhavet, V.N.V. f. Hanstholm, og fra 9 Fund fra „Hauch“s Togter i den østlige og midterste Del af Kattegat indtil udfor Fornæs Fyr; Dybden 125—10 Fv.

Ved de senere Undersøgelser i danske Farvande er den (væsentlig af „Thor“, enkelte Gange ogsaa af Dansk Biol. Stat.) taget temmelig ofte ved vore Kyster. I Nordsøen er den fundet paa følgende Steder: 43 Kv.mil V. og 32 Kv.mil V.$^1/_4$S. f. Horns Revs Fyrskib, 50 og 44 m, og 50 Kv.mil V. t. S. f. Thyborøn, 40 m. Fra Skagerak foreligger 14 Fund, (13) 70—660 m (nøjere specificeret er Dybderne saaledes: 13, 70, 90, 95, 108, 125, 140 (to Gange), 155 (to Gange), 170, 180, 246 og 660 m). I Kattegat er den i de senere Aar kun taget 2 Gange, nemlig 2$^1/_2$ Kv.mil S.S.V. og 10 Kv.mil S.Ø. t. S. for Trindelen, 34—56 m.

Bunden skal som Regel være ren Slik eller sandblandet Slik, sjældent rent Sand.

Størrelsen indtil 13 mm. Meinert angiver, at den oftest kun er taget enkeltvis; men de senere Fund kan indeholde 10—15 Ex. i et enkelt Skrab. Meget ofte er den taget sammen med *Hippomedon denticulatus* (Nr. 22, p. 14).

* 38. *Lepidepecreum longicorne* Bate & Westwood.

Lepidepecreum carinatum G. O. Sars 1895, pp. 113, 687, Pl. 38 fig. 2, Pl. 39 fig. 1.
— longicorne Stebbing 1906, p. 80 (Lit. og Syn.).
— mirabile Meinert, „Hauch“ p. 153, Pl. 1 fig 7- 12.

Arten er taget 2 Gange af „Thor“ i Nordsøen (St. 253, 28—9—1904, 32 Kv.mil V.$^1/_4$S. f. Horns Revs Fyrskib, 44 m; St. 983, 30—4—1907, 5 Kv.mil N.V.$^1/_2$N. f. Horns Revs Fyrskib, 17 m, intermediært, med Yngeltrawl) og en Gang af Dansk Biol. Stat., 15 Kv.mil N. t. V.$^1/_4$V. f. Thyborøn, 30—32 m, 13—7—1911. Meinerts Type-Ex. til *L. mirabile* blev taget N. f. Læsø, Nordre Rønner i V. 5.5 Kv.mil, 13 m, Sand og Smaasten. Af danske Expeditioner er den ikke taget i Skagerak; men Sars (l. c.) nævner den fra Mærdø udenfor Arendal.

Kun 1—2 Ex. er taget hvert Sted; Længden er 6—7 mm.

14—4—1923.

Gephyreen des Golfes von Siam.

Von

Prof., Dr. **W. Fischer**,

Bergedorf bei Hamburg.

Alle Arten dieser von der dänischen Siam-Expedition (1899—1900) stammenden Sammlung, mit Ausnahme von *Thalassema mortenseni* n. sp., kommen auch im übrigen indischen Ozean vor. Naturgemäss zeigen sich vor Allem verwandtschaftliche Beziehungen unserer Gruppe zu der Fauna der benachbarten Meeresteile.

Aspidosiphon steenstrupi Diesing.

Fundorte: Koh-Kahdat, 1—5 Fd., Sand, Steine $^{19}/_{2}$ 1900; ibidem, 5 Fd., $^{17}/_{2}$ 1900 und 1 Fd. $^{11}/_{1}$ 1900. Nordspitze von Koh-Chang, 1 Fd., alte Korallenblöcke, $^{15}/_{1}$ 1900. Dr. Th. Mortensen.

Aspidosiphon steenstrupi Diesing. var. *ambonensis* Augener.

Fundorte: Nordspitze von Koh-Chang, 1 Fd., in *Spondylus ocellatus* Rieve, $^{9}/_{3}$ 1900; Koh-Kahdat, 1—5 Fd., Sand, Steine $^{9}/_{1}$—$^{19}/_{2}$ 1900; Koh-Kram, 30 Fd., $^{23}/_{2}$ 1900; Koh-Kong, 10—15 Fd., $^{24}/_{1}$ 1900. Dr. Th. Mortensen.

Die Varietät findet sich ebenso wie die Hauptart in Bohrlöchern der Korallen in geringer Tiefe, bisweilen auch in Schnecken- oder Muschelschalen. Sie unterscheidet sich von der Hauptart durch ihre einfachen Hautkörper, die dort zu je 2—3 kombiniert sind (Fischer, 1922, p. 23), durch den helleren Rüssel und den abweichenden Verlauf der Verdickungsleiste der Haken (1922, Taf. 3, Fig. 24). Sie ist, wie die Hauptart, im indischen Archipel weit verbreitet (1922, p. 23 u. 24).

Aspidosiphon tortus Sel. et Bül.

Fundorte: Koh-Chuen, 30 Fd., $^{23}/_{2}$ 1900; Koh-Kam, 5 Fd., Kies $^{6}/_{2}$ 1900. Dr. Th. Mortensen.

Das Tier von Koh-Chuen ist mit eingezogenem Rüssel 2 cm lang; es steckte in einer geraden dünnen und zerbrechlichen Kalkröhre, die es scheinbar selbst angefertigt hatte. Das zweite, von Koh-Kam, dessen Rüssel ausgestreckt war, hat eine Körperlänge von 4 mm, eine Rüssellänge von 5 mm. Körper und Rüssel sind also fast gleichlang. Beide Tiere entsprechen in der Lagerung und Form der die Hautkörper bedeckenden Cuticularplättchen der Zeichnung Selenka's (1883, Taf. XIV. Fig. 196). Auch finden sich, wie bei diesem, zwischen den Hautkörpern liegende zerstreute Cuticularplättchen, die bei schwacher Vergrösserung als dunkle Punkte erscheinen. Die Schilder sind bräunlich-gelb gefärbt, der deutlich gefurchte vordere Schild umgreift die Bauchseite nicht vollständig, er ist an der Ventralseite von der übrigen Haut abgesetzt. Diese Befunde weichen von denen Selenka's ab, welcher sagt: „Der vordere Schild ist dunkelbraun, von ovaler Form; seine ventrale Hälfte ist von dicht nebeneinander stehenden Warzen eingenommen, welche dorsalwärts in Furchen übergehen." Das Hinterschildchen ist flach, mit 33—34 teils ganz, teils halb durchgehenden Furchen. Der Rüssel ist hinter der Hakenzone vollständig mit Stacheln besetzt. Segmentalorgane sind 2 vorhanden. Selenka fand bei seinem einzigen Exemplare nur ein linkseitiges (1883, p. 120). Sicherlich war das eine Abnormität, die auch hin und wieder bei anderen Gattungen auftritt. Alle übrigen Aspidosiphonen haben immer regelrecht 2 Segmentalorgane (1 Paar). Leider hat Selenka diese Abnormität als Einteilungsgrund für die Bestimmungstabelle der Arten (1883, p. 14) verwendet, so dass Anfänger leicht irregeführt werden können.

Dendrostoma signifer Sel. et de Man.

Fundorte: Koh-Chang, Steine, bei starker Ebbe, $^{14}/_{1}$ 1900; Bucht am Südende von Koh-Chang, zwischen grossen Muscheln, $^{11}/_{3}$ 1900; Küste bei Lem Ngob $^{30}/_{12}$ 1900; Westküste von Koh-Chang, alte Korallenblöcke, 1 Fd., $^{17}/_{1}$ 1900; Koh-Kahdat, alte Korallenblöcke, $^{18}/_{2}$ 1900; Koh-Kahdat, 5 Fd, $^{17}/_{2}$ 1900. Dr. Th. Mortensen.

Alle Tiere entbehren der Haken und zeigen 5 Tentakelhauptstämme wie die von Selenka bei den Philippinen und Singapore festgestellten, während die afrikanischen, australischen und neuseeländischen Exemplare Haken (Fischer, 1914 a p. 72; ders. 1914, b, p. 10 und 1922, p. 19) aufweisen, und 4 oder 6 Tentakelhauptstämme besitzen. Die Art ist im indischen Ozean weit verbreitet.

Phascolosoma pellucidum Kef.

Fundorte: Nordspitze von Koh-Chang, 1 Fd., alte Korallenblöcke, $^{15}/_{1}$ 1900; Koh-Kahdat, 1—5 Fd., Sand, Steine, $^{9}/_{1}$ 1900; Koh-Kram, 30 Fd., $^{23}/_{2}$ 1900. Dr. Th. Mortensen.

Häufig im südchinesischen Meere und im indischen Archipel.

Physcosoma agassizi Kef.

Fundorte: Nordspitze von Koh-Chang, 1 Fd., alte Korallenblöcke, $^{15}/_{1}$ u. $^{9}/_{2}$ 1900; Koh-Kahdat, 1—5 Fd., Sand, Steine, $^{9}/_{1}$ u. $^{10}/_{2}$ 1900. Dr. Th. Mortensen.

Die Würmer sassen vielfach noch in Bruchstücken von Korallen. Die Anordnung der Cuticularplättchen auf den Papillen entsprach der Zeichnung Taf. I Fig. 3 in meinen Gephyreen des Stockholmer Reichsmuseums (1922). Die Art ist circumtropisch.

Physcosoma nigrescens Kef.

Fundorte: Nordspitze von Koh-Chang, 1 Fd., alte Korallenblöcke, $^{15}/_{1}$ 1900. Dr. Th. Mortensen.

Die Art ist in allen tropischen Meeren weit verbreitet.

Physcosoma pelma Sel. et de Man.

Fundort: Nordspitze von Koh-Chang, 1 Fd., alte Korallenblöcke, $^{15}/_{1}$ 1900. Dr. Th. Mortensen. 2 Exemplare.

Die Art ist von Selenka und de Man, eingehender von Augener (1903, p. 311) beschrieben worden. Dessen Beschreibung deckt sich mit meinen Befunden, besonders betreffs der Länge des Rüssels, der Form und Farbe des Körpers und der Anordnung der Tentakel. Ich schätze die Zahl derselben auf 45—50 (Augener gibt „etwa 44“ an). Sie sind weisslich, am Grunde zimmetbraun, der sie umgebende Hautkragen ist ebenfalls weiss und ventral zu einer Unterlippe erweitert (1903, p. 18). Der hakenlose Rüssel ist mit kegelförmigen Papillen besetzt, die besonders am Grunde desselben stark hervortreten und ihre Spitzen nach hinten kehren; sie sind mit grossen Chitinplättchen bedeckt (Selenka 1883, Taf. VII, Fig. 102). Am Körper stehen sie besonders am Vorder- und Hinterende ziemlich dicht, im mittleren Teile weitläufiger. Es finden sich zwischen ihnen die für diese Art charakteristischen, eigentümlich geformten, körnigen, eckigen Cuticularplättchen. Dunkle Längslinien der Papillen, die Augener erwähnt, konnte ich nicht sehen. Die 19—21 Längsmuskeln sind besonders im vorderen und hinteren Körperteile deutlich sichtbar, ebenso treten die Quermuskeln im ersten Körperdrittel stark hervor. Sonst sind Abweichungen von den Beschreibungen der erwähnten Autoren nicht zu konstatieren. Die Art findet sich sonst noch bei den Philippinen, Java und Mauritius (Selenka), bei Amboina (Augener) und bei den Laccadiven und Malediven (Shipley).

Sipunculus titubans Sel. et Bülow.

Fundort: Koh-Mak, 5—6 Fd., 17/2 1900. Dr. Th. Mortensen.

Es liegt mir das Vorderende eines grauweisslich gefärbten *Sipunculus*-Exemplares vor, das die Ansatzstellen der Retraktoren noch enthält. Innwendig sieht man 26 Längsmuskelbündel. Der Enddarm mündet zwischen dem 4 und 5 Bündel nach aussen, die Segmentalorganöffnungen liegen vor dem After. Die Organe selbst sind in ihrer oberen Hälfte durch Mesenterien an die Körperwand geheftet, die Retraktoren entspringen in gleicher Höhe, die ventralen vom 2—5, die dorsalen vom 7—11 Längsmuskelbündel. Das Nervensystem hebt sich in der Rüsselregion von der Haut ab. Alle diese Befunde entsprechen der Beschreibung Selenka's von *Sipunculus titubans* Kef. Über die Verwandtschaftsverhältnisse dieser Art zu den Arten *robustus* und *nudus* ist man noch im Zweifel. Gerould sagt (1913, p. 429): "It will readily be seen, that these specimens suggest that *S. titubans* is a variable form closely resembling *S. nudus* and *S. robustus* Keferstein, from which, in some cases at least, it can hardly be distinguished". Eine Klärung dieser Verhältnisse wird hoffentlich bald durch eine bevorstehende Veröffentlichung nachgelassener Schriften Spengel's erfolgen. Die Art ist von Selenka bei Puntarenas (Costarica?) und von mir bei St. José di Guatemala, Madagaskar (Nossi-Bé) und Accra (Westafrika) konstatiert worden. Die von Gerould angegebenen Fundorte: Barbados, Uwea (Wallis-Island) Opalu (Samoa), Pelew-Inseln, Palaos, Amboina, Timor- und Lyly-Islands sind von ihm den Fundortsangaben Selenka's (1883, p. 99) über *Sip. robustus* entlehnt, den er mit *Sip. titubans* identificiert.

Cloeosiphon aspergillum Quatrefages.

Fundort: Koh-Kahdat, 5 Fd., 17/2 1900. Dr. Th. Mortensen.

Das vorliegende Exemplar ist 3.3 cm lang, der Rüssel ist zur Hälfte eingezogen und besitzt einen Kalkring mit einigen stark ausgezogenen Facetten, wie sie Sluiter (1889, Taf. 4 Fig. 13) bei seiner später wieder eingezogenen Art (Fischer 1922, p. 32) *Cl. javanicus* abbildet. Die Körperhaut ist hellbraun, unter dem Kalkring dunkeler, und so durchsichtig, dass die Segmentalorgane in ihrer ganzen Länge sichtbar sind. Innwendig beobachtete ich wieder (1922, p. 33) ein Divertikel und den am Darme in der Höhe des Divertikels ansetzenden Befestiger, der durch die Äste des Retraktors hindurchgeht und sich links vom Nervenstrang ansetzt.

Thalassema mortenseni n. sp.

Fundorte: Koh-Kong, 8 Fd., Schlammboden, 23/1 1900; Koh-Kut, 30 Fd., Schlamm, 28/1 1900. Dr. Th. Mortensen.

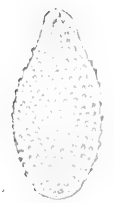

Fig. 1.

Fig. 2.

Fig. 3.

Diese neue Art (Fig. 1, nat. Gr.) unterscheidet sich von den anderen bekannten durch ihre aüsserst zarte, durchsichtige Körperhaut, die fast gleichmässig mit reihenweise angeordneten, ausserordentlich grossen, lang ausgezogenen, fast dreieckigen Papillen besetzt ist, die ihre Spitzen nach vorn kehren. (Fig. 1 u. 2). Die massenhaft vorhandenen schmutziggrünen wurstförmigen Kotmassen des Darmes schimmern durch die Haut und bedingen die Farbe des Tieres. Der Rüssel fehlte beiden Exemplaren. Am Vorderende bemerkt man 2 goldgelbe Hakenborsten und eine Ersatzborste. Die Papillen sind verschieden gross (Fig. 2) und fast überall gleichmässig verteilt, nur am Hinterende, wo sie bei den meisten Arten grösser sind und dichter stehen als am übrigen Körper, sind sie lockerer gestellt und ausnahmweise klein. Da die Haut zart ist, lässt sich eine Ganzfärbung leicht erzielen. Man sieht dann am Rande der Papillen dicht gedrängte Hautdrüsen (Fig. 3 dr.), je 2—4 von einer birnenförmigen Hülle umschlossen. Zwischen den Papillen befinden sich in der Haut ähnliche Gebilde (Fig. 3 dr.[1]), die Sluiter bei *Thalassema diaphanes* (1889, p. 245 und Taf. 3 Fig. 2b und 4b) als Sinnesbecher deutet, da er an sie herantretende Nervenäste beobachtet haben will. Innwendig sieht man viele Retraktoren der Hakenborsten, aber keinen Interbasalmuskel, hinter diesen 1 Paar ziemlich langer freier Segmentalorgane; ein Trichter oder Spiraltubus am Grunde derselben konnte nicht beobachtet werden. Der Verlauf des Darmes war nicht genauer zu konstatieren, da die zarte Darmhaut beim Ausspülen der aufgeschnittenen Tiere zerriss. Er schien, nach der Lage der Inhaltsmassen zu urteilen, keinen von dem der übrigen Thalassemen abweichenden Verlauf zu haben. Am Ende desselben befinden sich 2 kurze unverzweigte Analschläuche mit einzeln stehenden Trichtern. Geschlechtsorgane wurden nicht beobachtet.

Thalassema diaphanes Sluiter mit der unsere Art sonst grosse Ähnlichkeit hat, besitzt zum Unterschied von ihr ovale, sich nicht über die Haut erhebende Papillen. Die übrigen Thalassemen mit 1 Paare von Segmentalorganen und kontinuierlicher Muskulatur, also *Th. faex* Selenka, *Th. lankasteri* Herdmann, *Th. gigas* Max Müller und *Th. verrucosum* Studer haben andere Hautbeschaffenheit und anders beschaffene Papillen als die vorstehende Art.

Ausser diesen sicher bestimmbaren Arten war noch ein Bruchstück eines *Aspidosiphon* vorhanden, das gewisse Ähnlichkeiten in seiner inneren Beschaffenheit mit *Aspidosiphon gracilis* Baird aufwies aber in der Beschaffenheit der aüsseren Haut wesentlich von den Angeben Selenka's (1883, p. 122) und Augener's (1903, p. 319) abwich. Die ziemlich feste Haut war bei diesem Tiere braun und weiss gestreift auch Querstreifen resp. Furchen von gleicher Farbe waren zu sehen, so dass eine Felderung der Haut entstand. Die Felder trugen je einen Hautkörper, der mit vielen dicht an einander gelagerten kleinen, ovalen Cuticularplättchen bedeckt war. Der Vorderschild und der Rüssel fehlte. Der Hinterschild hatte 22—25 Furchen. Die Segmentalorgane waren der Körperwand angeheftet. Ihre Mündungen waren nicht zu konstatieren, ebensowenig die des Darmes. Hinten heftete sich derselbe durch einen starken Befestiger in der Mitte des Hinterschildes an. Zwei starke Retraktoren entsprangen dicht über dem Endschild und vereinigten sich erst ziemlich weit vorn im Körper.

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17—4—1923.

Respirationsforholdene hos Hydrocampa nymphaeata (Larve og Puppe).

Af

Rich. Ege.

Fra Universitetets dyrefysiologiske Institut og Universitetets ferskvandsbiologiske Laboratorium.

I Aarene 1913, 14 og 15 besøgte jeg gentagne Gange Universitetets ferskvandsbiologiske Laboratorium og havde her Lejlighed til under Wesenberg-Lunds kyndige biologiske Vejledning at underkaste en Del Vandinsekters respiratoriske Forhold en nærmere fysiologisk Analyse.

Fig. 1. *Hydrocampa nymphaeata.* Forstørret. (Efter Grünberg.)

Resultaterne heraf foreligger dels offentliggjort i „Videnskabelige Meddelelser fra D. Naturh. Forening" Bd. 66, 1915[1]), dels i „Zeitschrift für allgemeine Physiologie" Bd. 17, 1915[2]), men desuden var en Undersøgelse over Hydrocampa-Larven og Puppen saa vidt afsluttet, at jeg kunde forelægge disse Undersøgelser i Naturh. Forening (1916—17).

Paa ganske enkelte Punkter mente jeg dog, at disse Undersøgelser kunde trænge til visse supplerende Forsøg, hvorfor Offentliggørelsen blev udsat til et senere Tidspunkt.

Siden 1915 har jeg imidlertid været optaget af helt andre fysiologiske Spørgsmaal, der ganske har lagt Beslag paa min Tid, hvorfor jeg har besluttet mig til at forelægge mine Forsøgsresultater nu til Trods for deres Ufuldstændighed.

De første Bidrag til Hydrocampa-Larvens og Puppens Biologi og Fysiologi er givet af Reaumur. Senere er de studeret af G. W. Müller og Portier.

1) On the respiratory conditions of the larva and pupa of Donaciae.

2) On the respiratory function of the air stores carried by same aquatic insects.

Endelig har Wesenberg-Lund dels i „Wohnungen und Gehäusebau der Süsswasserinsekten[1]), dels i „Insektlivet i ferske Vande“[2]) givet en — væsentlig paa egne Undersøgelser — samlet Fremstilling af Dyrets Levevis og navnlig dets Respirationsforhold.

I Fremstillingen af de biologiske Forhold støtter jeg mig til W. L.s Fremstilling.

Sommerfuglen lægger sine Æg paa Undersiden af Vandplanters Flydeblade. Ganske kort efter, at Larven er kommen frem, bygger den sig af forbiflydende Andemadsblade (og lignende) en primitiv

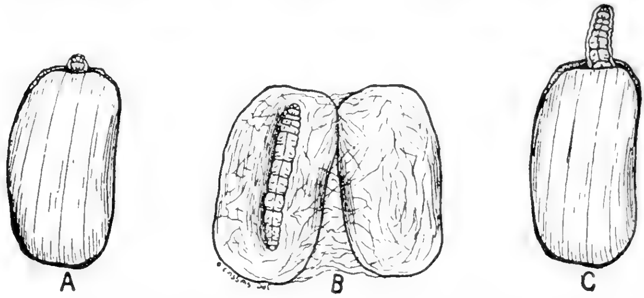

Fig. 2. *Hydrocampa nymphaeata*. A. Larven stikkende Hovedet ud af sit Hus. B. Huset lukket op; man ser Spindetraadene og Larven. C. Larven rager ud af Røret; Linien udenom Larven angiver Luftlaget. Naturlig Størrelse. (Efter Portier).

Bolig. Loftet dannes af det Flydeblad, den sidder under, Gulvet af Andemadsbladene.

Senere paa Aaret bygger Larven det Hus, der er karakteristisk for de ældre Stadier, idet den danner sig sin Bolig af to Bladstykker, som den har skaaret ud af Potamogeton natans; disse spindes sammen med de konkave Undersider af Bladet mod hinanden. Herved bliver der en lille Plads til Larven, denne er paa dette Tidspunkt lille og hele Huset er næppe 1 cm langt. Spindet, der holder Bladstykkerne sammen, synes ikke at være vandskyende. Boligen er i hvert Tilfælde fuld af Vand.

Direkte Respirationsforsøg angaaende dette Larvestadie har jeg ikke foretaget, men der kan ikke være Tvivl om, at Larven paa dette Tidspunkt maa faa den nødvendige Ilt ved Diffusion fra Vandet (Kulsyren skaffes bort paa tilsvarende Maade).

[1]) Fortschritte d. naturw. Forshhung. 9. 1913.

[2]) København 1915.

Saaledes som Reaumur og G. W. Müller gør opmærksom paa, er Spiraklerne lukkede, og Huden er ikke vandskydende.

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Næste Foraar træffer vi paany Larven i en Bolig bygget af Vandaksbladstykker. Boligen er større; men hvad der navnlig er karakteristisk er, at saavel denne som navnlig Larven er vandskyende.

Boligen er delvis luftfyldt og selve Larven er, selv naar dens Legeme beflnder sig frit i Vandet, omgivet af en ret betydelig — sølvglinsende — Luftkappe.

Spiraklerne er nu aabne, og Larven svarer ganske til en alm. Sommerfuglelarve; at Dyret nu er luftaandende, er hævet over enhver Tvivl.

Der kan næppe heller være nogen Tvivl om, at Larven udnytter den Luft, der findes i dens Bolig.

Men hvorledes fornyes da Luften i Larvens Bolig?

Herom findes der to Anskuelser; den ene, der dog gør et noget søgt Indtryk, stammer fra Portier; den gaar ud paa, at der bestaar en Symbiose mellem Larven og Potamogenton-Bladene. Larven skulde levere Bladene Kulsyre til Brug ved deres Kulsyreassimilation, og Planterne skulde til Gengæld levere Dyrene den ved Kulsyreassimilationen frigjorte Ilt.

Muligvis kunde man ogsaa tænke sig, at Ilten skulde fornyes ved en Diffusion gennem Potamogentonblade fra Atmosfæren, idet Boligens Loft stadig — som et Flydeblad — ligger ganske tørt i Vandets Overflade.

Portier skriver: „Il paraît donc difficile de comprendre par quel mécanisme l'oxygène peut se renouveler à l'intérieur de cette cellule étanche de laquelle les stigmates ne sortent pas.

On pourrait penser que des échanges gazeux se font par osmose, à travers la paroi des feuilles qui constituent l'habitation. Je crois qu'il faut plutôt songer à un autre mécanisme qui est le suivant: l'assimilation chlorophylienne continuerait à se produire au niveau des valves et il s'établirait ainsi une sorte de symbiose entre le fragment de plante aquatique et l'insecte qui s'en est emparé, celui-ci produisant du gaz carbonique qui serait bientôt décomposé par la plante.

Il est, en effet, très remarquable de constater que le fourreau conserve sa couleur verte et les fragments de feuille l'apparance de la vie, tant que la chenille vivante l'habite. Si on vient à l'enlever, les valves ne tardent point à se flétrir même lorsqu'on les laisse au contact de l'eau . . .

Il semble bien que l'oxygène nécessaire à la respiration provienne surtout de celui qui résulte de l'assimilation chlorophylienne des valves du fourreau ou de la feuille servant de support à la cellule."

I Modsætning hertil opstiller Wesenberg-Lund en overmaade simpel Forklaring baseret paa Iagttagelser over Larvens Liv og Færden i Naturen og i Aquarier.

Luften henter Dyret fra Atmosfæren derved, at Larven af og til strækker sin Forkrop ud af Boligen op i Vandskorpen, saaledes at denne Del af Dyret befinder sig i den fri Luft.[1])

De følgende Forsøg vil, saaledes som man vil se, ganske bekræfte Wesenberg-Lunds Hovedtanke.

Dog synes Wesenberg-Lund ikke ganske at turde benægte de andre Muligheder for Luftfornyelsen. Han skriver saaledes i „Insektlivet" p. 208: „En anden Anskuelse: at de grønne Bladstykker skulde forsyne Larven med Ilt, og at omvendt den af Larven producerede Kulsyre skulde optages af Bladstykkerne, lader sig indtil videre ikke afkræfte og kan mulig have en Del paa sig. Hvad der navnlig taler herfor er, at det særlig er om Natten, naar Kulsyreassimilationen ophører, at Larverne strækker sig langt ud og slaar til alle Sider. Den atmosfæriske Luft oven over Vandet maa dog sikkert betragtes som Hovedkilden til Luften mellem Bladstykkerne. Iøvrigt maa man formode, at der i iltrigt Vand tillige finder en Diffusion Sted imellem Luftmassen og Vandet, saa at den en Gang brugte Luftmasse bliver respirabel igen."

Først vilde jeg undersøge Sammensætningen af den Luft, der findes i Larveboligen under normale Forhold; den paagældende Luft kan enten ved et let Tryk klemmes ud af Boligen — dette

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[1]) Wünschen die Tiere also Lufterneuerung, so strecken sie den Körper aus dem Wasser heraus in die Luft. Eine neue Luftmasse, die nun wieder für eine Zeit respirabel ist, haftet dann an ihrem Körper und wird mit demselben in das Haus eingezogen. (Wohn. u. Gehäuseb. p. 122).

gælder dog kun, naar der er ret store Luftmasser til Stede — eller kan suges ud med en vandfyldt Pipette.

Undersøger man Luftens Sammensætning i Larveboligen under ganske tilfældige Forhold, vil man naturligvis finde ret variable Tal; som Eks. kan nævnes:

1,6 % CO_2	11,0 % O_2[1]
0,4 —	18,0 —
1,4 —	7,3 —
0,9 —	17,7 —

Denne stærkt vekslende Sammensætning af Luften[2]) tyder ikke paa Rigtigheden af „Osmose"- eller „Symbiose"-Teorien; efter begge disse maatte man antage, at der vilde indstille sig en bestemt Ligevægt, efter første Teori mellem Larvens Iltforbrug og Iltspændingsfaldet fra Luften — igennem Bladet — til Larveboligens Luft, i andet Tilfælde mellem Plantens Kulsyreassimilation og Dyrets Iltforbrug.

Derimod passer ovennævnte Analyser meget godt med den Anskuelse, at Dyret af og til henter ny Luft fra Atmosfæren.

Lavere Iltprocent end ca. 7 har jeg ikke fundet under normale Forhold.

For at afgøre Spørgsmaalet har jeg dernæst analyseret Luften efter at der var gaaet kendt — men variabel — Tid siden Larven har haft sin Overkrop oppe i Luften.

Sammensætningen af Luften i Larveboet umiddelbart efter at Larven har været oppe i Vandskorpen	0,6 % CO_2 19,7 — O_2
Sammensætningen af Luften i Larveboligen, efter at denne har været neddykket i Vand 4 Minutter siden sidste Luftfornyelse	1,1 % CO_2 11,0 — O_2
En anden Bolig 7 Minutter under Vand	4,8 % CO_2 2,2 — O_2

Saaledes kunde jeg fortsætte med en Række Analyser, der alle viser, at Luftens Sammensætning nærmer sig stærkt til den atm. Lufts Sammensætning, naar Dyret umiddelbart forinden har haft sin Overkrop oppe i Luften, for derefter at aftage, hvad Iltprocenten

[1]) Alle Analyserne er udførte med Krogh's Mikroluftanalyseapparat.

[2]) At CO_2 % altid er lav og relativ konstant, skyldes sikkert denne Luftarts Diffusion ud i Vandet, der som bekendt vil foregaa meget hurtigt i Sammenligning med andre Luftarter.

angaar, efterhaanden som Tiden gaar, uden at Dyret paany har Lejlighed til at sætte sig i Forbindelse med den atm. Luft.

Disse Analyser bekræfter altsaa i et og alt W.-L.s Anskuelse, dog maa man ikke forstaa Udtrykket, at Dyret henter ny Luft, som den med sit Legeme trækker ind i Huset, altfor direkte.

Blot Dyret stikker sit Hoved op gennem Vandhinden, vil der være Mulighed for en fri Luftdiffusion gennem Dyrets Luftklædning ned i Boligen.

Efter Analysen at dømme er en saadan Tilvejebringelse af en fri Diffusionsvej gennem Luftklædning tilstrækkelig til Luftfornyelsen.

Ved de ovennævnte Forsøg var det nødvendigt, naar det gjaldt om at forhindre Larven i at strække sin Forkrop op i Vandskorpen, at tvinge hele Larveboet ned under Vandoverfladen, men derved umuliggør man en eventuel Luftfornyelse ved Diffusion gennem det Bladstykke, der danner Boligens Overside.

Derfor kan de ovennævnte Analyser altsaa ikke udelukke Luftfornyelsen ved Diffusion.

Men hvorledes gaar det med Assimilations (Symbiose)-Forklaringen?

Vil ikke ogsaa Assimilationen være ophævet, dersom Flydebladet sænkes under Overfladen?

Det maa erindres, at Boligen udelukkende er bygget af Flydeblade, hvorfor man maa antage, at Assimilationen under disse Omstændigheder vil nedsættes i overmaade høj Grad.

Disse Forhold kan naturligvis siges at svække ovennævnte Analyser og gøre Resultatet noget flertydigt, idet det kan gøres gældende, at man i Virkeligheden har udelukket Iltfornyelsen, hvad enten denne finder Sted 1) direkte fra Luften, 2) ved Diffusion gennem Bladet 3) eller ved Bladstykkernes CO_2-Assimilation.

Men selve den Omstændighed, at Larveboligen er bygget af Flydeblade, der vender Undersiden ind mod Larveboet, er i Virkeligheden overmaade kompromitterende for Portiers Symbioseteori.

Der kan næppe være nogensomhelst Tvivl om, at den Iltmængde, der frigøres ved CO_2-Assimilationen, vil undvige i saa langt overvejende Grad gennem Spalteaabningerne, der findes paa Flydebladets Overside. Dette gælder naturligvis kun Larveboligens Loft, men hvad Gulvet angaar, vil dets Assimilationsbetingelser sikkert være meget daarlige, idet det ogsaa her er Undersiden der vender ind mod Larven.

Saavel „Assimilations“- som Diffusionsteorien lader sig direkte modbevise ved en noget anden Forsøgsanordning.

Ved Hjælp af et Pap „Taarn“ gøres det umuligt for Larven at hente ny Luft fra Atmosfæren, idet dog Larveboligens Loft stadig befinder sig over Vandoverfladen. Forsøgsanordningen fremgaar bedst af medfølgende Tegning.

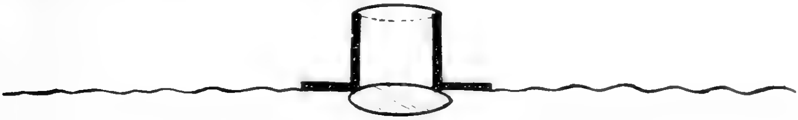

Fig. 3. Den bølgede Linie forestiller Vandoverfladen.

Ved den paagældende Forsøgsanordning kan man i gunstige Tilfælde forhindre, at Larven henter sin Luftforsyning direkte fra Atmosfæren, uden at man samtidig har umuliggjort Luftdiffusionen gennem Boligens Loft, eller Flydebladets Kulsyreassimilation.

Foretager man nu Luftanalyser efter kortere eller længere Tids Ophold under Taarnet, vil man finde, at Iltprocenten mindskes ganske som i ovennævnte Forsøg.

Et Forsøg viste saaledes en Kulsyreprocent paa $1{,}6$ og en Iltprocent paa $9{,}8$, efter at Larveboligen havde opholdt sig 5 Minutter under „Taarnet“.

Disse Forsøg viser ganske tydeligt, at Hydrocampa Larven udelukkende (eller i det mindste langt overvejende) er henvist til den Luft, som den selv henter direkte fra Atmosfæren.

Et andet Spørgsmaal — som specielt faar Betydning for Larven, medens den bygger sit Puppebo — er det dog, om ikke en Iltfornyelse ved Diffusion fra Vandet kan komme til at betyde noget.

For at undersøge dette Spørgsmaal blev der ledet en Strøm af iltfattig Luft gennem Larveboet.

Iltdiffusionen maa nemlig blive desto større, jo større Ilttensionsdifferensen mellem Vandet og Boligluften er.

Larveboligen er nedsænket i Vand. Iltprocenten i den gennemledte Luft var da $1{,}2$ og $1{,}3$ % (to Analyser).

5 Minutter efter at Luftgennemledningen er standset, var Iltprocenten i Larveboets Luft $1{,}1$ % O_2.

Heraf kan man slutte, at Iltdiffusionen (+ den ved den eventuelle Kulsyreassimilation frigjorte Ilt) eventuelt, naar Ilttryksdifferensen er gjort saa stor, som den overhovedet kan blive, muligvis har kunnet dække Larvens (under disse Omstændigheder sikkert stærkt nedsatte) Iltforbrug.[1])

Holdes Larveboligen under Taarnet, bliver Betingelserne for Luftfornyelsen ved Diffusion (fra Luften) bedre, hvad der ogsaa synes at fremgaa af følgende Analyse:

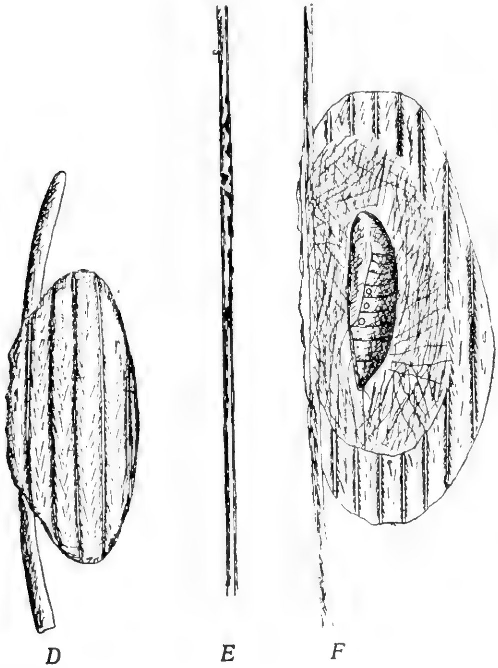

Fig. 4. *Hydrocampa nymphaeata.* D Puppehuset fastgjort til en Bladstilk af Potamogeton. E En Bladstilk med Huller, efter at Puppehuset er aftaget. F Puppehuset oplukket: man ser Spindet og i Midten Puppen. Svagt forstørret. (Wesenberg-Lund del.).

Larveboet gennemstrømmet med Luft med 1,3 % O_2; 5 Minutter efter, at Gennemledningen er ophørt, er Iltprocenten 2,4.

Ved dette lave Ilttryk og tilsvarende høje Ilttryksfald synes Iltdiffusionen fra Lnften at kunne dække (ja mere end dække) Larvens Iltforbrug.[2])

Da man, naar Larven er overladt til sig selv, aldrig finder saa lave Iltprocenter i Boet, betyder dette sikkert, at Luften under normale Forhold saa godt som udelukkende hentes direkte fra Atmosfæren.

Medens Larvens Respirationsforhold derfor maa siges at være klarlagt i det store og hele, saalænge den lever i sit Larvebo, gælder dette ikke, naar den skal til at forpuppe sig.

Om Forpupningsforholdene skriver Wesenberg-Lund i „Insektlivet i ferske Vande“ p. 209: „I Slutningen af Juli befries Planterne

[1]) Se Torbjørn Gaarder: Über den Einfluss des Sauerstoffdruckes auf den Stoffwechsel. Biochem. Zeitschr. 89. Bd. 1918.

[2]) Der dog ved dette lave Ilttryk maa antages at have ligget væsentlig under det normale.

for Larveangrebene, og man ser ikke mere til Larverne; undersøger man derimod Bladstilkene ca. 5—10 cm under Vandspejlet, vil man finde Hylstrene fastspundne til disse. Puppehylstrene ligner Larvehylstrene; de staar vingeformet ud til Siden fra Bladstilkene, der ligesom er klemt ind imellem de to Bladstykker. Skiller man Bladene fra hinanden, finder man et meget fint, luftfyldt Spind, inden i hvilket Puppen hviler. Denne Luft har en anden Oprindelse end den, Larven aandede ved. Undersøger man forsigtig Bladstilken paa det Sted, hvor Bladet er fasthæftet, ser man en Række Huller, der naar ind i denne. Det er højst sandsynligt, at den Luft, der findes i Puppens Silkespind, hidrører fra Luften i Planten; gennem de af Larven bidte Huller er den strømmet ind i Puppehylstret. Det er dog ogsaa muligt, at Luften hidrører fra Larven selv; inden og efter Forpupningen taber Dyret meget stærkt i Volumen; man har for andre Arters Vedkommende paavist, at Larven udpresser Luftblærer, som opfanges i Spindet. Tilsvarende Iagttagelser for Hydrocampernes Vedkommende mangler desværre endnu. Hvad der ikke letter Forstaaelsen af Respirationsforholdene er, at Hydrocamperne ligesom Paraponyx inden Forpupningen atter lukker for Hullerne med tykke Silkespind. Plantens Luft kan derfor næppe have respiratorisk Betydning."

Vil man undersøge Sagen nærmere, bliver man nødt til at skelne mellem 1) den Tid, Larven befinder sig i Puppeboet i Færd med at gøre dette færdigt og tjenligt som Bolig for Puppen og 2) selve Puppetiden.

Undersøger man de af W.-L. beskrevne Puppebo i Slutningen af Juli til Begyndelsen af August, finder man ofte, at disse er beboede af en Larve.

Puppeboligerne er luftfyldte, men da de er anbragte 5—10 cm^3 under Vandoverfladen, er det nu umuligt for Larven at hente Luften direkte fra Atmosfæren. Wesenberg-Lund gør opmærksom paa, at Larven har gnavet Huller ind til Plantens Intercellularrum, og at Luften rimeligvis maa stamme herfra; der kan heller ikke efter de efterfølgende Analyser at dømme være nogen Tvivl herom.

Puppeboligerne er først beskrevne af W.-L.; de minder i meget om Larveboligen, men er som nævnt fastgjort til Stilken af et Flydeblad et Stykke under Vandets Overflade.

Man maa her sikkert staa overfor det sidste Larvebo, som Larven har transporteret ned af Flydebladets Stilk. Boligen fæstnes til Stilken, og Larven gnaver Huller ind til Vandplantens Intercellularrum.

I den Tid, dette staar paa, inden Forbindelsen med Plantens Luftkanaler bliver etableret, maa Larven leve af det Luftforraad, der som sædvanlig omgiver hele Dyret og eventuelt findes i Larveboet. Under normale Forhold drejer det sig sikkert kun om en ganske kortvarig Periode. Derimod vil man i det mindste i Aquarieforsøg kunne finde, at Larven opholder sig i den til Stilken fastgjorte Puppebolig i flere Dage. I den første Del af denne Periode staar Larven gennem de gnavede Huller i Forbindelse med Luften i Planternes Intercellularer; man vil — i det mindste i visse Tilfælde — kunne se, hvorledes Luften i Intercellularerne og Luften omkring Larvens Legeme gennem Hullerne udgør en Enhed.

Direkte Luftanalyser bekræfter i alle Tilfælde den nøje Forbindelse mellem Luften i Planterne og i Puppeboligen paa det daværende Tidspunkt.

Analyse af Luften fra et saadant Puppebe (med Larve og aabne Huller ind til Planten	1,0 %	CO_2
	11,7 —	O_2
Analyse af Luften i Potamogeton-Stilkens Intercellularer paa det tilsvarende Sted toges umiddelbart derefter og gav følgende Resultat	0,9 —	CO_2
	12,1 —	O_2

Nedsættes Iltprocenten i Intercellularrummene, hvad der kan opnaas ved at afskære Flydebladene, saaledes at Bladstilkene er neddykkede i Vand og ganske uden Forbindelse med Atmosfæren, ser man, hvorledes Luften i dette endnu aabne Puppebo varierer ganske i Overensstemmelse med Intercellularluften, saaledes som følgende Forsøg viser.

Intercellularluft	4,4 %	O_2
Luften i „aabent" af Larve beboet Puppebo	3,1	—

Dette giver dog naturligvis ingen Forestilling om, hvorledes Luftsammensætningen vil være i et saadant Puppebo under normale Forhold, men skal blot tjene til at vise den nøje Overensstemmelse i Sammensætning mellem de to Luftsystemer.

Vil man gerne vide, hvorledes Luftsammensætningen er under normale Forhold, behøver man blot at analysere Luften i Potamogeton natans Flydebladenes Stilk en ca. 5—10 cm under Vandoverfladen ude i Naturen.

Iltprocenten i Puppeboet maa da være ca. 1 % lavere.

Af saadanne Analyser skal jeg nævne følgende, der alle er udførte paa Funkedammen $^{24}/_{6}$ 4—5 Eftermiddag. Klar skyfri Himmel.

23,6	% O_2
23,4	—
22,9	—
21,8	—
21,9	—

Til Trods for, at vi her har at gøre med P. natans, og man derfor maa antage, at den ved Kulsyreassimilationen frigjorte Ilt let vil undvige gennem Flydebladets Spalteaabninger, er Iltprocenten under de ovennævnte gunstige Assimilationsbetingelser tydelig højere end Atmosfærens.

Iltprocenten i de aabne Puppebo maa altsaa være lig eller noget over Atmosfærens[1]).

Saaledes som W.-L. skriver, vil Larven, inden Forpupningen finder Sted, tillukke de tidligere gnavede Huller, gennem hvilke Boet staar i Forbindelse med Planternes Intercellularer.

Man forstaar derfor saa udmærket godt, at W.-L. erklærer, at dette Forhold ikke gør Forstaaelsen af Puppens Respirationsforhold lettere, og at han føler sig fristet til at erklære, at Plantens Intercellularluft derfor næppe kan have respiratorisk Betydning.

Jeg tror dog ikke, at Wesenberg-Lund har Ret paa dette Punkt.

Spindet, der lukker Hullerne, og som her er særlig tykt, er en Del af det Spind, som tapetserer Puppeboligen indvendig og derved indeslutter hele Puppen.

Dette Spind er nemlig, saaledes som det sølvhvide Udseende antyder, luftfyldt; kommer man det i Alkohol, vil Alkoholen trænge ind i Spindet og fortrænge Luften; under Mikroskopet ser man ganske tydeligt, hvorledes Luftblærerne i saa Tilfælde bobler frem af Spindet.

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1) Selv om det ikke har nogen direkte Interesse i ovennævnte Sammenhæng, skal det dog nævnes, at man under gunstige Assimilationsbetingelser maa antage, at Iltprocenten i de Vandplanter, der ikke er forsynede med Flydeblade, kan blive betydelig højere. Intercellularluft fra Bladstilk af Potamogeton sp. $^{24}/_{6}$ mellem 6 og 6^{30} Aften indeholdt 45,4 % O_2, i et andet Tilfælde 36,3 % O_2.

Desværre havde jeg dengang, denne Undersøgelse stod paa, ikke Lejlighed til at udføre en mikroskopisk Luftanalyse paa disse fine Luftblærer, men selv uden at kunne støtte mig til saadanne Analyser tror jeg, man som eneste Forklaring tør opstille den Antagelse, at ogsaa Puppen henter sin Luft fra Planternes Intercellularer, idet Luften fra Planternes Intercellularer vil diffundere (rimeligvis uden at møde nogen egentlig Hindring) ud gennem de tykke luftfyldte Silkepuder, der danner en Slags Propper i de gnavede Huller ud i hele det luftfyldte Spind, saaledes at Luftfornyelsen foregaar herigennem.

Wesenberg-Lund skriver, at Puppeboligen er luftfyldt; men dette har ikke bekræftet sig i de Tilfælde, hvor jeg har aabnet Puppebo for at analysere Luften heri.

Fandtes der nemlig Luft i Puppeboet, vilde det være let at undersøge, hvorledes Luftens Sammensætning var i Sammenligning med Luftsammensætningen i Planternes Intercellularer, man vilde ved at ændre Luftsammensætningen i Planternes Intercellularer kunne konstatere, om Luften i Puppeboet ændredes i Overensstemmelse hermed.

Men i alle de Tilfælde, hvor jeg har søgt at faa Luft til Analyse fra Puppeboet, har det altid vist sig, at Boet indeholdt en Larve, ligesom jeg ogsaa mener at have fundet Tegn paa, at Luftmængden var stadig i Retur, efterhaanden som Tidspunktet for Forpupningen nærmede sig.

I de Tilfælde (iøvrigt relativt faa), hvor Puppeboet virkelig var beboet af en Puppe, har jeg ikke kunnet finde Luft uden den Mængde, der som ganske fine Luftperler var indvævet i Spindet.

Dersom denne Iagttagelse holder Stik, vil jeg antage, at Luften diffunderer fra det fine Spind ind gennem Puppens Spirakler og at Spindet paa sin Side faar Luften fornyet fra Planternes Intercellularer.

Uvilkaarlig vil man dog rejse det Spørgsmaal: ja, men selv om dette er rigtigt og muligt, hvorfor spinder Larven dog Hullerne til, inden Forpupningen finder Sted? Det maa dog alligevel antages at betyde en ekstra Hindring og Besværliggørelse af Luftfornyelsen i Sammenligning med Tilstandene i Puppeboet, før Hullerne blev tilspundne.

Dette Problem vil jeg gerne diskutere i Forbindelse med en

Udtalelse af Wesenberg-Lund i „Insektlivet i ferske Vande", p. 209. Plantens Luft kan, skriver han, „hvis der i Planten er det fornødne Overtryk, bruges til at drive Vandet ud af Kokonen med".

Efter min Mening vil et saadant Overtryk normalt ikke være til Stede, tværtimod vil jeg antage, at der til Stadighed (eller næsten til Stadighed) maa være et Overtryk i Puppeboet. Trykket inde i Plantens Intercellularer maa takket være den lette Forbindelse med den atmosfæriske Luft gennem Flydebladenes Spalteaabninger i det store og hele være lig Atmosfæren; det Tryk, der hviler paa Luften i Puppeboet, er derimod 1 Atm. + 5 à 10 cm Vandtryk.

Hvis denne Antagelse er rigtig, vil det betyde, at Luftblæren i Puppeboet ganske langsomt vil blive presset gennem Hullerne ind i Planten[1]), saaledes at Puppen kunde risikere at komme til at lide af Luftmangel, ja ligefrem drukne.

Selv om der skulde være et ret betydeligt Overtryk i Puppeboet, vil det derimod være uden Betydning for Luften i det luftfyldte Spind.

Den Fare, der derfor vilde true Puppen, modvirkes ved det af Larven dannede luftfyldte Spind, der ad indirekte Vej maa antages at sætte Puppens Spirakler i Forbindelse med Luften i Planternes Intercellularer.

Ogsaa de eventuelle Diffusionsforhold mellem Luftblæren og Vandet vil kunne tendere i Retning af en stadig Formindskelse af Luftreservoiret.[2])

For Larven, der dels kun skal leve i Puppeboet for en kortere Tid, dels er i Besiddelse af sin Luftpels og dels vel er i Stand til mere direkte at hente Luften ud gennem de gennemgnavede Huller, er Muligheden for Luftreservoirets Bortsvinden sikkert uden Betydning.

Den Fornyelse af Ilten, der spillede en overmaade vigtig Rolle

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1) Direkte Forsøg syntes ganske vist ikke at støtte denne Antagelse. Blæser man Luft igennem en Bladstilk af Potamogeton natans, i hvilke der findes naturlige „Larvehuller", medens Flydebladet befinder sig paa Vandets Overflade, strømmede der dog Luft ud gennem disse Huller.

Dette har dog ingen direkte Betydning, idet det jo er indlysende, at blæser man store Luftmængder igennem, vil Luften søge at strømme ud overalt, hvor der er Aabning, og ikke udelukkende, hvor Trykket er mindst.

2) Se Richard Ege: On the respiratory conditions of some air breathing water insects etc. Zeitschr. f. allg. Physiologie. Bd. 17. 1915.

for Corixae, Notonectae og de mindre Dytiscidae, kommer her, hvor Berøringsfladen mellem Luft og Vand er ringe og Diffusionen er vanskeliggjort af Bladstykkerne, næppe til at spille nogen synderlig Rolle.

Resumé.

Hydrocampa-Larven henter i sit andet Leveaar den Luft, som den benytter respiratorisk direkte fra Atmosfæren.

Hydrocampa Puppen (og Larven i Puppeboet) maa antages at faa den nødvendige Ilt fra Plantens (Potamogeton natans) Intercellularrum.

23—4—1923.

Ichthyologiske Notitser.

Ved

C. V. Otterstrøm.

III. Dyndsmerlingen (Cobitis fossilis L.) i Danmark.

Paa det zoologiske Museum i København findes et Eksemplar af Dyndsmerlingen, der er skænket Museet af Arthur Feddersen, og som er taget i Kalvebod Strand ved København d. 10. Juni 1899. Ad. S. Jensen, der omtaler Fundet i Zoologia danica, Fiske [S. 239], mener imidlertid, at dette ikke berettiger til at regne Dyndsmerlingen til den danske Fauna, idet der er en vis Sandsynlighed for, at Eksemplaret er hældt ud i Stranden fra et Akvarie i København. Kalvebod Strand, hvor Vandet er mer eller mindre salt, kan jo ikke antages at være egnet som varigt Opholdssted for Arten. — Heller ikke i Danmarks Fauna (C. V. Otterstrøm, 1914, S. 297) er Dyndsmerlingen regnet for nogen egentlig dansk Art.

Da jeg i November 1921 var i Tønder, nævnede min Broder, Seminarielærer Ahrent Otterstrøm, at det var bleven ham fortalt, at der skulde være Dyndsmerlinger der paa Egnen. I Foraaret 1922 bragte Seminarist Heinrich Jensen ham fire Eksemplarer, der var taget under Grøftegravning sidst i April ved Landsbyen Rørkjær lidt østen for Tønder. Beviset for, at denne interessante (navnlig for sit Tarmaandedræt bekendte) Art tilhører vor Fauna, var saaledes givet.

Af de nævnte fire Eksemplarer blev et sendt til Zoologisk Museum, et indgik i Tønder Statsskoles Samling, et fik jeg, medens det fjerde formodentlig er indlemmet i Seminariets Samling. Det Eksemplar, jeg fik, var det største; det maalte 221 mm og var en Hun med veludviklet Rogn; formodentlig har Fisken snart skullet lege, hvilket stemmer med, at Legetiden efter Vogt & Hofer [1909, S. 480] i Tyskland falder i April, Maj og Juni.

Seminarist Jensen havde for øvrigt allerede i 1921 taget en Dyndsmerling (ca. 15 cm lang) i en lille Dam paa Nordsiden af den Vej, der fra Rørkjær fører til Tønder. Men dengang vidste han ikke af, at Fisken var en Sjældenhed. Han havde den i længere Tid levende i et Akvarie, men under hans Bortrejse i Sommerferien døde den og blev bortkastet; først senere fik han at vide,

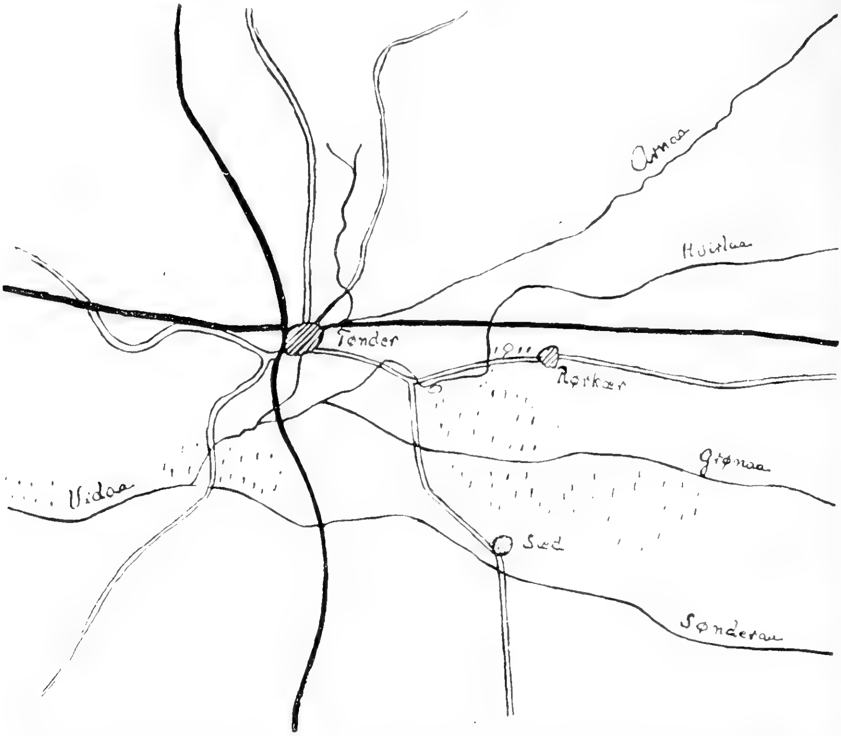

Fig. 1. Dyndsmerlingens (*Cobitis fossilis*) hidtil kendte Udbredelse paa Tønder-Egnen.

at det var ønskeligt at faa hans Artsbestemmelse kontrolleret. Heldigvis voldte det ham ikke synderlig Vanskelighed at fange nye Eksemplarer i Foraaret 1922. I den førnævnte Dam iagttoges der rigtignok ingen, men i en Dam paa Sydsiden af Vejen lidt længere ind mod Tønder (egentlig et Sammenløb af Grøfter, der gennem en Sluse staar i Forbindelse med Hvirlaa) blev — i hvert Fald det Eksemplar, jeg har faaet — fanget i en Ruse sidst i April, „lige før de første Frøer lagde Æg". Jensen skriver, at der fanges mange Dyndsmerlinger ved Grøfteoprensning, og at mange

Folk er bange for dem, fordi de tror, at Dyndsmerlingerne bider og er giftige (Fisken er sikkert fuldstændig uskyldig!). „Piefaal“ (ɔ: Pibeaal) kaldes den paa Egnen paa Grund af den pibende Lyd, den giver, naar den tages; som bekendt skyldes Lyden, at Fisken slipper Luft ud af Tarmen. Jensen mener, at Dyndsmerlingen findes i Grøfter og Damme, der staar i Forbindelse med Aaerne, særlig med Grønaa og Hvirlaa og, længere nede, Vidaa. Han har paa en Kortskitse afsat de to Damme og punkteret de Arealer, paa hvilke han med Bestemthed ved, at Fisken findes; men — som han tilføjer — den findes vel nok ogsaa andre Steder. — Efter hvad min Broder meddeler, siger Fisker Henrik Petersen i Rudbøl ved Vidaa da ogsaa, at han undertiden fanger indtil en halv Spandfuld Dyndsmerlinger om Foraaret, naar han sætter Gedderuser paa lavt Vand.

Senere (d. $^{4}/_{7}$ 1922) har Jensen sendt mig yderligere tre Dyndsmerlinger, som blev taget i den omtalte Dam Syd for Vejen. Det var ligeledes Hunner, der var fulde af Rogn. Formodentlig er Hannerne mindre end Hunnerne og fanges saa maaske ikke saa let. Disse tre Hunner, der vel er tagne i Juni Maaned, maalte 227, 217 og 164 mm.

Det er muligt, at Dyndsmerlingen er udsat (f. Eks. hældt ud fra et Akvarie) i nyere Tid og saa har formeret sig. Men det er dog sandsynligere, at den er virkelig hjemmehørende paa Tønderegnen. De topografiske og økonomiske Beskrivelser [Danske Atlas, Aagaard, Begtrup, Gudme, Trap og Oldekop] indeholder intet om Sagen, men det kunde heller ikke ventes, da det drejer sig om en saa lidet betydende Fiskeart. Alt, hvad der har kunnet fremdrages om Dyndsmerlingens Forekomst her, er følgende: Kusz [1817, S. 134] nævner „der Schlampizker“, men uden Angivelse af Forekomststeder og kender den formodentlig kun fra Holsten. Krøyer [III, S. 562] har intet faaet oplyst om, at den skulde forekomme nordligere end Kieler-Kanalen. Dallmer [1877, S. 87] skriver: „Der Schlammbeiszer (Cobitis fossilis). Ueberall, aber nur im Schlamm. Wird meist übersehen. Ohne Werth. Wird in Gläsern gehalten als Wetterprophet.“ Rimeligvis er Sagen netop den, at Dyndsmerlingen let bliver ubemærket, og dette er sikkert Grunden til, at Friis [1879], der var Læge i Tønder og ellers undersøgte de fleste af Tønder-Egnens Fisk, ikke har benyttet den til sit anatomiske Arbejde; han har sikkert ikke anet dens Eksistens saa nær Tønder.

Professor Wesenberg-Lund fortalte mig for nylig, at han for Aar tilbage i Tuel Sø ved Sorø havde set en Fisk, som han mener, næppe kan have været andet end en Dyndsmerling; desværre lykkedes det ham, trods ihærdige Anstrengelser, ikke at fange den. I den Anledning skrev jeg til Fiskeriforpagter, Dr. Hoffmeyer i Sorø og spurgte ham, om han havde bemærket Dyndsmerlingen. Han svarede mig (d. $^{23}/_{10}$ 1922), at han engang for flere Aar siden havde fanget en Fisk, som han mente var en Dyndsmerling, i Tuel Sø, men desværre var Eksemplaret, som han længe havde haft opbevaret i Formalin, bortkommet. Pigsmerlingen (*Cobitis tænia* L.) er jo almindelig paa Sorø-Egnen, men det synes ikke rimeligt, at der kan være sket Forveksling med en Pigsmerling. Der er saaledes god Grund til at antage, at ogsaa Tuel Sø har en Dyndsmerlingbestand, og at der er Mulighed for at træffe Fisken i andre midtsjællandske Vande; men det sikre Bevis for dens normale Forekomst paa Sjælland kan dog endnu ikke anses for givet.

Dyndsmerlingen lever ikke i Norge og Sverige og er sjælden i det sydlige Finland; den er hos os paa sin Nordgrænse, og den Mulighed er da ikke udelukket, at den under mildere klimatiske Forhold kan have haft større Udbredelse, og at dens sidste Tilflugtssted paa Sjælland kunde være Sorø Søerne, hvor jo ogsaa Mallen holdt sig længe. Men maaske vil Fremtiden vise, at Dyndsmerlingen forekommer ogsaa andre Steder hos os.

IV. Bastarder mellem forskellige Karpefisk.

Som bekendt forekommer der ret hyppig Krydsninger mellem visse Arter af Karpefisk. Vogt & Hofer [1909] beskriver ikke mindre end 18—19 Krydsninger mellem europæiske Arter af Familien, og af disse er de fire ogsaa taget hos os, nemlig Karpekarudsen (*Cyprinus carpio* × *carassius*), Brasenskallen (*Abramis brama* × *Leuciscus rutilus*), Rudskallefliren (*Leuciscus erythrophthalmus* × *Abramis blicca*) og Løjeskallen (*Aspius alburnus* × *Leuciscus rutilus*). Men desuden er der nu hos os taget en hidtil ukendt Bastard, Brasenløjen (*Abramis brama* × *Aspius alburnus*).

Det er tydeligt, at i visse Søer er Bastarder ret almindelige, medens de ikke iagttages i andre Søer. Saaledes har jeg undersøgt 2934 Skaller, 756 Brasen og 1038 Løjer fra Furesø, og desuden er talrige andre uden nøjere Undersøgelse gaaet gennem mine Hænder; og dog har jeg aldrig set en Krydsning mellem to af disse Arter fra Furesø. Derimod har jeg ret jævnlig truffet saadanne i Arresø, i Silkeborg Søerne og i Fladesø. Der maa være bestemte Grunde til, at der saaledes i nogle Søer jævnlig opstaar Krydsninger, i andre ikke. For at f. Eks. Brasenskallen skal fremkomme, maa selvfølgelig baade Brasen og Skalle leve i Søen; men skønt begge Arter er almindelige i Furesø, er det dog ikke nok til at lade Bastarder opstaa; visse andre Betingelser maa øjensynlig være til Stede. Brasenskallen har jeg taget i Arresø, i Brassø, Almindsø, Lyngsø og i Fladesø. Alle Steder er vel nok Brasenens Legetid noget efter Skallens, men uden Tvivl kan der dog jævnlig findes Brasenhanner med flydende Mælk, inden alle Hunskallerne har afleget, og Skallehanner med flydende Mælk sammen med Brasenhunner med løs Rogn.

Oversigt over Legetiden hos Skalle og Brasen.

	Furesø	Arresø	Brassø	Almindsø	Lyngsø	Fladesø
Skalle...	sidst i April først i Maj (indtil $^{22}/_{5}$, abnormt $^{21}/_{6}$).	1921: midt i Maj, 1922: $^{18}/_{5}$—?, (ca. 15°)	?	?	?	?
Brasen..	ca. medio Maj til ind i Juni.	Sidst i Maj og først i Juni.	Juni			Nogle faa Dage omkring 1. Juni.

De Krav, der stilles til Legepladser, synes omtrent at være de samme. I Furesø leger baade Skalle og Brasen paa Sivstubbene paa 1—2 Meters Dybde; i Arresø leges der paa Plantevæksten paa faa Centimeters Dybde. For saa vidt er der god Mulighed for Krydsning.

Legefiskenes Størrelse er i høj Grad forskellig i de forskellige Søer, som hosstaaende Oversigt udviser. Tallet i Parenthes angiver den Størrelse, i hvilken ca. 50 pCt. af Fiskene deltager i Legen.

		Fureso	Arresø	Brassø	Almindsø	Lyngsø	Fladesø
Skalle	♂	9(10)—24 cm	7(8)—13	10(10)—16	—16	?	—24
	♀	11(16)—40 cm	9(10)—18	12(13)—36	—33	?	—26
Brasen	♂	31(36)—57 cm	16—30	22(22)—47	?	?	?
	♀	35(40)—58 cm	18—38	21(24)—48	?	?	?

Der er tydeligvis større Forskel paa Legefiskenes Størrelse hos de to Arter i Furesø end i Arresø og Brassø, men det er dog næppe rimeligt, at dette Forhold har afgørende Indflydelse.

Nogen paafaldende Mangel eller Overflod paa Hanner synes ikke at findes noget af Stederne. De i Oversigtstabellen angivne

	Fureso	Arresø	Brassø	Almindsø	Lyngsø	Fladeso
Skalle ♂ %	36 %	40 %	29 %			47 %
Brasen ♂ %	49 %	47 %	53 %			58 %

Procenttal for Hannerne refererer sig til den samlede Fangst og er — da Hunnerne af Skalle bliver langt større end Hannerne — ikke noget nøjagtigt Udtryk for Forholdet mellem Antallet af Legefisk af de to Køn; da der fanges flest af de større Fisk, er der i Virkeligheden flere Hanskaller, end Oversigten angiver.

Man kan ikke se bort fra, at der er en særlig Chance for Krydsning, hvor Legen foregaar i strømmende Vand. Her vil Mælken kunne blive skyllet ned fra et legende Brasenpar og befrugte Rognen fra en gydende Skalle. Ret lang Tid er Mælken ikke befrugtningsdygtig; den 20. Maj 1920 maalte jeg, at Brasenspermatozoernes Bevægelse var aftagende 30 Sekunder efter Vandtilsætningen, 60 Sekunder efter denne var Bevægelsen svag, og efter endnu et Minuts Forløb var den næsten ophørt. Hvad der uvilkaarlig har bibragt mig Indtrykket af, at det strømmende Vand kan have Betydning i den Forbindelse, er den Omstændighed, at de i Arresø fundne Bastarder alle blev taget i Mundingen af Pølaa, skønt der kun blev taget en ringe Part af de undersøgte Fisk paa dette Sted; men da Individerne var adskillige Aar gamle, forudsætter det, at Fiskene er meget stationære og ikke spredes ud over Søen fra det Sted, hvor de klækkedes.

Da det er paavist, at Krydsbefrugtning snarest kan finde Sted, naar Æggene er svækkede, f. Eks. ved at være overmodne, er der maaske særlig Grund til at antage, at Bastarderne skyldes saadanne Hunner, som man af og til træffer, som Maaneder efter Legetidens normale Afslutning gaar rundt fyldte med Rogn (formodentlig forsinkede i Udviklingen p. Gr. af Sygdom), og som nu har svært ved at finde Hanfisk af samme Art, som ikke har leget.

Det skal endelig anføres, hvad der er at tilføje til det i Danmarks Fauna angivne.

Brasenskalle (Abramis brama L. × *Leuciscus rutilus* L.*).*

Denne Bastard, der i Forvejen opgaves taget paa fem forskellige Lokaliteter hos os, har jeg yderligere taget følgende Steder:

Arresø, Mundingen af Pølaa, Ruse, d. $^{5}/_{5}$ 22, 1 Brasenskalle, ♀, 14 cm. G. 20 (ɔ: Gatfinnen har 20 Straaler). Ligner i Farve og Skæl en Skalle, i Form mest en Brasen.

Brassø, udfor Ulvehoved, Aalehaandvaad, d. $^{19}/_{9}$ 18, 1 Brasenskalle, 20 cm. G. 18. Sidelinien i den tiende Skælrække fra R. 15 Skælrækker mellem R. og Bu. Forryg uden skælfri Midtstribe, men saadan findes mellem Bu. og Gattet. Farveskildringen i Danmarks Fauna passer med Undtagelse af, at saavel de farvede Finner som Halefinnen er svagt rødlige.

Almindsø, Aalehaandvaad, d. $^{24}/_{9}$ 18, 1 Brasenskalle, 15 cm, 37 g.

Lyngsø, Aalehaandvaad, d. $^{9}/_{6}$ 20, 1 Brasenskalle, ♂, 18 cm. G. 19.

Silkeborg Langsø. Fiskeriejer Errboe, Lysbro, har set Brasenskallen her.

Fladesø, Nordsiden, Ruser, d. $^{11}/_{7}$ 21, 2 Brasenskaller.
a) 29 cm, 265 g. G. 2 (rudimentære) + 17 = 19.
b) 22 cm, 100 g. G. 2 (rudimentære) + 17 = 19.

Fladesø, N. for Roddenbjerggaard, Aalehaandvaad, d. $^{26}/_{7}$ 21, 1 Brasenskalle, 11 cm.

I Arresø og Fladesø er Fliren (Abramis blicca Bloch) ikke paavist, og det er saaledes udelukket, at der kan være Tale om Flireskaller. I de andre af de ovennævnte Søer findes Fliren, men intet tyder paa, at de fiskede Bastarder ikke skulde være Brasenskaller.

Løjeskalle (*Aspius alburnus* L. × *Leuciscus rutilus* L.).

Løjeskallen var for faa Aar siden ikke kendt her fra Landet, og fra Udlandet kendtes kun to Eksemplarer (et engelsk og et tysk) [Vogt & Hofer, 1909]. Nu kendes 6 danske Individer, og Bastarden er visse Steder Fiskerne velbekendt. A. C. Johansen og Løfting [1918, S. 463] nævner, at der d. $^{22}/_{4}$ 14 fangedes 2 Eksemplarer i Aalegaarden ved Resenbro (Gudenaa) (♀, 148 mm; ♀, 140 mm), og at der toges et i Sildebundgarn tæt udenfor Udbyhøj (Randers Fjord) d. $^{21}/_{5}$ 14 (112 mm). De giver tillige Beskrivelser og Figurer af Fiskene. — Naar de tilføjer, at Bastarderne flere Gange er fundet i Udlandet, og at den rimeligvis er identisk med Feddersens „Hvidskalle" (som han mente var Spirlinus bipunctatus [1879, S. 91]), kan jeg ikke være enig med dem, idet Bastarden kun synes fundet to Gange tidligere, og idet Svælgknoglerne af Feddersens „Hvidskalle" synes mig at være af en Brasenbastard, saaledes som jeg allerede har bemærket i Danmarks Fauna [1914, S. 279]. — Selv har jeg taget Løjeskallen 3 Gange:

Arresø, Mundingen af Pølaa, Ruse, d. $^{5}/_{5}$ 22, 1 Løjeskalle, ♀, 12 cm. G. 16. Bu. lidt længere fremme end R.

Borresø, ved Mundingen af Millingbæk, Vaad, d. $^{17}/_{6}$ 19, 1 Løjeskalle, ♂, 15 cm. R. 11, G. 18. Venstre Svælgben med 6 Tænder i een Række, nærmest som Skallens, men desuden Antydning af en lille Tand i en ydre Række. Kropfarve som en Løje; Iris oventil messinggul, nedentil sølvhvid; Br. og Bu. gullige. Gik sammen med legemodne Løjer. — Allerede tidligere havde Fisker Bjørnholt fortalt mig, at der jævnlig træffes Bastarder mellem Løje og Skalle sammen med de legende „Millinger" (Løjer).

Borresø, noget nedenfor Ulvenæs, Ruse, d. $^{9}/_{6}$ 20, 1 Løjeskalle, ♀, 17 cm, 38 g. G. 17. Venstre Sidelinie 45 Skæl. Kropfarve nærmest som en Skalle; Iris oventil messinggul, nedentil sølvhvid; Finner blegere end Skallens, navnlig Bu. og G. iøjnefaldende, da de kun er svagt gulrøde, næsten ufarvede. Fisken synes at skulle lege.

Silkeborg Langsø. Fiskeriejer Errboe har her set Løjeskallen.

Rudskalleflire
(*Leuciscus erythrophthalmus* L. × *Abramis blicca* Bloch).

Et Eksemplar (17 cm) af denne Bastard toges i 1844 i Randers Fjord. Senere er Krydsningen ikke bemærket hos os, før A. C. Johansen og Løfting [1918, S. 465] iagttog to Eksemplarer (23.8 cm, Resenbro Aalegaard, d. 22/4 1914 og ♀, 28.3 cm, Grund Fjord, d. 27/6 1916), som de nærmere beskriver.

Brasenløje (*Abramis brama* L. × *Aspius alburnus* L.).

Denne Bastard er mærkelig nok ikke tidligere iagttaget, hverken hos os eller i Udlandet. Jeg tog et 16 cm langt Eksemplar (♂), i Arresø i en Ruse i Mundingen af Tilløbet Pølaa d. 4/5 1922.

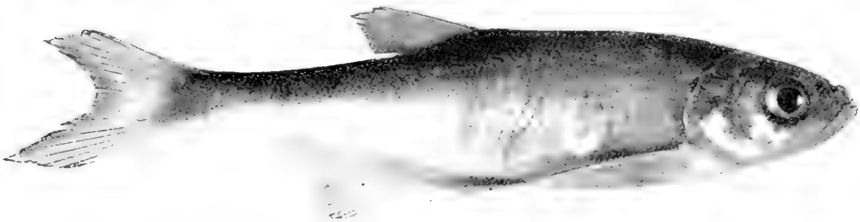

Fig. 2. Brasenløje (*Abramis brama* L. × *Aspius alburnus* L.). ♂, 16 cm. Arresø.

Dens Kropform ligner Løjens, men er tydeligt noget højere og mere sammentrykt. Munden er opadvendt omtrent som Løjens. Svælgtænderne sidder i to Rækker med 5 Tænder i den indre og 1 Tand i den ydre Række (paa det ene Svælgben er der i den indre Række kun 3 Tænder i Behold, men der mangler sikkert 2). Tænderne har ret lang Tyggeflade, delvis med takkede Kanter; Spidsen er kroget, og ved dens Grund er der paa Tandens Bagside et meget tydeligt Hak. Rygfinnen begynder lidt bag Midten af Mellemrummet mellem Bugfinnernes Rod og Gatfinnen og ender en Smule bag Gatfinnens Forende. Halefinnens Flige er afskaarne parallelt med Længdeaksen (ikke Beskadigelse).

Fig. 3. Brasenløje. Højre Svælgben med Tænder.

Fig. 4. Brasenløje. Fjerde Tand paa højre Svælgben. Stillingen er en lidt anden end i den foregaaende Figur.

Rygfinnen har	1	rudimentær og	10	veludviklede	Straaler ...	i alt 11	Straaler.
Gatfinnen -	1	—	- 21	—	— ...	- 22	—
Brystfinnerne	„	—	- 15	—	— ...	- 15	—
	„	—	- 15	—	— ...	- 15	—
Bugfinnerne	1	—	- 9	—	— ...	- 10	—
	1	—	- 9	—	— ...	- 10	—
Halefinnen	....		18	—	—	i alt x+18+x	—

De bageste Straaler i Ryg- og Gatfinne er dobbelte. Skællene danner 14 Længderækker mellem Rygfinnen og Bugfinnerne. Langs Sidelinien er der henholdsvis 54 og 55 Skæl. Skælkernen ligger i Skællets forreste Halvdel. Forryggen er jævnt afrundet og dækket af Skæl; derimod bøjer Skællene ikke over den skarpe Bugkant mellem Bugfinnerne og Gattet, men staar her Kant mod Kant. Farven var nærmest som Braseneres (disse er i Arresø meget blege); Ryg- og Halefinne havde sorte Spidser, Brystfinnerne og Gatfinnen delvis ogsaa.

At der ikke er Tale om Løje × Flire, fremgaar allerede af, at Fliren (Abramis blicca Bloch) ikke kendes fra Arresø. Brasenløjens Størrelse (16 cm) overgaar den Størrelse, Løjen naar i Arresø (næppe over 13 cm). Dens Alder var ca. 7 Aar. — Eksemplaret findes nu paa Zoologisk Museum i København.

Krydsningerne interesserer som Regel Fiskerne meget, og de lægger straks Mærke til dem. Gennemgaaende bedømmer de ogsaa deres Slægtskab rigtigt, og der er derfor Grund til at nævne nogle af de mundtlige Meddelelser, jeg har faaet om Forekomsten af Bastarder.

Tjele Langsø. Fisker Nielsen, d. $^{5}/_{11}$ 21. Bastarder mellem Brasen og Skalle og mellem Skalle og Rudskalle menes iagttagne.

Rødsø, d. $^{6}/_{11}$ 21. „Hverken“ menes at være en Krydsning mellem Brasen og Skalle og er ret almindelig. De menes at ligne baade Skalle og Brasen, og naar Formen er mest som Brasen, er Finnerne røde, ellers ikke. [Delvis Forveksling med Abramis blicca?]

Viborg Søerne. Fiskehandler J. Chr. Jensen, d. $^{7}/_{11}$ 21. Bastarder mellem Skalle og Brasen er ret almindelige [mulig dog Forveksling med Abramis blicca, som han mener ikke findes].

Mossø. Fisker Johan Sørensen, d. 22/8 22. Kender udmærket godt Bastarder, bl. a. ogsaa Rudskalle $\times$ Brasen, mener han.

Skalle $\times$ Rudskalle er hidtil ikke beskrevet fra Danmark, men kendes fra Tyskland (langtfra hyppig) [Vogt u. Hofer, S. 453], hvorimod den naturlige Forekomst af Rudskalle $\times$ Brasen næppe er fastslaaet, men Krydsningen er kunstig fremstillet [Vogt u. Hofer, S. 455].

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The Danish Expedition to the Kei Islands 1922.

By
Dr. **Th. Mortensen.**
(With Plates I—III.)

In November 1921 Dr. Hjalmar Jensen and the author left Copenhagen on a scientific Expedition to the Malay Archipelago, especially the Kei Islands. The Expedition was undertaken as the consequence of a plan, set forth some time before (in the fall of 1918) by the present author, of establishing a tropical marine biological station with deep-sea investigations as its main object. There could hardly be any doubt that the most suitable place for a station with this programme was to be found in the Malay Archipelago; but more exactly to point out the place on the basis of the knowledge gained through previous researches was not well possible. New investigations with this special view would be necessary, and this was then the main object of the Expedition: to carry out investigations, mainly marine biological, in those places which might come into special consideration as eventually offering suitable conditions for the planned station. Those places were Amboina, Banda and the Kei Islands, the latter locality having been especially pointed out to the author by Professor Max Weber as being probably the best of all, judging mainly from his experiences from the "Siboga" Expedition. The investigations of the Expedition were accordingly concentrated to these three places. On the way back to Java there was an opportunity of a few days' dredging off Macasser, and, finally, after the return to Java the author was afforded the opportunity of a 14 days' dredging trip in the Java Sea and the Sunda Strait.

On the arrival at Java the Expedition was joined by the two Dutch biologists, Dr. H. Boschma and Mr. H. C. Siebers, biol. docts., ornithologist of the Buitenzorg Museum.

The Expedition received very important assistance from the Indian Government, especially through the small steamer "Amboina" being placed at our disposal for the dredging operations, the Expedition having to pay only the expenses for coal and oil. As there was no steam winch on the ship, a winch to be fitted to an oil motor was constructed at the navy wharf in Batavia and sent to Ambon to be installed onboard the ship there. Especially Mr. Bischop van Tuinen of the navy department made us exceedingly obliged to him for his truly untiring efforts to arrange all this for the Expedition in the very best way. Also the director of 's Lands Plantentuin, Buitenzorg, Dr. Docters van Leeuwen, the director of the Zoological Museum in Buitenzorg, Dr. K. W. Dammerman, and the director of the Laboratorium voor het onderzoek der Zee in Batavia, Dr. A. L. J. Sunier, met us with the greatest kindness and assisted the Expedition in every way. The sincerest thanks of the Expedition are offered here to the Indian Government and to the gentlemen named for all their kind help, which was of material importance to the success of the Expedition. Last, not least, I beg to express the great indebtedness of the Expedition to our Dutch colleagues, above all Professor Max Weber, for the interest they have taken in the plan of the Expedition and the assistance rendered through introductions and in various other ways.

The expenses of the Expedition were paid by the Danish Rask-Oersted Fund; sincerest thanks are herewith offered the direction of this Fund for its liberal support.

The investigations were carried out in the different localities as follows: At Amboina (and Saparoea) from February 8th to March 14th; at the Kei Islands from March 17th to May 23rd; at Banda from May 31st to June 21st; at Macasser from June 27th to 29th, and in the Java Sea and the Sunda Strait from July 13th to August 8th and again, after a visit to Tjibodas and Buitenzorg for the sake of making studies and collections of the terrestrial fauna, in the first week of September.

In this report is dealt only with the marine investigations as carried out by the author.

Dr. Hjalmar Jensen, who was the botanist of the Expedition, returned, together with Mr. Siebers, directly from the Kei Islands, while Dr. Boschma remained and took part in the investigations at Banda, Macasser and in the Java Sea and the Sunda Strait. Special and very cordial thanks are due to him for his untiring interest in the investigations of the Expedition and for his faithful and ever kind and helpful companionship. Finally the author wishes to express his most sincere thanks to his friend and companion, Dr. Hjalmar Jensen, who always most willingly made it his special task to solve the many sorts of practical problems and difficulties connected with such an expedition, and to whose genial and friendly support the author feels exceedingly indebted.

The author left Batavia on September 20th and returned to Copenhagen at the end of October 1922.

I. Amboina.

Ever since Rumphius published his work "d'Amboinsche Rariteitkamer" (1705) Amboina (or Ambon — the two forms of the name being used deliberately —) has been one of the classical localities in natural history. Researches undertaken by various naturalists in more recent times, especially by Bedot & Pictet in 1890, Semon in 1891—1892 and the "Siboga" Expedition 1900, have shown many more forms to occur there than those recorded by Rumphius, the number of species thus known to occur in the Bay of Amboina being very considerable. It was accordingly with rather great expectations that the Expedition set out to work there.

As it would not be convenient to establish the headquarters of the Expedition in the small hotel in the middle of the town, it was thought desirable to find a place outside the town, where a temporary laboratory might be established. Through the kind help of the Assistent-Resident, Mr. Noll, we were introduced to a gentleman in the city of Amboina, Mr. Versteegh, who possesses a country house a few kilometers from the town, in a place named Gelala, situated in a plantation of Cocos, Arenga, nutmegs o. a., close to the shore. This delightful house he most liberally placed at our disposal; there we established our temporary laboratory and spent a whole month under the most satisfactory circumstances.

To begin with we had to confine our researches to the shore and the shallow water, having only rowing boats with native divers for our disposal, until the instalment of the motor and winch on the "Amboina" was ready. Off Gelala there is a large flat, which lies dry at low tide, thus offering excellent opportunities for studying the rich shallow water fauna. All sorts of bottom are represented on this flat, rocks, stones, sand, mud, and grass bottom, each sort of bottom having its own characteristic fauna. Part of the shore is an old coral rock, forming a flat ledge, covered only at high tide. The porous rock is inhabited by innumerable boring organisms — Molluscs, Gephyreans, Annelids a. o. — while at a slightly lower level,

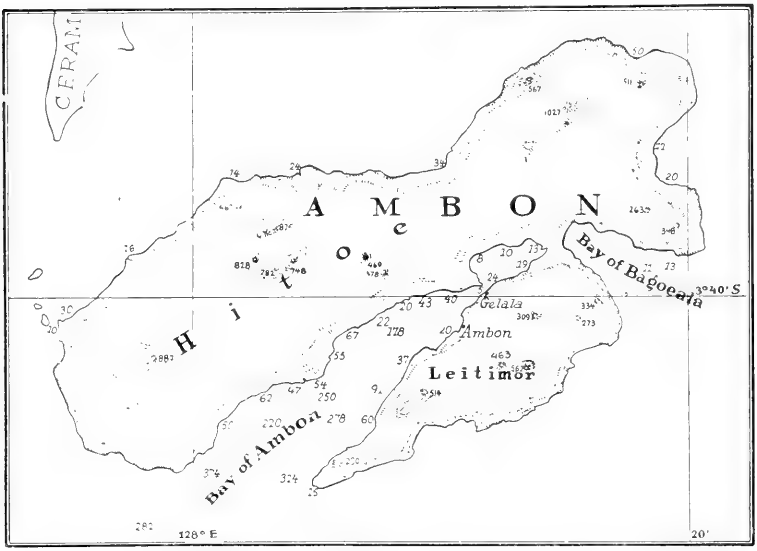

Fig. 1. Map of Amboina. Depths in fathoms.

which lies dry only at exceptionally low tides, the peculiar boring Echinoid *Echinostrephus molare* is found in deep, cylindrical holes. In small pools left on the rock at low tide a small grey Actinian is found in great numbers, like a carpet of flowers, each specimen attached in a hole in the rock, into which it retracts itself as the water disappears. The most interesting feature in the animal community peculiar to this locality is, however, the occurrence of some large Annelids (*Nereis* sp. and *Marphysa* sp.), which from their holes in the rocks extend themselves, often for up to two decimeters length, over the dry rock, seeking their nourishment in the thin coat of microscopical plants which covers the rock. When walking over the rock one sees them retracting into their holes, quick as lightning, and it is only on approaching very cautiously that one succeeds in observing them distinctly. When standing quite still for some minutes one may see them come out again, head and fore-body, from their holes, and in this way it was even possible to take a photo of them. On the other hand, I found it quite impossible to secure a complete specimen, the rock being much too hard to be cut to pieces without crushing the worms, which appear to be of a very considerable length. I had to content myself with cutting off the foreend of some specimens, when they had extended themselves over the rock.

On the sandy parts of the flat, in such places where a thin layer of water remains at low tide, innumerable specimens of the starfish *Archaster typicus* are crawling about or lie buried in the sand, a star figure showing the place of their hiding. In the muddy parts the flat Scutellid *Arachnoides placenta* is the main inhabitant, while in the areas covered with sea grass (*Thalassia testudinum*) meterlong, greyish-brown, warty *Synapta's* and a red *Oreaster* are the dominant forms. Numbers of fishes also occur here, among which *Ophichthys colubrinus* is the most sensational, affording one of the most perfect cases of mimicry; it resembles the sea-snake *Platurus colubrinus* (Schneid.) (which also occurs here) so completely in colour and shape that even an expert ichthyologist would hardly venture to say, except on a closer inspection, whether it is the fish or the snake he has before him.

Places of sandy bottom, which become quite dry at low tide, are inhabited by a large Enteropneust, its huge sandy excrements showing the spot, where it may be dug out. Also various forms of Sipunculids, Annelids and Molluscs may be found here, as also *Lingula* and Amphiurids, whereas I was disappointed in not finding here any of the smaller forms of Synaptids otherwise usually living in such places. Numerous crabs (*Gelasimus* and *Mycteris*) also occur in such localities, strewing their characteristic sand-pellets over the surface. Upon the whole, an almost endless number of forms occur here, offering a rich harvest to the collector and a most fascinating study to the naturalist, who takes an interest in marine ecology.

The coral "gardens", of which Ambon boasts as a special attraction, are not superior to what is found in almost any place, where corals thrive well. The colonies stand more or less isolated, hardly forming what may be termed a reef. This is, of course, due to the fact that here in the inner part of the bay, where no other current occurs than the flow of the tide, the water is not pure enough for affording the corals quite ideal conditions.

An extraordinarily rich collecting ground is afforded by the pier at the town of Ambon and perhaps still more so by the coaling pier a little way outside the town. Here on the iron pillars magnificent Gorgonids, Hydroids and Sponges form hiding places for innumerable smaller forms, Worms, Crustaceans etc. Beautiful Comatulids are found clinging to the pillars as huge flowers; also large Euryalids may be found here, while various forms of gorgeously coloured fishes and shoals of plain small Clupeids seek a shelter among the pillars. On the stony walls, at or a little below low water mark, *Diadema's* occur in such quantities as to make the ground black. Both *Diadema setosum* and *D. Savignyi* are met with; the two species were, however, not found intermingled.

When after about a week the instalment of the winch and motor onboard the "Amboina" was ready (very skilfully made by a Chinese firm) the dredging operations could begin. On account of the very rapidly increasing depth in the bay the dredging had to be confined to the inner part of the bay, from a little way outside the town to the inner end, the more so as great difficulties proved to be connected with dredging work here. The bottom is very irregular, in many places rocky, and very often the trawl caught hold and was got up only after much trouble, with the net more or less torn. In order not to run the risk of losing too much of the dredging apparatus and wire (of which I had brought only 1200 M. length along with me from home) dredging was not extended beyond ca. 200 Meters depth. Nevertheless and in spite of all difficulties, quite a rich harvest was made, especially of Echinoderms and Gorgonids. Among the former I would especially mention a *Coelopleurus*, which was found in considerable numbers, mainly in depths of ca. 150 M.; it must in some places be quite crowded on the bottom. Also several species of Cidarids were encountered (mainly caught in the tangles attached to the trawl) a. o. a fine specimen of an *Acanthocidaris*, which genus had not hitherto been found in the Moluccan Sea. From a depth of ca. 60 Meters the dredge once came up nearly filled with the curious Actinian *Sphenopus*, which must doubtless sit with its wedgeshaped body buried in the sand, only with the tentacle crown above the ground. It was otherwise taken only now and then, a few specimens; but here then, evidently we had hit a spot, where it must have been almost covering the bottom. Mention should also be made of the curious Ophiurid *Ophiopteron*, (which I have taken also at the Kei Islands and at the Philipphines, during my Pacific-Expedition in 1914). It was suggested by Ludwig, who established the genus and described the first of its species, that it was a swimming Ophiurid, the curious skin fold connecting its armspines being thought to act like a swimming web. As I do not remember having seen that anybody has protested against this suggestion, I may here take the opportunity of stating that it is so very far from being a swimming form that it is one of the most sluggish Ophiurids I have seen. It is generally found in crevices in stones and the like, and hardly moves at all when removed from its hiding place.

The innermost part of the bay, the "Inner Bay" proper, is almost like a large pond, only through a narrow, but fairly deep channel connected with the outer part. The bottom is all over soft mud, the depth being rather uniformly ca. 20—35 M. Dredging here gave very poor results. A few *Brissopsis luzonica*, some small *Astropecten*, a pair of Synaptids and a few shells being nearly all that was found.

Regarding now the question whether Amboina could be considered a fit place for the planned biological station, I do not hesitate in declaring that, in spite of its undeniably very rich and varied marine fauna, it is not a very good place for such a station. In itself the bay of Ambon, which might rather be termed a fjord, is a somewhat small area as field of operation to a larger permanent laboratory, to which come the difficulties due to the more or less rocky character of the bottom. But a no less serious objection is the character of the water, which appears to be not very well fit for experimental work, owing — I can hardly doubt, though having made no direct investigations as to this point — to an unfavourable hydrogen ion concentration. This appears very evident from the experiments in rearing Echinoderm larvæ, which I undertook. Over and over again I made artificial fertilizations of various forms of Echinoids and Asteroids, but I never succeeded in rearing the embryos beyond the very first stages. This was a great disappointment to me, as I hoped especially here to get the opportunity of rearing the larvæ of such interesting forms as *Echinostrephus* and *Coelopleurus*, which were both ripe at the time of my stay here. I can state now with certainty that the latter has pelagic larvæ; I did, however, not succeed in rearing them so far as to the beginning formation of the skeleton.

An involuntary visit of some few days to the bay of Saparoea on the little island of that name E. of Ambon, due to unfavourable weather which did not permit continuing the passage across the Banda Sea with the small "Amboina", gave as result some valuable ecological observations on the shallow water fauna of the fine, very sheltered harbour. Otherwise hardly anything could be done. In the Inner Bay (the harbour), the bottom was a very soft, white coral mud, with a very poor fauna only, making dredging very unprofitable; outside the harbour the bottom proved so full of rocks, that dredging was impossible, resulting only in the loss of a dredge.

II. The Kei Islands.

Researches on the fauna and biological conditions of the seas round the Kei Islands were first undertaken by the "Challenger" Expedition, which in September 1874 made a dredging (Station 192) S. of the little Island of Taam in a depth of 129 fathoms, the quite extraordinary success of which made it one of the very richest hauls of the whole Expedition. Especially the surprising fact that numbers of truly abyssal forms occurred here in so relatively shallow water made this haul exceptionally interesting, indicating that very unusual physical and biological conditions must exist here. The "Siboga" again made a dredging here (St. 253, in a depth of 304 Meters) with similar results. Two more deep water dredgings (St. 254, in a depth of 310 M., and St. 256, in 397 M.) were made by the "Siboga" in the sea between the Kei and the Tajando Islands, and four more in the Strait between Great Kei and Little Kei, viz. one (St. 259, depth 487 M.) in the northern part, one (St. 260, depth 90 M. only) off Elat, and two (St. 262, depth 560 M., and St. 266, depth 595 M.) in the southern end of the strait. A few dredgings were also made in the shallow water between the islands of the Little Kei-group. This is practically all that was done till now in this region, the Expedition of Dr. H. Merton (1907—8) having confined its marine researches to collecting on the reefs and at the coast.

From the data thus available it was to be expected that the interesting biological conditions, first observed to the south of the Island Taam, resulting in the occurrence of a rich genuine abyssal fauna in depths of only ca. 2—300 M., would be found all over this region. And this was, in fact, the main object of the Expedition: to carry out investigations here with the view of giving the definite proof — or disproof — of this suggestion. If proof were given that the suggestion was correct, this would mean that the principal condition for choosing the Kei Islands as the place of the planned Laboratory was fulfilled.

First of all the bathymetrical conditions of this area had to be studied to a much greater extent than had been done hitherto, the few stations of the "Siboga" being almost the only available data outside the littoral.[1]) It is true that H. O. W. Planten has published (in 1892)[2]) a detailed map of the sea round the Kei Islands, giving numerous soundings; as he had, however, no apparatus for sounding greater depths than 40 fathoms, his contribution to the knowledge of the extra-littoral areas does not amount to much more than stating the depths there to exceed 40 fathoms. Besides in the places where dredgings were undertaken — the stations marked on the map, Pl. II — soundings were made in several other places. On the basis of these soundings, together with those of the "Challenger", the "Siboga" and of Planten, the bathymetrical chart of the Kei-region, Pl. I, has been worked out. Future investigations may perhaps prove the 400 M. curve to go somewhat farther in from the North and South between the Kei and the Tajando groups, only relatively few soundings having been made in the outer part. But in the main this chart is correct. It has thus been proved that the area between the two said groups of islands forms a large plateau with very uniform depths, sinking gradually from ca. 200

1) The „Challenger" made two soundings between the Kei and the Tajando Islands.

2) Tijdschr. Kon. Nederlandsch Aardrijkskundig Genootschap. IX. 1892.

Meters near the islands to 4—500 Meters in a distance of ca. 20—30 miles to the North and South. The deep water continues very close to the small Island of Godan and sends a tongue down almost to the point Ngidioen; similarly from the South a tongue of deep water continues towards the same point, only a very narrow ridge between Ngidioen and Godan, with a depth of ca. 70 Meters, separating the two continuations of the deeper water to the North and the South of the Islands Godan and Er.

In the Strait between Great and Little Kei the 400 Meter line goes rather far South, but in the middle part of the Strait depths of somewhat less than 400 Meters are found, thus forming a ridge between the deeper waters to the North and to the South of the Strait, the depths sinking rather abruptly to the South, as shown by the "Siboga". Along the coasts the depth increases very rapidly, the littoral area being here rather narrow. Especially off Elat there was found to be a very steep ridge, the depth increasing almost abruptly from ca. 100 to ca. 400 Meters.

While in the Bay of Ambon the bottom was found very irregular, offering considerable difficulties to dredging, it was an agreeable surprise to find the bottom in the Kei-area generally very good, regular sand- or, in the deeper parts, mud bottom, so regular that in many places it would even be possible to use an otter trawl. Of course, nearer the coastal ridge the bottom is less regular and here the dredge not rarely caught hold in the bottom; but, upon the whole, the bottom proved very favourable to dredging. In one place (Station 47) several stones, in another place (St. 49) several large sand concretions came up, containing several burrowing organisms.

The result of the dredgings in the depths from ca. 200— ca. 400 Meters was, upon the whole, most satisfactory, showing conclusively that the genuine abyssal fauna, which was first met with in 129 fathoms S. of Taam, occurs all over this area. I may name a few of the more prominent forms: various Elasipods and Echinothurids (*Hapalosoma pellucidum* in places quite common), Cidarids in considerable numbers, *Micropyga*, *Hemipedina*, *Zoroaster*, various Brisingids, *Calliaster*, *Ophiotholia*, *Astroschema*, *Metacrinus*, *Hyalonema*, *Kophobelemnon*, *Culeolus* etc. As regards stalked Crinoids this area is exceptionally rich. To the four species of *Metacrinus* found by the "Challenger" in the dredging S. of Taam the "Siboga" added three more species, no less than seven species of these magnificent forms thus occurring in this one place. To these I have added two more, viz. a small, remarkably robust species of *Rhizocrinus* (?) and a large, reddish-brown form, apparently *Democrinus Weberi* (Döderlein). One of the most interesting finds was two magnificent specimens of *Dermatodiadema indicum* Döderlein. In the specimens of this and related forms, brought to light by previous expeditions, the long curved spines are all directed upwards as a tuft, while the primary spines of the oral region are all lacking. Of the two specimens dredged here (Station 62) one especially was in perfect condition, hardly any of the spines being broken; they disclosed the interesting fact that all the oral primary spines are provided with a curious hoof, recalling that of the Echinothurids. The spines all curve downwards, those provided with

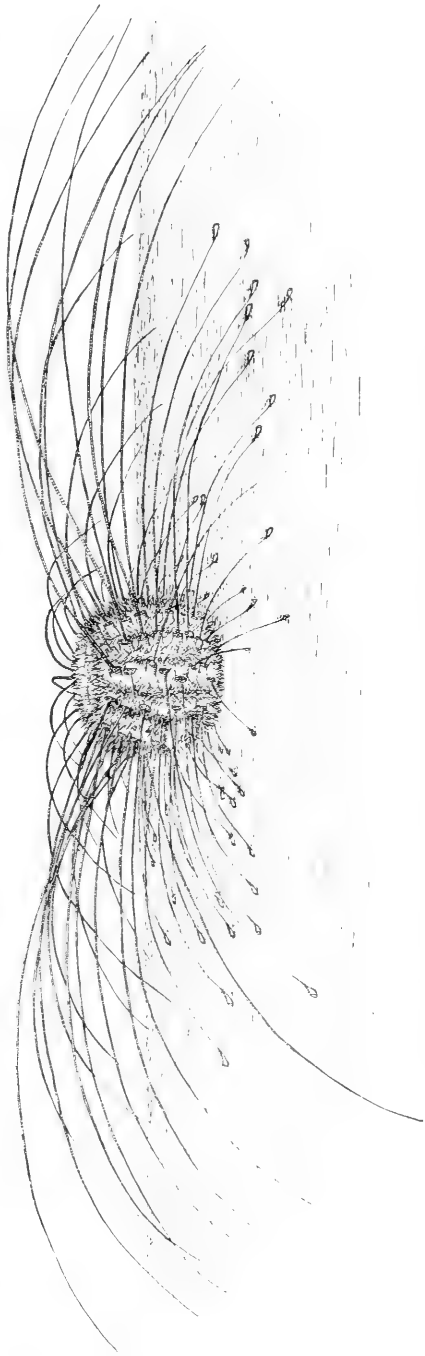

Fig. 2. *Dermatodiadema indicum* Döderlein, ca. 1/3 nat. size. (J. Lieberkind del.).

the hoof reaching the ground, and also the very long aboral primary spines reach, or almost reach, the ground with the point, as seen in figure 2. This is really one of the finest Echinoids in existence. It was due to the fortunate circumstance that the trawl had been only a very short time on the bottom, and the contents thus very small, that these two specimens came up in such excellent condition. The spines, especially those of the oral side, are so thin and fragile that they break exceedingly easily. In spite of a very careful preservation they also suffered somewhat through the transport, the figure being, therefore, partly a reconstruction. But one of the specimens is still sufficiently well preserved for proving the correctness of the figure. The upward direction of the spines, as hitherto known from preserved specimens, is accordingly unnatural and due to preservation. That also the other, related species with such long, curved aboral spines will prove to have the oral spines provided with a hoof and to walk on them in the same way as does the present species, may well be suggested.

A very interesting find was also that of about a dozen specimens of *Opechinus spectabilis*, hitherto known only through the single specimen dredged by the "Challenger" at the station S. of Taam (mentioned by Agassiz in his Report on the "Challenger" Echinoidea under the wrong name of *Temnopleurus Hardwickii*). It was taken at St. 46, very close by the place of the said "Challenger" station. This dredging also yielded several very young specimens of *Metacrinus*. On the other hand, I was disappointed in not getting any specimens of *Moiropsis claudicans*, a very interesting Spatangoid, known from this place alone ("Challenger" St. 192); the no less interesting *Catopygus recens* appears to be represented in the material from here by a very young specimen. Upon the whole, the Cassiduloids, otherwise so sparely represented in recent times, are exceptionally well represented in this region. A large fine *Echinolampas* was fairly common in deeper water, *Echinobrissus epigonus* in shallower water (though generally only found as dead tests); also a fine new type of Cassidulids was found, and a closer examination of the material collected will probably reveal still other forms.

Dredgings in shallower water likewise gave excellent results. Especially off Elat (St. 24), in a depth of 100 Meters, an exceedingly rich fauna was found, numerous Gorgonids and Comatulids

(a. o. *Eudiocrinus*) being the more prominent forms. In the vicinity here, as also in various places at Little Kei, a very large, folded *Orbitolites*, up to 4—5 cm in diameter, was very numerous and formed a very conspicuous part of the material in the dredge. Another very rich dredging ground was found close by Toeal, the main town of the islands. The large, conspicuously coloured *Cucumaria tricolor*, large, nearly white *Asthenosoma's*, *Astropyga radiata* and various Comatulids formed here the main part of the contents of the trawl, while numerous small and inconspicuous forms (e. g. *Fibularia, Pleurechinus*), attractive to the specialist only, were to be found in the sifted bottom material.

Merton[1]) describes the beautiful "coral gardens" in the vicinity of Toeal, consisting mainly of a great variety of Alcyonarians. I shall not enter here on a description of this truly fascinating animal community, but would rather call attention to another locality, viz. Vatek, opposite Toeal. The steep rock wall here, which goes perpendicularly down some 5—10 Meters, extends for about a kilometer or more along a very narrow sound, in which the flow of the tide produces a strong current, which sweeps along the rock wall, thus affording unusually favourable conditions for numerous animal forms. The wall is covered from between high and low water mark at least as far down as the eye can penetrate by means of a water glass by a luxuriant growth of Hydroids, Gorgonians, Antipatharians, Sponges, Mollusks, Synascidians, Bryozoans, among which abound Comatulids, Synaptids, Annelids, Euryalids — in fact, this is one of the richest localities I ever met with. Especially the Hydroids (mainly *Aglaophenia cupressina*) are luxuriantly developed, hanging in long, dense, graceful tufts from the rock, recalling tufts of grass, or rather ferns, overhanging rock precipices. These Hydroids, upon the whole, form a very prominent feature in the shallow water fauna, and are especially found attached to the large, leathery tubes of Eunicid worms, which rise some decimeters above the bottom, but go so deep down in the bottom that the divers never succeeded in getting any of them up complete. Another feature very characteristic of the shallower waters at the Kei Islands is the astonishing richness in Syn-

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1) Hugo Merton. Forschungsreise in den Südöstlichen Molukken Aru- und Kei-Inseln. Abh. Senckenb. Naturf. Gesellsch. Bd. 33. 1910.

ascidians; nowhere in the world have I seen anything comparable. Monascidians were much less richly developed.

In shallow water *Culcita* and *Oreaster* occur in great quantities, especially the latter, from about low water mark down to some 10--20 Meters, so far down as can be seen through the very clear water by means of a water glass. About low water mark also various Holothurians, *Archaster typicus* and *Echinaster luzonicus* are fairly numerous, the latter very commonly infested with a beautifully coloured, red and white mottled *Coeloplana* (n. sp.), which lives epizoic on the starfish and, evidently, multiplies mainly through autotomy.

Coral reefs are especially richly developed around the Island Doe Roa and the other islands to the North (the islands to the South I have had no opportunity of examining). The curious fact that the lowest tide always occurred during the night while I was staying at the islands accounts for the fact that I have paid only little attention to the fauna of the reefs. I may only mention the occurrence in some places of numerous specimens of *Acanthaster*, *Linckia*, *Echinometra* and *Echinostrephus*. On the flats inside the reef, *Tripneustes gratilla* was common at the south side of Doe Roa. A curious fact was the relative scarcity of *Diadema* and *Echinothrix*. On the sandy flats inside the reef, lying dry at low tide, *Laganum Bonani* and *Edwardsia's* were found in great numbers in certain places, and, of course, the usual crabs, *Mycteris* and *Gelasimus*, characteristic of such localities. A peculiar feature here was the scarcity of animals occurring below old coral blocks and stones lying on the sand. This is evidently due to the fact that the white coral sand is so exceedingly fine, like mud, filling out any hollow or crevice and leaving no free space for the animals. This explains the relative scarcity of Ophiurids, which otherwise abound under stones and coralblocks in the low water region in tropical seas. In some places this fine white sand was inhabited by innumerable quantities of an *Edwardsia* sitting vertically in the sand with its tentacle crown just above the surface, looking like small flowers — in fact it reminded me of such places in the sand dunes along our own coasts, as are occupied by the moss *Polytrichum*, which likewise just has its head peeping above the sand.

An exceedingly beautiful sight it was to see the natives wandering on the reefs at low tide during night, seeking by torch light for all sorts of edible animals, the light being reflected by the calm water.

I may still mention an observation made in the vicinity of the Tajando Islands on some calm days in May 1922, viz. of extensive patches of Chlorophyceæ (two different forms, probably belonging to the genera *Enteromorpha* and *Cladophora*) covering the surface of the sea. I have no idea from where these algæ came; they all appeared to be thriving well, being beautifully green. I could not help being reminded thereby of the floating Sargasso, and I really would suggest it to be a corresponding phenomenon, only, of course, on a very much smaller scale. No animals were found to inhabit these floating masses, which might indicate that they had not been floating here for a longer period. On such calm days another interesting observation was made repeatedly, viz. that the water looked almost dirty, numbers of dirty-brownish, woollike masses floating everywhere, at the surface and so deep down as the eye could penetrate. On a microscopical examination of these masses they were found to consist of long threads of diatoms (especially *Skeletonena,* so far as I remember). This observation has an important bearing on the question of the plankton-production in tropical seas, bearing witness of an exceedingly fast growth of the Diatoms; such Diatom masses were always observed after the surface had been lying calm only for some hours, and the chains evidently had been formed during that short interval; the movement of the waves break the chains very easily, which accounts for the fact that they are only observed during calm weather. I have no more exact observations regarding this phenomenon, becoming too late conscious of its importance. It would certainly be worth while to make more exact observations of this phenomenon.

If we will now ask, how far the results of the investigations carried out in this region give a definite answer to the question whether the Kei Islands would represent a suitable place for the planned tropical marine laboratory, I cannot hesitate in stating that, in my opinion, this would be an ideal place for such a station, at least as far as the biological conditions are concerned.

First of all, it has been definitely proved that a rich and varied fauna of genuine abyssal forms occurs over the whole of the large plateau of 2—400 Meters depth, which occupies the area between Little Kei and the Tajando group, and the Strait between Great and Little Kei — this peculiar condition being evidently due, as pointed out by Prof. Max Weber[1]) to the currents running here over the edge between the Banda and Arafura Sea, on which the Tajando and the Kei Islands are situated. This occurrence of the abyssal fauna in so relatively shallow water represents a unique advantage to the study of the biology of the deep sea animals. It is evident that the deep sea animals do not suffer so much on being brought up from such small depths, as when coming up from the much larger depths, ca. 1000—2000 Meters or more, in which they usually live. It would appear that (due exception being made especially to the Aphysostomous fishes) they are not very sensitive to the difference in pressure, the difference in temperature being much more serious to them. But here, in the said depths, the bottom temperature is (according to the researches of the "Siboga") relatively high 10—15° C., and accordingly they suffer much less than when coming from a considerably lower bottom temperature to the high temperature of the surface waters. In fact, I found that several of the deep sea animals would stand even the surface temperature for quite a while. Of course, at a laboratory for deep sea studies there must be facilities for having a constant supply of water cooled down to the bottom temperature, on board the ship as well as in the laboratory itself, in order that the animals may at once be transferred to water holding their accustomed temperature. But the difficulties in keeping water cooled down to a temperature of 15° or somewhat less are quite considerably smaller than when a lower temperature has to be kept.

From the place, which I would think the most suitable for the laboratory here, viz. the Island of Doe Roa (or, rather, the small island situated close to its south coast (see Pl. I), there is only a distance of some 6—8 miles to places where the abyssal fauna may be found, both to the East and the West of the islands. This means that, with a suitable vessel, there will be only ca. one hour's sailing from the laboratory to the dredging ground. Dredging in such relatively shallow water as ca. 300 Meter, need not take a

[1]) Max Weber. "Siboga" Expeditië. I. Introduction et Description de l'Expedition. p. 118.

very long time, ca. one hour being generally ample time for making a good haul. Accordingly it should be possible in the course of some 3—4 hours to bring the living specimens of abyssal animals home to the laboratory, where they may then be studied under favourable conditions. I do not think that any place in the world, excepting, perhaps, the Sagami Sea at Japan, can offer such facilities to the biological study of the deep-sea animals.

To this may be added many other advantages. The shallow water fauna is exceedingly rich and varied; there are fine and extensive coral reefs and a very interesting littoral fauna. Then the quality of the water is excellent, as might be expected in a place like this, where the land consists of raised coral formation, and where currents sweep along the shores. It is true, I have made only a single experiment in raising a culture of Echinoderm larvæ, as I could not afford the time necessary for such work. But this single experiment was so decidedly a success — in marked contradistinction to the numerous unsuccessful attempts at Ambon — that I cannot have the slightest doubt that here conditions would be quite ideal for such experimental work.

The climate and health conditions are good. There is regular communication (for the present twice a month) with Java, by means of excellent, comfortable mailboats. A radio station is planned. Further there is excellent communication with the adjacent Islands, the Aru- and Tenimber Islands, New Guinea, as also with Banda, Amboina and Ceram. This implies that a laboratory at the Kei Islands might, as far as the terrestrial flora and fauna is concerned, become a central Institution for the scientific investigation of the whole of the southern part of the Moluccan region. Also as regards the marine investigations it is, of course, not the intention that they should be confined to the nearest neighbourhood of Doe Roa. I have pointed out the special advantage of having a rich supply of genuine deep-sea forms, very easily accessible, so close to this place, this fact implying a. o. that for a beginning a smaller ship would suffice, which means again that the expenses need not be very great. But, of course, gradually the investigations might be extended to the adjacent areas e. g. the deep basin between Great Kei and the Aru Islands, the Arafura Sea and the greater depths of the Banda Sea, all these parts offering no end of the most fascinating problems of research.

I have given my arguments for the fitness of the Kei Islands, as a place for a laboratory such as the one planned, at some length, in the hope that, in case — as is, unfortunally, most likely — it proves impossible to have the plan realized under the present abnormal financial circumstances, it may be realized some day in the future, when circumstances will be normal again. That it would be of the greatest benefit to science I feel ardently convinced.

III. Banda.

Researches on the marine fauna of Banda were previously made by the "Challenger" and the "Siboga", each of these great Expeditions spending a few days here. The "Challenger", during a four days' visit (29/IX—2/X 1874) made dredgings in a depth of 17 fathoms between the islands, but otherwise mainly made collections (especially of corals and Comatulids) on the reef. (Also a dredging was made outside the East end of Lontor (Station 194 and 194 a), in 200—360 fathoms, but with no striking results). The "Siboga" dredged between Neira and Lontor in 9—45 Meters depth (Station 240) and found there a rich fauna, mainly of Molluscs; but especially the reefs are stated to be very rich. The late director of the Department of Marine Biology of the Carnegie Institution, Washington, Dr. A. G. Mayor, having also called my attention to the Banda Islands, and especially to their rich coral reefs, it was naturally with no small expectations that I arrived at Banda with the view of undertaking researches there for about a month's time. From Professor Max Weber I had an introduction to Mr. Sech Said Baädilla, in the little town of Banda, a rich and prominent Arab with a touch of scientific ambition, possessing a small museum which is open to tourist visitors. Mr. Baädilla, who offered assistance already to the "Siboga" Expedition, received us very kindly and left us one of his pearling schooners with diving apparatus and a trained crew on very profitable terms. I wish here to express my very sincere thanks to Mr. Baädilla for his most valuable and kind assistance.

The researches at Banda were confined to the shallower waters between the islands Neira, Lontor (or Lonthoir) and Goenoeng Api, as I had sent back directly from the Kei Islands my big winch with the long wire (1200 Meters), keeping with me for the researches at Banda and Java only a smaller winch with 300 Meters of wire. But even if the "Amboina" with its whole outfit had been at disposal here, it would hardly have been possible to work to any extent outside these islands, partly on account of the rapid increase of the depth here, partly on account of the weather being now (June) rather rough.

It has been pointed out that the whole of the Banda group is really only one huge volcano, the islands representing the remnants

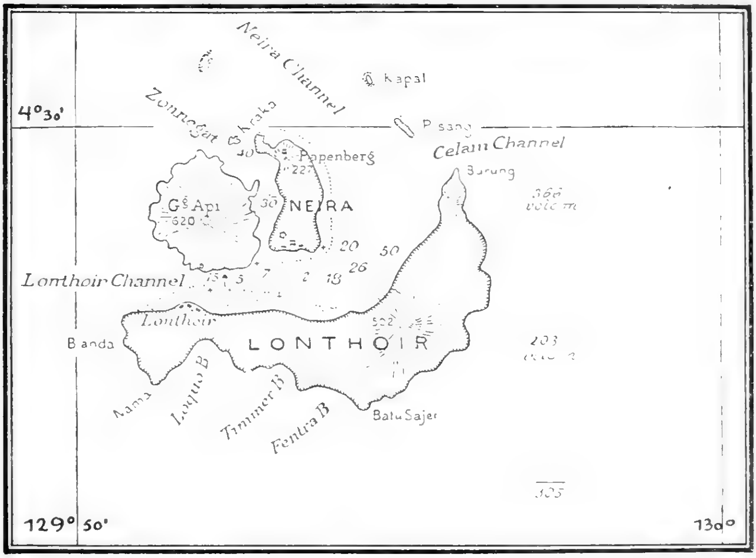

Fig. 3. Banda, the inner group of Islands Depths in fathoms.

of three different crater walls, viz. an inner one formed by Lontor, Pisang and Kapal, a second indicated by Roen and Rozengain and a third, outer one by the islands Ay, Sowangi and the submerse Rosengain riff[1]), a striking parallel to the Tengger mountains on East Java (with the celebrated Bromo volcano). To anybody who has seen both Banda and the Tengger mountains the parallel must appear evident. Moreover, I can adduce a fact, hitherto unobserved, which

[1]) The fig. 3 represents only the inner group of islands; as for the outer ones, mentioned above, I may refer to the map in G. F. Tydeman's "Hydrographic Results of the Siboga Expedition". Siboga Expeditië III. 1903. Pl. XIII. p. 43.

strenghtens the theory of the Banda group representing a parallel to the said mountains.

One of the special features of the Bromo is the celebrated "sand-sea", an immense flat of black, smooth sand, occupying the space between the active Bromo crater and the outer crater wall. The same thing is found in the Banda group, the seabottom between Lontor, Neira and Goenoeng Api forming a quite similar flat of fine black sand, the difference being only that here in Banda the depth is in two places considerably deeper, viz. off a small place named Kombir, on the East end of Lontor, and between Neira and Goenoeng Api, forming here two deep holes of ca. 100 Meters. (Fig. 3.)

This black sand bottom, consisting of volcanic ash, appears to be rather unfavourable to animal life. This is apparently not in accordance with the results of the researches undertaken by the Siboga and the Challenger, Prof. Max Weber especially mentioning „l'abondance des animaux marins qui y vivent" (Introduction, p. 107). The contradiction is, however, only apparent. I have in some dredgings found a really abundant animal life, thus once off Kombir (Lontor) in ca. 75—90 Meters numerous small solitary corals and molluscs; but mostly the result of the dredgings was very poor. Sometimes, when the dredge came up after having been dragged over the bottom for half an hour or more, it was found to contain almost nothing — a small Gorgonian or a small sponge. Thus f. i. in the deep basin — 100—120 M. — between Neira and Goenoeng Api; but also in shallower water (20—30 M.) the result of the dredgings was generally very poor. Evidently it is only in small patches that a rich fauna is found. Thus it was impossible to find again that patch off Kombir, where the haul rich in solitary corals was made; several other hauls made in very approximately the same place all gave very poor results. This relative poor result of the dredgings lead to gradually giving up dredging and employing the diver alone. He, having the freedom of moving about over a considerable area and collecting what he chooses, has, of course, a great advantage over the dredge which must keep to the straight line. The fear that he should be able to find only the larger organisms soon proved groundless. After he had learned what sort of animals we wanted, it was really astonishing what he could bring up also of small organisms. It is, to my knowledge, the first time that a diver has been used to any considerable extent for scientific collecting. The result was so successful that it is to be highly recommended for future work. To point out the advantages in employing a diver for biological collecting is superfluous — everybody sees it for himself. There is no doubt that a future biological station in these regions must have an expert diver in its staff. Not that a diver will make dredging superfluous — of course not; but diver and dredging will supplement each other most excellently and convey a much more complete knowledge of the bottom fauna than can be obtained through one of those means alone.

Among the more prominent forms of animal life thus obtained in the water between the Islands of Neira, Lontor and Goenoeng Api I may name especially the Asteroids *Culcita*, *Choriaster* and *Linckia*. The *Culcita's*, the larger ones up to 20 cm in diameter, and often gorgeously coloured, disclosed the most interesting fact of having nearly constantly a large *Fierasfer* (sometimes two specimens) within their body cavity. Only a single specimen (some twenty specimens opened) was found to contain no *Fierasfer*. Also at Amboina and the Kei Islands this parasite was found in *Culcita*, but much less commonly, the conditions at Banda thus evidently being especially favourable to it. (Also in various mussels, as well as in Holothurians Fierasfers were observed). This occurrence of *Fierasfer*, in the body cavity of *Culcita* (first mentioned by Bleekers, 1854[1]) is much more remarkable than its occurrence in Holothurians or in mussels; while in these latter forms it has free entrance and exit, it seems rather enigmatic how it enters the starfish. Its anal opening being, as in other starfishes, very small so as hardly to allow the fish to enter, even as very young, the only possible entrance would appear to be through the mouth of the starfish, and then it must evidently break through the wall of the oesophagus or the stomach. Direct observations in an aquarium would probably settle the question very easily. The possibility, of course, exists that the starfish is able to widen its anal opening very considerably so as to allow the fish to enter this way, but also in that case it would have to break through the

[1]) Bleekers: Iets over visschen levende in Zeesterren. Tijdschr. voor Nederl. Indië. 1854. p. 162.

wall of the stomach in order to get into the body cavity. I have tried to find the hole in the oesophagus or stomach through which the fish must be supposed to have entered, but the fact that the wall of the stomach is exceedingly thin and delicate makes it doubtful whether the holes actually observed were not accidentally caused by the cutting open of the starfish, which — on account of the very thick leathery skin — cannot be done in a very gentle way. The fish must, of course, leave its host for the sake of propagation; but this is again for future observations. I would only point out that all the specimens found were apparently nearly or quite full-grown (ca. 10—15 cm long); only in the single case, where two specimens were found together in one starfish, one was only about half as big as the other. Young specimens were never met with. It may further be pointed out that the facts that the fish is fairly strongly pigmented, and that its eyes are apparently quite normally developed, not showing any trace of being more or less rudimentary, as might be expected from its living in complete darkness, would seem to indicate that the fish does leave its host at times. A detailed study of all the questions connected with this most interesting case of parasitism — it could hardly be termed symbiosis — could not fail to be of more than ordinary interest.

Besides the thick and clumsy, light pink-coloured *Choriaster's*, and the huge, grayish-yellow *Linckia's* (*L. Guildingii* Gray), with the thick, stiff arms up to 28 cm long, also *Echinaster luzonicus* was fairly common, generally carrying the same sort of *Coeloplana* as was found so very commonly at the Kei-Islands. Very large Holothurians were brought up in considerable numbers, among which one named "Trepang koeda" (horse-cucumber) was almost meterlong; the "Trepang soesoe" (*Mülleria maculata* Brandt, according to literature; I have not myself verified the identification), estimated as the most delicious of the eatable sorts, was found to cover itself with small pieces of algæ; nearly constantly a small crab, evidently commensal, was found among its tentacles (probably *Lissocarcinus orbicularis* Dana, known to live in this way in various Holothurians of the Indian Ocean). Comatulids were numerous, as already found by the "Challenger", while Ophiurids and Echinoids were very rarely found by the diver and evidently very scarce.

Among the Gorgonians mention should be made especially of a small, creeping form (*Acanthogorgia* sp.) which grows in extensive, low, inextricable bushes, very much recalling the heather. It must cover the bottom in large patches, and affords, of course, a fine sheltering place for a vast number of small organisms, especially Crustaceans and worms, while numerous Bryozoans, Sponges, Tunicates a. o. attach themselves to the older, dead branches. This very interesting Gorgonian I have not met with anywhere else. Several other large, fine Gorgonians were brought up by the diver a. o. a very large *Melitodes,* and also very large and fine specimens of Antipatharians. On the other hand, no specimens were met with of the "Acabahal" (*Plexaura*) which plays a rather important part in these regions, its black axis being used for making armrings which are believed to help against rheumatism and are worn very commonly, not only by the natives but also by many of the white inhabitants

The interesting *Paralcyonium* found at Banda by the "Siboga" was also brought up by the diver, and likewise some fine specimens of a *Cerianthus*, whose leathery tube was found to be inhabited by a large, black *Phoronis*, just as is the case with the *Cerianthus* occurring at Misaki. The "Challenger" Report especially mentions the great numbers of *Fungia* occurring on the coral reef at Banda. We found them likewise very numerous in places on the reef, as also the diver brought up many specimens from deeper water, among which an extraordinary specimen of a *Halomitra* (*philippinensis* Studer?) measuring no less than 56 cm in diameter, looking like an exquisite model of the mountain Goenoeng Api. Very remarkable was the great percentage of specimens showing signs of regeneration; an extensive material of such regenerating specimens was collected by Dr. Boschma for special study.

As regards the coral reef at Banda I was struck by the feature that it was rather more uniform than at Ambon and at the Kei Islands, especially the *Turbinaria's* were much more richly represented here than I have seen elsewhere.

In a small bay at the outside of Goenoeng Api a very interesting animal community was met with. Looking through the waterglass I observed in a depth of 10—12 M. the bottom to be closely set with meterlong red, thin, gently waving organisms, which I thought to be a sort of *Virgularia* or related form. I pointed them out to the diver asking him to take up some specimens for me. It proved, however, quite impossible. As soon as he reached the bottom they disappeared round him, and as he walked on they disappeared in the ground before him. He tried to dig them up from the fine, loose, black sand, but this also proved impossible, although he dug as deep in the sand as his arm's length. He tried a second time digging with a spade, which he carried down with him, but likewise without success. Enough was, however, seen to show that these organisms were not Pennatulids, but gigantic Polychæte worms, sitting in the sand in a similar way as *Tubifex* in fresh water pools, the posterior end (at least I think it must be the posterior end) of tne body waving free in the water above the bottom. They were observed to sit not so very close, probably not more than some 20 in a square Meter; they covered an area of several hundreds square Meters, probably much more, being, evidently, found also farther out in deeper water, where they could not be observed on the dark bottom by means of the water glass. This interesting animal community I have not met with anywhere else.

The iron columns of the pier at the town were, no less than at Amboina, a favourite ground for all sorts of Gorgonians, Sponges, Hydroids etc., with all sorts of gorgeously coloured fishes swarming around them. The bottom between the tide limits was black with *Diadema's*, which collected on the lower part of the stony wall inside the pier in some places in such masses, that the long thin, horizontally protruding black spines appeared like a giant brush. Where — as is a common practice — the inhabitants have their "W. C."s over the water, the *Diadema's* always were seen to collect in dense masses, finding here a favourite feeding ground with a rich food supply. I was very surprised in finding here also large, gorgeously coloured *Asthenosoma's* in so shallow water as even to lie on dry ground at low tide. Apparently they also visited the same feeding ground as the *Diadema's*. At another place *Prionocidaris baculosa* was found in numbers among stones lying dry at low water.

The extensive sandy flats along the S. and E. coast of Neira and at the inner side of Lontor offered collecting grounds of considerable interest. Besides the, as food much valued, *Tripneustes gratilla* we collected here *Peronella Lesueuri* and a pair of small forms of *Laganum*, as also some *Brissus*. While in day time these animals lie covered with sand and are not easily detected, at night they crawl about on the surface of the bottom — as I have also observed in other places (e. g. Hawaii). The diver, who proved to be also an expert collector here on the flats, maintained that the *Brissus* would come out only when quite dark; even the moon light it did not like!

These flats otherwise are conspicuous through being covered to a great extent by small hills looking very much like mole casts; by low water they look very picturesque, small ponds of clear water remaining between them, in which they are reflected. That these hills are due to the action of some sort of animal is evident — but which sort, I have not been able to make quite sure. The idea that they might be due to Enteropneusts, which I have in other places seen to produce something the like, though on a smaller scale, had at once to be discarded. Digging in the mounds and following the holes did not result in finding the originator with certainty. Not rarely a large Sipunculid, footlong, red, somewhat thicker than a finger, was found therein, and the diver insisted on the mounds being made by this animal. I am, however, more inclined to think that they are formed by a *Thalassina,* which Decapod is well known to make huge mounds, where it lives; a single specimen of this form was found here, it being thus certain that it does occur here. The big *Squilla's*, which also occur here, living in holes in the ground, do not make mounds over their holes.

A very curious feature was observed on these mounds, viz. a more or less radiate arrangement of the particles on the top. That this is due to the action of the waves is beyond doubt; they form on the freshly thrown out material wave-lines, sorting the material according to weight, the lighter grains of white coral coming then to lie between the elevated lines of the heavier, black volcanic sand particles; a closer inspection shows that the wave-lines are at a right angle to the dominating direction of the wind, as should be expected. Similar *Thalassina*(?)-casts, were also observed in great numbers on the sandy flat at the S. coast of Doe Roa, at the Kei Islands.

The flat at Lontor is in its inner part strewn with huge, black volcanic bombs, the ground between these larger stones being, as it were, paved with small, smooth, black stones. This part — an area of several hectares — which is covered by the water only at the highest tide, is the home of a small crab of the *Gelasimus*-group;

it digs its holes between and under the stones, the small (here) white sand balls dug up by it lying spread all over, very conspicuous among the black stones. Farther out, where the volcanic stones are much less numerous, and where a few centimeters of water may remain, covering the sand at low tide, the community of the *Edwardsia's* occurs, as at Saparoea and the Kei Islands, but here also were observed, in places, groups of fine Sabellids, their red tentacle crowns looking like beautiful flowers.

The *Thalassia*-meadows occupying the outer part of the flat were, as usual, inhabited by a very rich and varied fauna — Holothurians, Asterids, Molluscs (a. o. a small green *Akera*-like form, in colour so closely resembling the *Thalassia* leaves, that it was very hard to discover); but a feature which I have not observed in other places was the considerable number of mostly small specimens of *Echinothrix calamaris* (also some *Salmacis*) lying free among the leaves; otherwise these sea-urchins are, at daytime, mostly found under stones, where they hide themselves, together with the young *Diadema's*. The *Tripneustes*, which is more generally found moving free about also at daytime, covers itself with small stones, pieces of *Thalassia* leaves, algæ etc. and thus procures a concealment (perhaps also from the light). The number of small fishes occurring in these *Thalassia*-meadows — mainly in the deeper part, where the leaves still float free also at low tide — is astonishingly great. A haul with a seine, for which I engaged the native fishermen, brought an overwhelming mass of mainly small forms or young fish — *Teuthis*, *Zanclus*, *Mullus*, *Hemiramphus*, *Aulostoma* etc. — a true orgy of colours! Using a seine in such a locality, where not only the dense *Thalassia*-growth, but also stones and coral blocks will catch the net, presents considerable difficulties, of course; they are, however, easily overcome, the fishermen simply diving down and lifting the net over the hindrance, where it may have caught hold, all the while they are shouting and pulsing in the water with sticks in order to frighten the fishes away from the place, where the net is to be lifted. The same way of using a seine I have also observed in the West Indies.

Most noteworthy among all the fishes of Banda is undoubtedly the "laweri", the famous fish with the large luminous organ situated under the eyes, several specimens of which (the "laweri batoe", *Photoblepharon palpebratus*) were brought me by the fishermen; the sight of some freshly caught specimens, kept in a dish with water in a dark room, is truly impressing; the light they emit is almost strong enough for reading, and when they blink, covering the luminous organ through raising the "lid" situated below the organ, I could not help being reminded of corn-lightning. The blinking does not occur at regular intervals, and, upon the whole, relatively rarely. That the fishermen cut out the luminous organ and use it for bait is a well known fact. The conclusion reached by the American specialist in Bio-luminescence, O. N. Harvey, who had been staying at Banda a short time before our visit there (1920) in order to study especially the luminescence of the laweri, that it is due to luminous bacteria living in symbiosis with the fish, does not make this rather unique case of luminescence less interesting. I have seen only the *Photoblepharon*, no specimens of the other "laweri", *Anomalops katoptron*, being caught during my stay at Banda.

In spite of the many interesting faunistic and biological observations made here, it does not seem to me that Banda would be a very good place for a biological laboratory as the one planned. Certainly Banda does not equal Amboina or, especially, the Kei Islands, as regards the richness of the fauna as well as in other respects. There is very easy access to the greater depths, of course, the little group of islands rising directly from depths of about 4000 Meters. But this does not imply anything like so easy an access to the abyssal fauna as is found at the Kei Islands. And there are several serious objections to be made against choosing Banda for the place of the future station. Thus e. g. the water appears, according to experiments which I undertook, unfavourable to experimental work — much as I expected from the volcanic condition of the place. But it seems to me superfluous to give the reasons against choosing Banda as the place for a future laboratory more in detail, the advantages of the Kei Islands in this respect being so evident that hardly anybody could be in doubt as to which place to give the preference.

On the return voyage to Java the — usual — four days' stay in Macasser, due to the time table of the mail boats, was made use of for doing some dredgings in the neighbourhood of the harbour, mainly near the little Island of Samalona, the director of the harbour works, ingeneer H. V. van der Voort, most kindly placing at our disposal a small steam launch, excellently suited for dredging work in more shallow water. I beg here to express my sincerest thanks to this gentleman for this courtesy, as also to Mr. P. Rasmussen of the Macasser Produce Co., Ltd., for all kindness shown to the Expedition on our way out and back.

These few days' work was, of course, not sufficient for giving more than an impression of the biological conditions of the bottom in this sea, the impression being not very favourable. The bottom nearly everywhere consisted of a very soft mud, in which only a comparatively scanty fauna was found. Only on the edge towards the riff on Samalona and on the small bank Taka Bako a more varied fauna was found, some fine *Salmacis virgulata* being the most noteworthy find.

The sandy shore of Samalona proved a locality of considerable biological interest. Numbers of Amphipods, apparently very closely related to the *Talitrus* and *Orchestia's* of our own sandy shores, were found here at the upper limit reached by the waves, living in much the same way as these latter, the sand being in places completely covered with the small heaps of loose sand, thrown up by the Amphipods when burying themselves in the sand. The sandy beach otherwise was the home of great numbers of sea-cockroaches (*Hippa*), so swiftly moving and again burying themselves, when thrown out of the sand, that they were hard enough to see, being also exactly of the colour of the sand; further the white mussel *Cardium* (*donaciforme?*), so very common in the sand on these shores, was found here (but not *Donax*), and also a fairly large *Chirodota*, rather unusually resistent, so that one could haul it out of the sand without tearing it to pieces. The shore here being at times evidently exposed to a rather heavy surf (the surrounding coral reef is too small for giving much protection), this quality of the *Chirodota*, living in the loose sand, is in good accordance with the character of its habitat.

IV. The Java Sea; Strait Sunda.

On my return to Batavia in the beginning of July, I had the opportunity of spending a fortnight at the newly established marine Laboratory there. I beg to tender here my most cordial thanks to the director of the laboratory, Dr. A. L. J. Sunier, for his unsurpassed hospitality and his untiring efforts for facilitating my work, the main object of which was to extend my studies on the larval development of Echinoderms. Owing to various circumstances (a. o. the destruction of a diatom culture, which I had brought along with me from home, and the impossibility of starting new cultures, because the chemical solutions which I had also brought along with me to this end, proved to be impure and therefore killed the organisms instead of stimulating their growth) my efforts were not crowned with quite satisfactory results. The larvæ of *Diadema setosum* and *Linckia miliaris* were reared, but the former not beyond the first stage, and the latter not so far that it could be ascertained whether this larva — which is of the usual *Bipinnaria*-form — passes through a *Brachiolaria*-stage. That the larva of *Diadema setosum* proved to be closely similar to that of *Diadema antillarum* is only what was to be expected. Another Echinoid, *Echinothrix Desori*, which lives in numbers on the riff at the little Island Edam outside Batavia, was found to have no ripe sexual products by this time of the year.

From the 26th of July to the 8th of August I had the privilege of partaking in a trip to the Java Sea, West of the Thousand Islands, and in the Sunda Strait with the G. S. "Brak", undertaken with the object of carrying out investigations for the Batavia Laboratory. In the time left from this research work I was allowed to make dredgings and thus had a most welcome opportunity of studying the bottom fauna in this area and of making comprehensive collections, which was the more desirable, as very little work of this kind has been done, since Professor C. Ph. Sluiter made his important investigations about half a century ago; upon the whole, so extensive investigations have never been undertaken here. Sluiter's work was, as far as the dredgings are concerned, mainly confined to the Bay of Batavia and — according to kind information in a letter — to the part of the Sunda Strait between the town of Anjer and the Island "Dwars in den weg" (about the area indicated by Stations 73 and 74 in the accompanying map, Pl. III). More recently, 1907—09, Professor P. N. van Kampen has made fisheries investigations over an extensive area of the Java Sea, and also in the tract West of the Thousand Islands, during which also zoological observations and collections were made. Only a very small part of this material has, however, been scientifically worked out, while the general record of these investigations deals solely with the results applying to the fisheries.[1]) The work of J. Brock (1885) was confined to collecting on the riffs of the islands Edam and Noordwachter (and Amboina), that of A. Korotneff (1885) to shore- and riff-collecting in the Strait Sunda and the Batavia Bay (his dredgings at Billiton not directly concerning us here, as being outside the area in question). Thus the investigations now undertaken, especially those in the Sunda Strait, for no small part cover entirely virgin ground and accordingly may claim some interest.

Regarding the Bay of Batavia I have nothing to add to the description given by Sluiter in 1887,[2]) having only made a few dredgings there, while Sluiter worked there through several years. My researches which were in the main confined to the West of the Thousand Islands, gave in general the result, that the fauna is perhaps somewhat less rich than might be expected in such a tropical sea. Near the coast of Java the bottom was found to be very soft mud, inhabited by the usual mud-loving forms, among which the two small Spatangoids, *Palæostoma mirabile*, and a small (undescribed) *Pericosmus*, which were in places fairly common, were the more interesting. Foremost in biological interest, however, stands a foot-long, red fish, which lives entirely buried in the mud, like earthworms in the soil, and which is, in accordance with this mode of life, entirely blind, the eyes being rudimentary and covered by

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1) Verslag van de verrichtingen van het Onderzoekingsvaartuig „Gier“ gedurende het tijdvak 2 September 1907 tot U ⁰ 1908. Mededeelingen van het Visscherij-Station te Batavia. Nr. IV, 1909. Verslag der verrichtingen van . . . . . „Gier“ over het jaar 1909. Ibidem. Nr. V. 1910.

2) C. Ph. Sluiter. Die Evertebraten aus der Sammlung des kgl. naturwiss. Vereins in Nederl. Indien in Batavia. Zugleich eine Skizze der Fauna des Java Meeres. Natuurkundig Tijdschr. voor Nederl. Indië. XLVII. 1887.

a thick skin so that hardly any trace of the eye is to be seen on the outside. It is a species of the genus *Gobioides*.

Where the bottom is hard, stony, it is generally covered with huge sponges, which fill the dredge and thus make work on this kind of bottom rather difficult. The dredge very soon fills completely with the sponges and thus, although even dragged for a longer time over the bottom, does not work any more; accordingly it gives a relatively poor result of the dredging and conveys a — probably — false impression of the bottom fauna being relatively poor. Eminently characteristic of the sandy (or sandy-muddy) bottom is an elegant Hydroid of the family Aglaopheniidæ (*Lytocarpus*) its slender, often Meter-long stem, with the alternating feathershaped sidebranches carrying the polyps, being fixed in the bottom by means of a large tuft of fine rootlets. Often Comatulids and Ophiurids are attached to these Hydroids and sometimes they were found full of *Caprella's*, while Bryozoans are attached to the basal tuft, and numbers of worms live among the rootlets. Upon the whole, these Hydroids are an ecological factor of importance.

In the Sunda Strait the trawl several times came up completely filled with pumice stones from the Krakatau eruption in 1883. It was very interesting to notice that hardly any animal forms were found attached to these pebbles[1]) — probably because they are so light as to be rolling about by the slighest movement of the water from the current or the waves. Otherwise the bottom was muddy in nearly all the places where dredgings were made. I was very struck with the different character of the fauna in various places, in spite of the uniform character of the bottom. In some places the bottom must be almost covered by the elegant *Retepora*-like Bryozoan, *Retiflustra Schønaui* Levinsen, together with which were found numbers of another characteristic Bryozoan, a *Stirparia*

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[1]) Prof. Sluiter found in a pumice stone from off Krakatau in 9 fathoms a specimen of a *Bonellia*, which he described as *Bonellia pumicea* (C. Ph. Sluiter. Die Evertebraten a. d. Sammlung d. Kgl. naturw. Vereins Nederl. Indien. Batavia. III. Die Gephyreen, Natuurk. Tijdschr. Nederl. Indië. L. 1891, p. 111); I have not observed any specimens of this interesting animal in the numerous pumice stones, which were brought up in various stations here.

(undescribed species, according to kind information of Dr. E. Marcus, who has also identified the above named form for me.) It has a most remarkable superficial resemblance to a *Rhizocrinus*, and someone not very familiar with these forms might well mistake it for this Crinoid.

One of the reasons, why I wished especially to investigate the fauna of the Sunda Strait, was, indeed, the question whether *Rhizocrinus* was to be found here. According to Korotneff[1]) it was formerly found here in the relatively shallow water of only ca. 30 Meters. It would be very interesting to see, whether it had now established itself here again, after having — probably — been exterminated by the ashes and pumice from the Krakatau eruption. As I did not succeed in finding it there, in spite of the fairly extensive dredgings that were made, it would appear that it has not yet succeeded in establishing itself here anew — if, indeed, the statement of its occurrence here in former times does not rest on a mistake. Since dredgings in this region had by the time of Korotneff's visit there been undertaken only by Sluiter, the statement of Korotneff (— „Jadis, à cet endroit (ville d'Anger) on trouvait aisément de grands *Rhyzocrinus*, maintenant, le fond de la mer est complètement couvert de cendres et de limon et il est inutile de songer à y faire une capture scientifique" —) might be expected to rest on informations, which he had received from Sluiter. Asking Professor Sluiter about this matter, I was informed by him that he never found *Rhizocrinus* there and accordingly never told Korotneff about it. On the contrary, he informs me that directly after the publication of Korotneff's „Compte rendu" he wrote to him asking him from where he had this information about *Rhizocrinus*, but never got an answer to that question. Thus it seems fairly evident that this statement of the former occurrence of *Rhizocrinus* must rest on a mistake. Were it not for the expression „grands Rhyzocrinus", I should be inclined to think that the statement rested on the named Bryozoan, *Stirparia* having been mistaken for the Crinoid. Anyhow, this statement of the (former) occurrence of *Rhizocrinus* here in so shallow water as

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[1]) A. Korotneff. Compte rendu d'un voyage scientifique dans les Indes néerlandaises. Bull. Acad. R. de Belgique. 3. Sér. XII. 1886.

ca. 30 Meters, an occurrence quite unusual for this sort of Crinoid, ought to disappear from literature.[1])

The above mentioned community of *Retiflustra* and *Stirparia*, together with several smaller Hydroids a. o., was mainly found at Station 81, in the Southern part of Strait Sunda (comp. Pl. III). In other places (especially Station 95, in Lampong Bay) a small thin-shelled *Laganum* was exceedingly numerous, while a few miles away (Station 97), on apparently quite the same sort of bottom a curious Mollusc (*Calyptræa* sp.) was the dominant form. Another striking example was afforded by the two Stations 82 and 83, at Prinsen Eiland in the southernmost part of the Sunda Strait. At both stations solitary corals were plentiful, but they were of different sorts in the two places, although the bottom and other physical conditions would seem to be quite identical. Upon the whole, I would take the opportunity of emphasizing that even where the bottom is very uniform, the various components of the fauna are by no means always evenly distributed, but rather occur more or less in herds or aggregations, in some spots in great numbers, in others very scarce.[2])

A visit to the fine coral reef (an almost pure *Acropora*-reef) surrounding the small Huisman Island, close to the larger Island of Sebesi, resulted in the interesting find (first due to Dr. H. Boschma) of a number of *Plococidaris verticillata*, otherwise not so commonly met with. It lives way down among the old branches of the *Acropora*. More interesting was, however, a visit to the Island of Krakatau itself, the rest of which now stands with nearly vertical

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1) A. H. Clark, in his paper "Four new species of the Crinoid Genus Rhizocrinus" (Proc. U. S. Nat. Museum. XXXVI. 1909, p. 674) quotes the statement of Korotneff and suggests that the species "recorded" by Korotneff is possibly the large *Rh. Weberi*. As seen from what is set forth above it is not adequate to state that the *Rhizocrinus* was recorded by Korotneff, which would imply that he had found it there himself.

2) A similar statement is made by Semon in his book "Im Australischen Busch" 1896, p. 505. "Es lässt sich mit einem Wort meiner Ansicht nach nicht bezweifeln, dass eine Anzahl von Grund bewohnenden niederen Seetieren, besonders Stachelhäutern, geradezu gesellig lebt" ..... It does, however, not appear that he means to extend this statement also to such forms as live in deeper water on a quite uniform bottom.

walls from the very top (2500 feet) down to the deep basin of ca. 300 Meters, now occupying the place formerly occupied by the larger part of the island, which was blown up by the eruption in 1883. I shall not enter on that most interesting chapter: the history of the repopulation of the island by plants and animals after the total destruction of all life by the eruption, but content myself with referring to the two most recent important contributions to that subject, viz. Docters van Leeuwen's "The Flora and Fauna of the islands of the Krakatau-group in 1919"[1]) and K. W. Dammerman "The Fauna of Krakatau, Verlaten Island and Sebesi"[2]). As regards the marine fauna I may refer to the most interesting observations by Sluiter (in 1888—89) on the reappearance of the reefforming corals at the coast of Krakatau[3]). Here I may mention only some observations on the littoral fauna of the island.

The North side of the Island is, as stated above, a vertical rock wall, with some huge blocks at its foot, over which a heavy surf constantly washes. Here we find the animal community peculiar to such localities in the tropics, above all characterized by the Echinoid *Colobocentrotus atratus*, which is, with its pavement of thick, flattened spines on the aboral side and with its innumerable sucking feet on the oral side, eminently adopted to living in the strongest surf — indeed it does not occur in places with no heavy and constant surf. It feeds on the fine algal vegetation occurring on the rocks. A rather extraordinary fact is the occurrence of a small, white Planarian, which is constantly found under the *Colobocentrotus*, where it is safe against being washed away. (This Planarian I have also observed living under *Colobocentrotus* on the rocky shores of Hawaii). Very interesting is also the occurrence of a small fish (*Salarias* sp.) in the same locality. The whole of its underside, head and body, acts as a sucker, and thus it is safe from being washed away by the surf. I found it exclusively on the vertical surfaces of the rocks, sitting in great numbers, quite close together, with the tail curved up along the side of the body, which gave it quite a parti-

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1) Annales du Jardin Botanique de Buitenzorg. XXXI.

2) Treubia. III. 1922.

3) C. Ph. Sluiter. Einiges über die Entstehung der Korallen-Riffe in der Java-See und Branntweinsbai, und über neue Korallenbildung bei Krakatau. Natuurk. Tijdschr. voor Nederl. Indië. XLIX. 1890.

cular appearance. It was easy enough to catch numbers of them with a hand net; for the approaching net they were springing away, just as if they were a swarm of insects, to other rocks or down into the water, where they were then very rapidly swimming or skipping over to some other rock. Upon the whole, this little Blennioid recalls *Periophthalmus* in its appearance and habits, a most pronounced parallel biological adaptation within two different families.

In the black volcanic sand forming the beach on the East Coast of Krakatau I was very pleased in finding numbers of a small Spionid living in exactly the same way as described by me for *Scolecolepis squamata* from the Dutch and Danish sand beaches[1]). The worm sits vertically, free in the sand, not in tubes; when the smooth water glides down over the beach after the retreating waves, it raises its head above the sand, spreading its two long tentacles in two curves against the current, evidently with the object of catching any small organisms that are carried down with the water. On the black sand they were very distinctly and much more easily seen than is *Scolecolepis squamata* on the white sand of our own beaches. The two curves of the tentacles remained quite distinct in the dry sand, after the water had run down. I was the more pleased to find this interesting worm here, as I had been looking, for it in many other places, but always in vain. The reason for its not occurring on beaches of usual coral sand evidently is this that the sand is not uniform enough for it. Even if it looks very pure and uniform on the surface, it is very often full of larger or smaller pieces of coral farther down, and these larger pieces make the sand unsuitable for the worm. That the other animal forms, so eminently characteristic of such sandy beaches, were likewise represented here need scarcely be said. I would only mention the interesting fact that the *Hippa's* found here were almost black as the colour of the sand — though, apparently, not specifically different from the white *Hippa* found so commonly on the sandy shores in these regions.

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1) Th. Mortensen. Biologiske Studier over Sandstrandsfauna'en, særlig ved de danske Kyster. Vid. Medd. Dansk Naturh. Forening, København. Bd. 74. 1922.

It is not my intention to have the zoological material collected on this Expedition made the object of a special series of publications, the economical conditions at the present time making it too difficult to secure the necessary funds for such larger publication. I expect only to have some special parts of the material worked out, in connection with material collected during my Pacific Expedition in 1914—16. Accordingly, what may be published will appear in the series "Papers from Dr. Th. Mortensen's Pacific Expedition, 1914—16" in this Journal.

In conclusion I give the following list of the dredging stations, referring to the two maps, Pl. II—III. The dredgings at Amboina, Banda and Macasser were not listed as stations. Regarding the names given under "Remarks" attention must be called to the fact that these were for the greater part entered into the notebook directly on capture, thus resting mainly on memory, not on actual scientific determination.

List of the Dredging Stations of the Danish Expedition to the Kei-Islands 1922.

I. The Kei-Islands. (Map Pl. II).

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
1.	30/III	5° 34' S, 132° 50' E.	370	Mud	Tangles	*Salenia*, Ophiurids, Brachiopods etc.
2.	31/III	5° 32' - 132° 27' -	180—220	Sand	—	*Ophiacantha*, *Zoroaster* a. o. Starfishes. *Callionymus*.
3	—	5° 32' - 132° 36' -	245	—	Trawl	*Metacrinus* Comatulids; *Micropyga*, *Hapalosoma pellucidum*; *Zoroaster*; *Aphrocallistes* a. o. Sponges; Gorgonids, Crustaceans, Annelids, Brachiopods; *Flabellum*. Upon the whole very rich.
4.	3/IV	5° 31' 40" - 132° 26' -	250	—	—	Came up unclear; in the tangles some Cidarids, *Hapalosoma*, Ophiurids. Asteroids.
5.	4/IV	5° 31' 30" - 132° 38' -	250—90	—	—	Came up unclear; in the tangles several Echinoderms.
6.	—	5° 32' - 132° 36' 30" -	210	—	Dredge	Numerous dead shells; few living specimens.
7.	5/IV	5° 38' 30" - 132° 26' -	196	Sandy mud with small stones	Trawl	Several Asteroids and Ophiurids, *Psolus*, Pagurids, Bryozoans, Hydroids; some fishes.
8.	—	5° 39' - 132° 26' -	300	Mud	—	Cidarids; *Calveria*, *Palmipes*, *Calliaster* a. o. Asteroids; Elasipods, *Synallactes reticulatus*; Crustaceans; Bryozoa, Brachiopods; Actinians; *Lophius*. Upon the whole very rich.
9.	6/IV	5° 41' - 132° 24' -	260	—	—	*Molpadia;* a few fishes. The trawl was at the bottom only for a very short time, on account of bad weather.
10.	—	Off Doelah	50	Fine Sand	Dredge	Numerous dead shells, few living specimens. *Echinocyamus*, *Fibularia*, small Linckiids; Annelid tubes; Sponges
11.	9/IV	Off Toeal	20	—	Trawl	*Asthenosoma*, *Fibularia*, *Lovenia*, *Brissopsis*; Comatulids: *Veretillum*.
12.	—	5° 30' S., 132° 35' E	325	Sand, shells, corals	—	Only a few minutes on bottom: caught hold. Sponges; Crinoids; *Astroschema*, *Aræosoma*, *Pleurotoma* with *Zoanthus*. Evidently a very rich place.
13.	—	5° 31' - 132° 36' 30" -	275	Sand	—	*Aræosoma coriacea* (?); *Micropyga*; *Echinolampas*; Cidarids: *Ilyodæmon*; Corals.

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
14.	10/IV	S. of Doe Roa	40	Sand	Trawl	Numerous Crinoids; *Salmacis; Goniaster; Linckia, Astropecten*. Numerous *Pecten's;* Eunicid tubes; *Retepora;* numerous Synascidians. — Very rich.
15.	—	—	ca. 20—5	—	—	Numerous *Lithothamnion's. Spongodes,* Pennatulids, Gorgonids; *Iconaster longimanus;* Ophiurids, Crustaceans; Brachiopods.
16.	12/IV	5°32'20" - 132°37' -	50	Sand with Lithothamnion	Dredge	Gorgonids; Sponges; *Ophiomyxa; Echinobrissus epigonus;* a large *Neomenia* (?). Large *Orbitolithes.*
17.	—	5°34'40" - 132°35' -	100	Sand, shells	—	Sponges; Gorgonids. Mainly dead shells.
18.	—	Doe Roa Strait	40	Sand, corals	—	Numerous Gorgonids and Antipatharians; Crinoids; *Pecten; Rossia* (?) etc.
19.	14 IV	Off Toeal	20	Sand	Trawl	*Asthenosoma, Astropyga, Salmacis; Cucumaria tricolor; Colochirus*; Comatulids. Very rich. Several other hauls were made later on at this place, always with excellent result. These dredgings all got the same number.
20.	—	Doe Roe Bassin	50	—	—	Numerous Crinoids, Bryozoans, Hydroids, Sponges, Synascidians, Crustaceans, Ophiurids. Very rich.
21.	—	5° 30' S., 132° 47' E.	70—50	Hard bottom, Corals	—	Gorgonids, Hydroids, Sponges. *Luidia.* Only a few minutes at bottom; caught hold.
22.	15 IV	5°30'40" - 132°51' -	340	Sandy mud	—	*Aphrocallistes;* Ophiurids; Crustaceans. Only a very short time at the bottom, on account of the current.
23.	—	5° 34' - 132° 50' 20" -	300	Sand	Young fish Trawl	A small yellowish Pteropod in good numbers; *Phronima.* Few Medusæ. Not very rich.
24.	—	5° 37' - 132° 56' -	100	Hard bottom	—	Numerous Comatulids (*Eudiocrinus* a. o.); Euryalids; *Asthenosoma, Microcyphus;* Brachiopods; Gorgonids. Very rich.
25.	16/IV	5°34'20" - 132°55' -	85	Very fine Sand	Trawl Dredge	Some few Echinoids and Corals; *Murex;* very poor.

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
26.	16/IV	5⁰38'S, 132⁰55'20"E.	90	Sand	Trawl	As the trawl contained numerous *Udothea* and Florideans, it must have passed over a spot of considerably smaller depth than the 90 M., which were sounded at the end of the dredging. Several Crinoids (*Eudiocrinus*; *Faorina chinensis* (?); Gorgonids. Many large *Orbitolites* (probably from less than the 90 M.). Sponges; Ophiurids. Rather rich.
27.	17/IV	2 Miles N. of Elat	60—70	Fine Sand	—	A fine Euryalid; some fine *Murex*; two magnificient Sabellids in large, calcareous tubes.
28.	—	5⁰37' S, 132⁰54' E.	400	Mud	—	Some large Cidarids; *Astrotoma*; *Henricia*, *Ophiomusium*.
29.	—	5⁰38' - 132⁰53'30" -	430	—	—	Only a little while in bottom; caught hold. Several fine Crustaceans; *Molpadia*, *Ophiotholia*.
30.	18/IV	Between Doe Roa and Kei Doelah	40	Sand, shells	—	Numerous Crinoids; *Palmipes*, *Iconaster*; *Ophiopteron*; Sponges, Gorginians. Very rich.
31.	—	Doe Roa Bassin	50	Sand	—	Numerous *Goniaster's*, Crinoids, *Salmacis*, *Retepora*, Sponges, Ascidians. Very rich.
32.	22/IV	5⁰32'20"S. 132⁰34' E.	260	—	—	Several Cidarids; *Micropyga*, Elasipods; Crustaceans.
33.	—	5⁰31' - 132⁰34' -	285	—	—	*Ophiotholia*; Brachiopod. Rather poor.
34.	—	5⁰34' - 132⁰36' 50" -	60—25	Coral	—	Only a very short time in bottom; caught hold in Corals. Gorgonids, Synascidians.
35.	23/IV	Bay N. of Noehoe-Roa	32	Sand	—	Mainly dead shells.
36.	—	—	35	—	—	Young Antipatharians.
37.	—	Doe Roa Strait	40	—	—	Gorgonids, Antipatharians, Hydroids; Ophiurids.
38.	24/IV	N. E. of Doe Roa	35	—	—	Numerous Crinoids; numerous *Salmacis*. Ophiurids.
39.	—	N. of Doe Roa	60	Sand, Lithothamnion	—	*Centrostephanus* (?); *Linckia*, *Psolus*; Brachiopod.
40.	25/IV	—	25	Sand	—	Numerous large Sponges; Gorgonids; *Laganum*, *Fibularia*

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
41.	25/IV	5°28'40"S.,132°28'E.	245	Mud	Trawl	*Metacrinus*, *Micropyga*, *Echinolampas*, *Histocidaris* a. o. Cidarids; *Brisinga*, *Zoroaster*, *Goniaster;* numerous *Ophiothrix* and *Ophiacantha; Ophiomusium*, Elasipods; *Kophobelemnon; Spongodes; Culeolus;* Hexactinellids. Very rich.
42.	26/IV	5° 35' - 132° 29'	225	—	—	Several Elasipods; *Hapalosoma pellucidum;* Cidarids *Zoroaster*, *Astropecten*, *Goniaster;* Pennatulids; Hydroids; Annelids.
43.	27 IV	5° 30' - 132° 45' -	35	Sand, coral	—	A large Antipatharian; *Virgularia*; *Echinaster*; Ophiurids
44.	30 IV	5° 39' - 132° 23' -	268	Mud, shells	—	*Metacrinus*, *Brisinga;* Elasipods; *Aræosoma*, *Micropyga* Gorgonians, Hexactinellids
45.	1 V	5°48'30" - 132° 14' -	270	Sand	—	*Metacrinus*, Ophiurids; *Calliaster*; *Echinobrissus;* Gorgonids.
46.	2/V	5°47'20" - 132° 13' -	300	Clay, mud	—	*Metacrinus*; *Salenia*, *Micropyga*, *Hapalosoma*, *Opechinus spectabilis; Pteraster*, *Hymenaster;* Ophiurids; Gorgonids; Hydrocorals Brachiopods, Molluscs Fishes. Very rich.
47.	3/V	5°44'30" - 132° 18' -	236	Mud, stones	—	*Zoroaster* a. o. Asterids; *Ophiacantha; Kophobelemnon.*
48.	—	5°40'10" - 132°21' -	263	Sandy mud	—	*Sphærothuria; Zoroaster*; Pennatulids; Annelids; Crustaceans.
49.	—	5°37'10" - 132°23' -	245	Sand	—	*Metacrinus*, Cidarids, *Hemipedina*, *Hymenaster*; Crustaceans, Corals; *Callionymus.* Very rich.
50.	4/V	5°34' - 132°25' 40" -	233	—	—	*Brisinga; Zoroaster; Metacrinus;* Cidarids; *Prionechinus;* numerous Ophiurids; *Sphærothuria;* Crustaceans; *Hyalonema; Neæra;* Macrurids. Very rich.
51.	7/V	5° 46'30" - 132° 51' -	348	Mud	—	*Echinolampas;* Euryalids; *Zoroaster; Synallactes;* Brachiopods; *Flabellum;* Crustaceans; Hexactinellids; Macrurids a. o. fishes.
52.	—	5° 46 - 132° 49' 35" -	352	—	—	*Lætmogone*, *Meseres*, *Sphærothuria; Ophiotholia; Pentacheles; Aphrocallistes*, *Hyalonema.*

a-on	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
3.	9/V	5⁰ 36' S., 132⁰ 55' E.	85	Sand	Trawl	*Echinobrissus*, *Echinocyamus*; *Palmipes*, *Linckia*; Ophiurids; *Psolus*; Crustaceans, Hydroids, Molluscs, Brachiopods.
4.	—	5⁰ 34' - 132⁰ 55' -	85	—	—	Gorgonians; Crinoids (*Eudiocrinus*); Sponges.
5.	10/V	5⁰ 33' - 132⁰ 51'30" -	353	Mud	Young fish Trawl	Some Medusæ, Heteropods etc. Not very rich.
6.	—	5⁰ 30'20" - 132⁰ 51' -	345	—	Trawl	*Metacrinus*; *Democrinus Weberi*; numerous Comatulids. *Phormosoma*, *Hemipedina*; *Solaster*; numerous Ophiurids; *Lætmogone*; *Psolus*; *Crania*; many Custaceans; Fishes. Very rich.
7.	—	5⁰ 32' - 132⁰ 49'25" -	ca. 200	Shells	—	*Echinocardium*: *Echinobrissus*. Only very short time on bottom; caught hold.
8.	12/V	5⁰ 29' - 132⁰ 37' -	290	Mud	—	*Metacrinus*, *Rhizocrinus*; numerous Ophiurids; *Synallactes*; *Histocidaris*, *Micropyga*, *Echinolampas*; numerous Crustaceans; numerous Hexactinellids (*Hyalonema*); Brachiopods; Actinians. Very rich.
9.	--	5⁰ 28' - 132⁰ 36' -	385	Corals, Sponges	Trawl	*Lophohelia*, *Aphrocallistes*; *Metacriuus*, Comatulids; *Aspidodiadema*, *Echinolampas*, *Ophiocreas*, *Astrotoma*. Brachiopods, Pagurids Very rich.
0.	14/V	S. of Doe Roa	25	Gravel, shells, Lithothamnion	Dredge	*Amphioxus*; *Echinobrissus*, *Echinoneus*. Crustaceans.
1.	—	Between Doe Roa and Kei Doelah	50	Bryozoans	Trawl	Numerous Bryozoans, Sponges, Synascidia; *Lithothamnion*. *Ophiopteron*. Molluscs; Crustaceans. Very rich.
2.	15/V	5⁰ 29'25" - 132⁰ 50' -	290	Sand, shells, Concretions	—	Two magnificent *Dermatodiadema indicum*; *Aræosoma*, *Echinolampas*; Ophiurids; Crustaceans. Only very short time on bottom; caught hold.
3.	16/V	5⁰ 32' - 132⁰ 36'25" -	ca. 250	Sand	Dredge Trawl	*Metacrinus*; *Chætodiadema*; *Hapalosoma*; Cidarids; *Palmipes*; Ophiurids; Gastropods; Sponges. Trawl only a very short time on bottom; caught hold.

II. Java Sea; Sunda Strait (Map Pl. III).

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
64.	26/VII	5° 51' S., 106° 22' E.	35	Sandy mud, shells	Trawl	Several Clypeastroids; *Maretia; Plococidaris bispinosa;* numerous Crabs; *Arca* a. o. Molluscs; Soleids. *Lytocarpus.*
65.	27/VII	5° 52' 5" - 106° 17' -	25	Sand		*Lytocarpus; Asthenosoma; Oreaster;* Clypeastroids; Ophiurids; Molluscs.
66.	—	5° 54' - 106° 12' -	24	Sandy mud shells	—	Numerous small Clypeastroids: *Lovenia; Pteraster*; Crustaceans; Molluscs; Bryozoans; Fishes. Very rich.
67.	—	5° 48' - 106° 12' -	38	Sand	—	*Lytocarpus;* numerous Hydroids; Sponges; Comatulids.
68.	—	5° 47' - 106° 14' -	55	Stones	—	Numerous large Sponges; Hydroids; *Astropyga.*
69.	—	5° 47' - 106° 17' -	50	Sand	—	Rather poor; nothing of special interest.
70.	28/VII	5° 40' - 106° 21' -	35	Mud, shells	—	Very numerous small *Turritella*; small *Lytocarpus.*
71.	—	5° 40' - 106° 08' -	54	Sand, stones	—	Numerous Sponges; Hydroids; Synascidians; *Vermetus*; Gorgonids.
72.	—	5° 41' - 105° 57' -	35	Stones	—	Very numerous Sponges; Hydroids; Gorgonids; *Iconaster, Oreaster*; *Asthenosoma*; Molluscs
73.	—	5° 57' - 105° 57' - Sunda Strait	30	Sand, shells	—	Hydroids; *Spongodes*; Comatulids; small Crustaceans. Caught hold in the bottom; net torn.
74.	29/VII	6° 3' - 105° 54' -	30	Stones, shells	—	Remarkably dead bottom, mostly dead shells. A few Ophiurids, Molluscs and Sponges.
75.	—	6° 10' - 105° 44' -	40	Sand, shells	—	*Lytocarpus, Spongodes*, Comatulids; Crustaceans. Very poor.
76.	—	6° 8' - 105° 44' -	29	Mud	—	Many Clypeastroids; *Palæostoma, Pericosmus*; *Molpadia*; numerous small Gastropods.
77.	—	6° 22' - 105° 44' -	30	—	—	Many Clypeastroids; *Palæostoma, Pericosmus, Maretia, Lovenia*; *Amussium.* Very rich.
78.	—	6° 25' - 105° 41' -	30	—	—	Clypeastroids; *Palæostoma, Pericosmus, Molpadia.*
79.	—	6° 28' - 105° 38' -	47	—	—	Clypeastroids; *Palæostoma*; small Holothurians; *Amphiura*; *Veretillum, Virgularia.*

Sta-tion	Date	Position	Depth (Meters)	Bottom	Instru-ment	Remarks
80.	29/VII	6° 36' S., 105° 34' E.	33	Mud	Trawl	*Laganum*; *Amphiura*; small crabs. Very poor.
81.	30/VII	6° 37' - 105° 27' -	49	—	—	Numerous *Retiflustra* and *Stirparia*; small Hydroids.
82.	—	6° 38' - 105° 21' -	35	Sandy mud	—	Numerous solitary Corals; Crabs; Molluscs; *Spongodes*.
83.	—	6° 42' - 105° 17' -	45	—	—	Numerous solitary Corals, other species than those in Station 82; a very conspicuous difference, although the bottom was the same. Clypeastroids; *Molpadia*.
84.	31/VII	5° 55' - 105° 31' -	38	Sandy mud, pumice	—	*Lytocarpus*; Crabs; *Laganum*; *Luidia*; Ophiurids.
85.	—	5° 53' - 105° 34' -	25	—	—	*Lytocarpus*; a few fishes, a large Clypeastroid. Very poor, on account of the pumice.
86.	—	5° 54' - 105° 37' -	31	Mud, pumice	—	Very poor, on account of the pumice. A few Hydroids, Molluscs; *Maretia*; *Amphisile*.
87.	—	5° 56' - 105° 38' -	31	—	—	Very poor, on account of the pumice; hardly a single living animal.
88.	—	5° 57' - 105° 34' -	31	Sandy mud	—	A large Clypeastrid (*Peronella decagonalis* (?) with a small epizoic Ophiurid among its spines. *Dorippe*; Gastropods.
89.	31/VII	5° 57' - 105° 32' -	18	Sandy mud with pumice	—	*Halophila*. Small Pleuronectids, *Hippocampus*; Crabs; *Turritella*. *Laganum*; *Molpadia*. Small *Orbitolites* in immense numbers.
90.	1/VIII	5° 55' - 105° 30' -	36	Hard bottom	Trawl Dredge	Comatulids; Ophiurids, Gorgonids; Sponges. Net of trawl torn.
91.	—	5° 53' - 105° 27' -	42	Mud	Dredge	A few Ophiurids; *Squilla*. Very poor.
92.	—	5° 49' - 105° 29' -	32	Clay, Mud	—	*Chirodota*; Sipunculids; Annelids. Very poor.
93.	—	5° 44' - 105° 30' -	31	—	—	Sipunculids; Holothurians.
94.	—	5° 44' - 105° 21' - Lampong Bay	27	—	—	*Lovenia*; *Laganum*. The poor result of the Stations 91—94 is due to the fact that a dredge had to be used here, while the trawl was under repair, the dredge being no fit instrument for such bottom.
95.	—	5° 44' - 105° 20' -	25	Mud	Trawl	Numerous *Laganum*; *Lovenia*; *Cucumaria*; *Virgularia*; Mussels.
96.	—	5° 42' - 105° 17' -	29	—	—	*Laganum*; Holothurians; Molluscs; very large shrimps.

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
97.	1/VIII	5^0 38' S., 105^0 17' E.	25	Mud	Trawl	Numerous Molluscs, especially *Calyptræa, Turritella, Dentalium*; *Goniaster*; *Cucumaria*; *Molpadia*; *Virgularia*. Very rich.
98.	2/VIII	5^0 33' - 105^0 18' -	27	Mud, pumice	—	Very poor, on account of the pumice. Some Mussels and Crabs.
99	3/VIII	5^0 28' - 105^0 17' -	25	—	—	Very poor, as in Station 98. A few Molluscs and Crabs. *Synapta*.
100.	—	5^0 49' - 105^0 25' -	54	Clay, Mud	—	Numerous worm-tubes; a few Ophiurids; solitary Corals.
101.	—	5^0 54' - 105^0 28' -	60	Mud, pumice	—	Very poor, on account of the pumice. *Ophiomyxa*; Corals.
102.	—	6^0 9' - 105^0 28' - (Krakatau)	75	—	—	As Station 101. A few Ophiurids, Molluscs, Crabs; *Sternaspis*; *Molpadia*.
103.	4/VIII	6^0 5' - 105^0 42' -	52	Sand, shells	—	Numerous solitary Corals, *Spongodes*, Hydroids; *Iconaster*, *Linckia*, *Pteraster*; *Neomenia* (?); Molluscs; Crustaceans; Sponges. Very rich.
104.	—	5^0 52' - 106^0 4' -	38	Stones	—	Numerous Sponges; *Prionocidaris baculosa*; *Asthenosoma*; *Oreaster*; Hydroids; Bryozoans; Crustaceans.
105.	5/VIII	5^0 56' - 106^0 7' -	13	Mud	—	*Gobioides*; Soleids; *Virgularia*; *Molpadia*; Crabs.
106.	—	5^0 50' - 106' 16' -	32	Sand	—	*Lytocarpus* a. o. Hydroids; *Prionocidaris baculosa*; Clypeastroids; Crabs; Gastropods.
107.	—	5^0 47' - 106^0 7' -	49	Sand, stones	—	Numerous Sponges; Hydroids; *Pteroides*; Molluscs; *Pterois*.
108.	—	5^0 44' - 105^0 56' -	54	—	—	Numerous Sponges; *Stenopus*.
109.	—	5^0 32' - 105^0 54' -	16	Mud, shells	—	*Brissopsis luzonica*, *Maretia*; *Temnopleurus*; Polychetes; *Pegasus*.
110.	—	5^0 25' - 105^0 53' -	12	Sandy mud	—	*Brissopsis luzonica*; *Lovenia*; *Astropecten*; *Goniaster*; *Ophiothrix*; *Echiurus*; *Solen*; *Lytocarpus*.
111.	6/VIII	5^0 28' - 106^0 3' -	22	Sandy mud	—	*Maretia*; *Laganum*; *Murex*, *Neæra*; Sponges; Fishes. Very poor.
112.	—	5^0 36' - 106^0 13' -	52	Mud	—	*Gobioides*; *Calocaris* (?); *Amphiura*; *Pericosmus*, *Lytocarpus*; Crabs; Sponges.
113.	—	5^0 45' - 106^0 22' -	72	—	—	*Gobioides*; *Polynemus* (?); *Sternaspis*; *Astropecten*; Crabs. Numerous large Sponge-spicules, woven together, no living Sponges.

Station	Date	Position	Depth (Meters)	Bottom	Instrument	Remarks
114	7/VIII	5° 51' S., 106° 27' E.	60	Mud	Trawl	*Lytocarpus*; Sponges; *Chirodota*; *Echinaster*; *Laganum*.
115.	—	5° 57' - 106° 28' -	11	—	—	*Gobioides*; *Calocaris*(?); Worm-tubes; *Amphiura*; *Virgularia*; *Pteroides*; *Lingula*; *Cucumaria*; *Laganum*.
116.	—	5° 57' - 106° 34' -	22	Sand, shells	—	Numerous Molluscs; *Goniaster*; *Salmacis*; *Laganum*; *Synapta*.
117.	—	5° 58' - 106° 38' -	17	Mud	—	*Echiurus*, *Sternaspis*; *Abra* (?); Crabs.
118.	—	5° 54' - 106° 40' -	27	Sand, shells	—	Numerous Molluscs, especially *Arca*; *Astropyga*; Comatulids.
119.	—	6° 0' - 106° 50' -	22	Mud	—	*Chætodiadema*; *Laganum*; *Palæostoma*; *Luidia*; *Placuna*; Crabs; *Pteroides*.
120.	8/VIII	5° 54' - 106° 47° -	31	—	—	*Stichopus*; *Amphiura*; Sipunculids; Crabs; an Anguillid with rudimentary eyes, probably living in the mud.
121.	—	5° 54' - 106° 55' -	32	—	—	*Laganum*, *Amphiura*; *Aphrodite*; *Ophelia*. Very poor.
122.	—	5° 53' - 107° 02' -	27	—	—	*Gobioides*; Worm-tubes; *Molpadia*; *Amphiura*; *Virgularia*.

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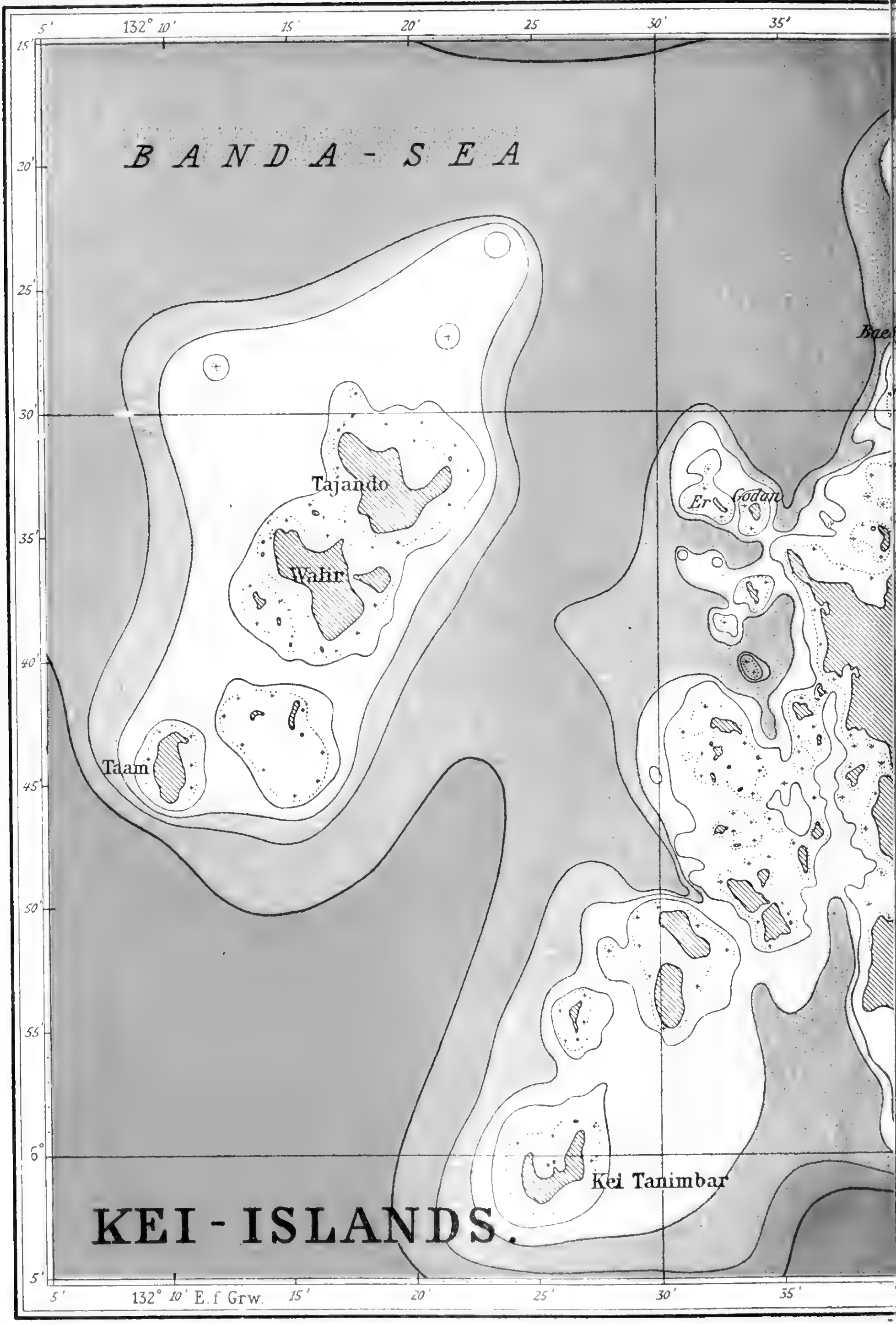
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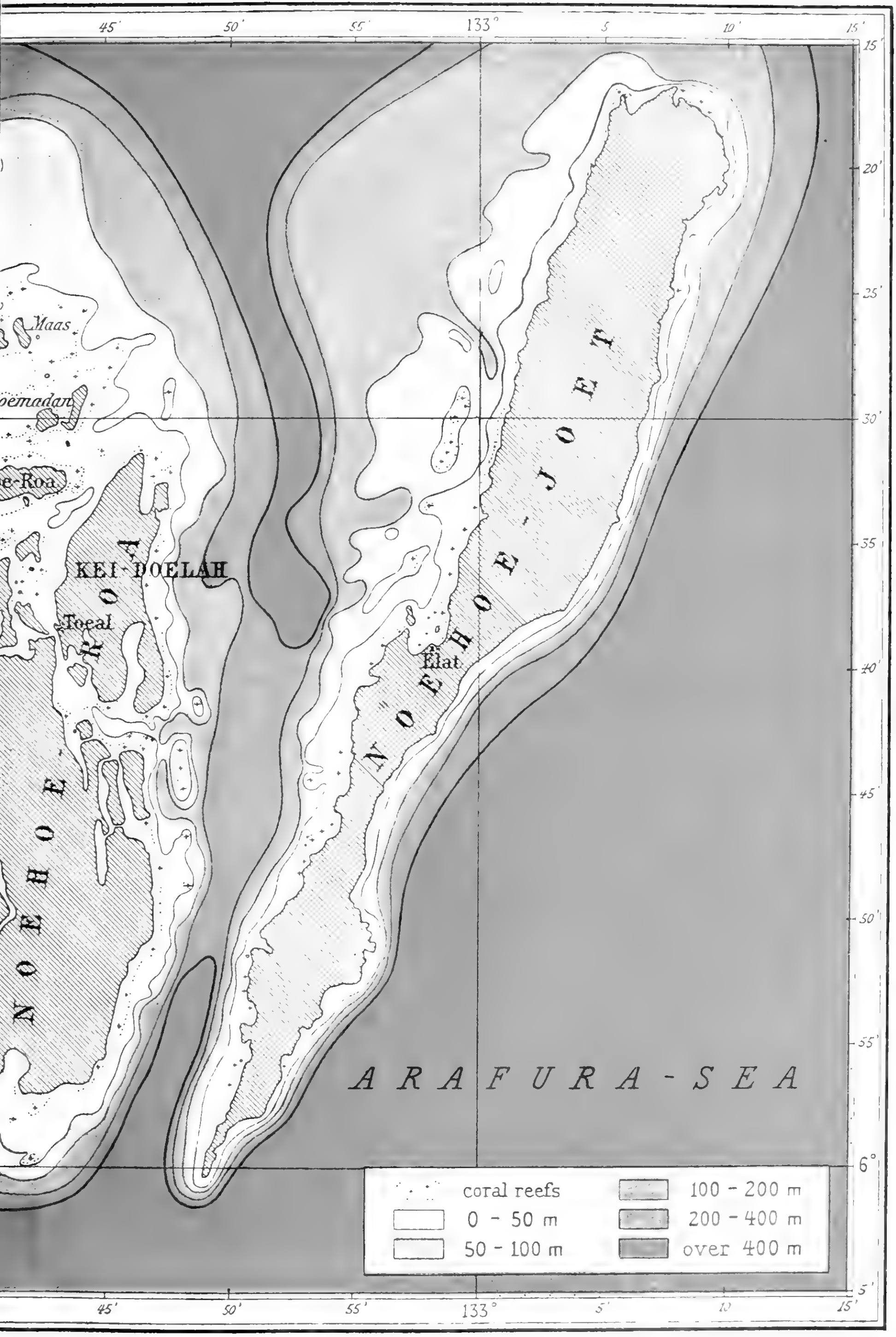

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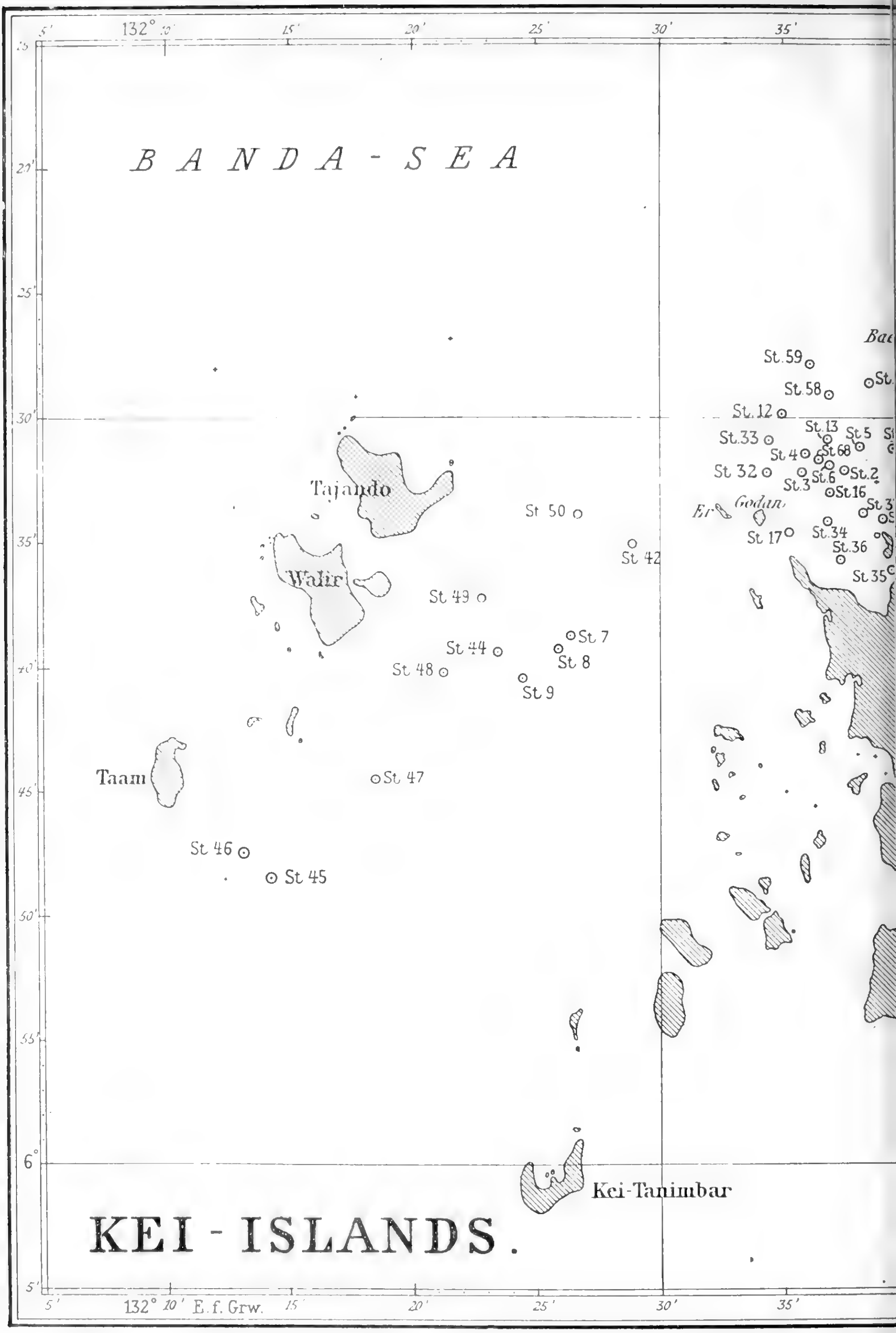
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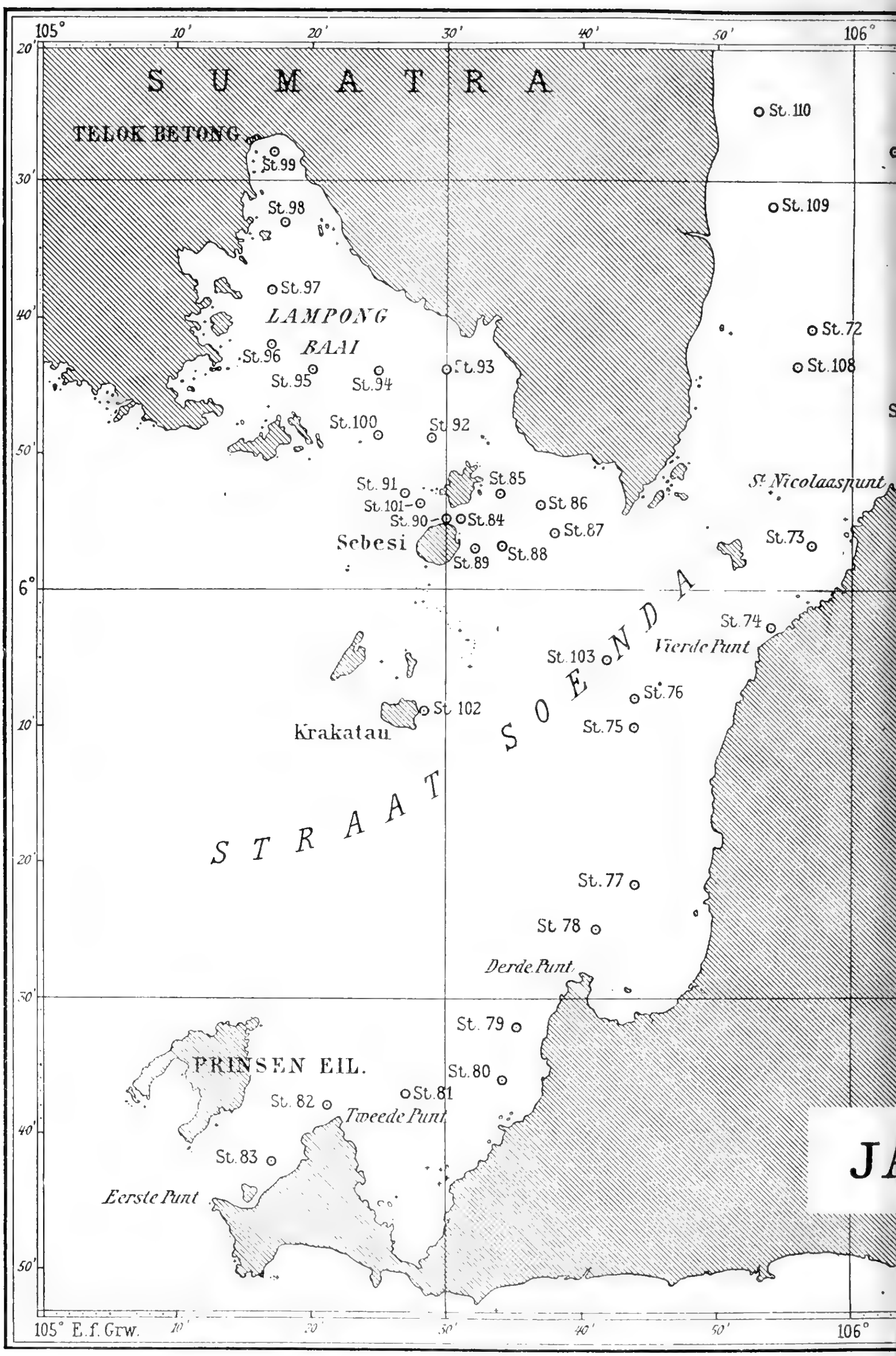
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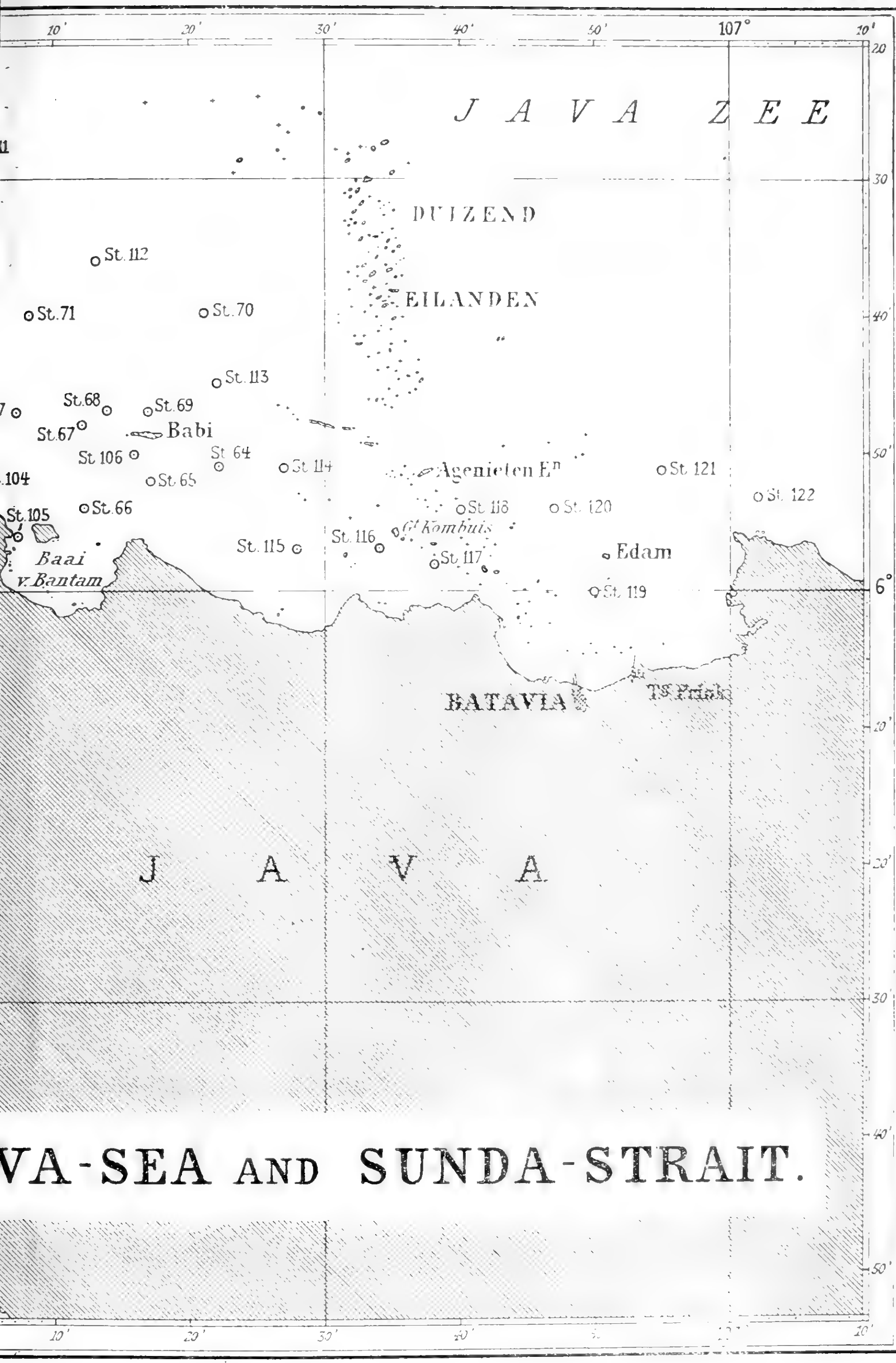


VA-SEA AND SUNDA-STRAIT.

Some Remarks on the Biology of the Sciomyzidae together with the description of a new Species of Ctenulus from Denmark.

(Dipt.)

By

Will. Lundbeck.

About the biology of the *Sciomyzidae* not much seems to be known. In the following I certainly do not give any important increase to our knowledge, I do, however, think that the communication may be of some interest. In the well known revision of the *Sciomyzidae* by Hendel (Abhandl. k. k. zool. bot. Gesell. Wien, II, 1902, 9) the author records the very few facts known about the biology of the family: Léon Dufour (Ann. Soc. Ent. de Fr. 2 VII, 1849, 67, Tab. III, fig. 1—8) describes larva and pupa of *Tetanocera ferruginea* Fall.; the larva was found among Lemna and Callitriche in a fen in the middle of November; it pupated eight days later, the pupa hibernated and developed in April. Gercke (Verh. Ver. f. nat. Unterhalt. Hamburg. III, 1876, 145) mentions eggs, larva and pupa of *Sepedon sphegeus* F., and larva and pupa of *S. spinipes* Scop.; they were found on Lemna trisulca in wet trenches (nassen Gräben), the eggs on the ninth of June, the larvæ in the middle of June, and the pupæ in August, and the development took place in late summer. De Meijere (Zool. Jahrbüch. Anat. und Ontog. XV, 1902, 684) mentions larvæ and pupæ of *Sepedon sphegeus* among Lemna on the surface of water. Hendel remarks also that the metamorphosis of *Sciomyza crassiseta* communicated by Kaltenbach probably belongs to some Trypetid,[1]) and that hitherto no development of any Sciomyzine was known. One case had, however, escaped the attention

[1]) In Kat. paläarkt. Dipt. it is given with a query as synonym to *Antichaeta atriseta* Lw.

of Hendel viz. that Perris (Mém. Soc. Sc. Nat. Lille, 1850, 119) had bred *Salticella fasciata* Meig. from *Helix pisana* Müll., but without being able to decide whether the larva was parasitical or saprophagous. To the recorded few cases only very little has been added later on, as far as I have seen; Schmitz mentions (Biol. Zentralbl. 37, 1917, 31) that he has once bred *Sciomyza* (*Ditaenia*) *cinerella* Fall. from a snail-shell, and Mercier (Ann. Soc. Ent. de Belgique LXI, 1921, 164) has, like Perris, bred *Salticella fasciata* Meig. from *Helix pisana*, but stating that the *Helix* was living, thus, as it seems, proving this Sciomyzid to be a parasite.

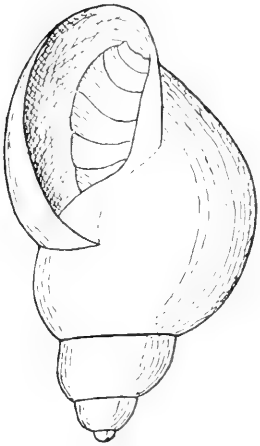
As said above I have seen no other case recorded. Now I have myself bred a number of species or I have got them bred by my friend Cand. Kryger, but only from the puparia without knowing the larvæ and thus not being able to decide anything as regards their feeding habits. The species are: *Sciomyza albocostata* Fall., *S. obtusa* Fall., *S. dorsata* Zett., *S. ventralis* Fall., *Calobaea bifasciella* Fall., *Bischofia simplex* Fall., *Dichrochira leucopeza* Meig., *D. pectorosa* Hend., *D. glabricula* Fall., *D. nigrimana* Meig., *Ditaenia grisescens* Meig., *D. cinerella* Fall., *Anthichaeta analis* Meig., *Anthichaeta* sp., *Heptopteryx brevipennis* Zett., *Ctenulus pectoralis* Zett., *Ct. punctatus* n. sp. (to be described on a following page), *Tetanocera ferruginea* Fall., *T. elata* F., *T. silvatica* Meig., *Dictya umbrarum* L., *Pherbina coryleti* Scop., *Hedroneura rufa* Panz., *Elgiva albiseta* Scop., *Limnia unguicornis* Scop. and *Sepedon sphegeus* F. The species are all taken as pupæ in the various flood refuse at the border of fens, ponds and lakes. When the flood refuse here is sieved in earlier or later spring, especially in March, April and May (my dates range in all from $^{17}/_{1}$ to $^{27}/_{6}$) the pupæ may be present in smaller or greater numbers, sometimes rather numerous, and the development then takes place sooner or later. The pupæ evidently have hibernated in this state as I have had pupæ taken already on $^{17}/_{1}$; accordingly the pupation takes place in autumn; I have also once taken the pupa of *Bischofia simplex* on $^{6}/_{10}$, the imago came on $^{30}/_{10}$, but this was in a heated room, in the free it would no doubt only have come in spring, and on the same date I took a pupa of *Ditaenia grisescens* the development of which was likewise accelerated.

As regards the puparia of the named species I shall only make the following remarks, but except the three species treated later in the paper: The puparia of the *Sciomyzinae* I have seen are all of rather common shape, cylindrical and elongated oval, a little attenuated at each end. At the posterior end are two small protruding and diverging spiracular knobs, and below them a number of more or less pronounced teeth. The colour is paler or darker reddish. Only the puparium of *Bischofia simplex* is relatively short and thus more oval, and it is of a darker colour, dark or blackish brown. The surface of the puparia is smooth, only in *Ditaenia grisescens* I found girdles of small spines, and the puparium of *Sciomyza dorsata* is somewhat corrugated transversely. The puparia of the *Tetanocerinae* are, what is interesting to state, somewhat different from those of the *Sciomyzinae,* and they are more or less of the shape known for *Tetanocera* and *Sepedon.* They are thus less cylindrical, but have generally the ventral side rather arched, the dorsal more flattened, and generally the posterior end with the spiracular knobs is curved a little dorsally; the surface is less smooth than in the *Sciomyzinae,* it is more or less corrugated transversely and along the sides there are one or more longitudinal rows of elongated oblique or more roundish impressions which may be more or less pronounced. (The puparium of *Tetanocera ferruginea,* of which I have seen a great number, may for the rest vary rather much, both as regards the shape and the ornament of the surface, yet preserving a certain characteristic aspect.) The surface is characteristically dull and also the colour is characteristic, greyish brown tending towards slightly greenish, sometimes almost aeneous. The puparia of *Heptopteryx brevipennis* and *Limnia unguicornis* are, however, reddish and have the posterior end not or almost not recurved; in *Hedroneura rufa* and *Sepedon sphegeus* the colour is rather pale, whitish or yellowish. I shall finally note that in accordance with de Meijere's statement I found no outer prothoracal spiracular tubes in any Sciomyzid pupa.

The places in which these puparia are found together with what is known of the larvæ of *Tetanocera* and *Sepedon* would seem to make it probable that the larvæ are phytophagous or feed on decaying vegetable matter, perhaps also being carnivorous on small objects, but anything definite is not brought forward; on the other hand it may, after the observation of Mercier, now be taken as proved that *Salticella fasciata* is parasitical on snails. As noticed, Schmitz has bred *Ditaenia cinerella* from a snail-shell, but as I have the same species from flood refuse it is certainly no snail-feeder, its presence in the shell being quite occasional. The species seem all to hibernate as pupæ, yet *Sepedon* excepted as Gercke found the pupæ of the two species in August, and my pupa of *S. sphegeus* is likewise from August, developing soon after, but as the imagines may be found also early in the year the species have perhaps two yearly broods, the second generation then probably hibernates as egg or larva; the same may be the case with *Hedroneura rufa* as my sole pupa of this species was found in September, developing in the same month, and it is of course also possible that the other species may have two broods in the year, the second brood hibernating as pupæ.

The above remarks hold good for the species I enumerated, with the exception of three which as regards their puparia as well as no doubt also their feeding habits behave in another and rather interesting way. These three species are *Calobaea bifasciella* and *Ctenulus pectoralis* and *punctatus* n. sp. When in spring flood refuse at the border of fens and lakes is sieved, we find in it plenty of shells of small snails of the genera *Limnaea* and *Planorbis*. In the shells no rest of the snail is present, but a pupa has taken place in them (living snails are of course also present). The pupa sometimes is found rather deep in the shell so that it is not easily detected. The facts are for the rest somewhat different in the three species, so that I shall treat each separately.

Calobaea bifasciella Fall. The pupa of this elegant little species I have found exclusively in *Limnaea truncatula* Müll. According to the size of the shell the pupa sits more or less deeply inwards, sometimes near the opening, and as the puparium fits very closely in the shell it looks in the latter case as if the shell was closed by a chitinous cover. The puparium is of course placed with the anterior end outwards, and it is placed so that the ventral surface rests against the outer circumvolution; the anterior half part of the dorsal surface lies free in the opening while the posterior half part stretches into the shell. The puparium fits so closely in the shell that in order to get it out uninjured it is necessary to dissolve the shell with muriatic acid. The puparium is then seen to be of a very curious shape, caused by its fitting in the shell. The ventral



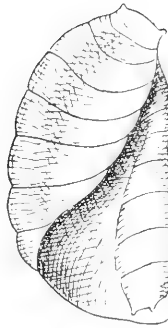
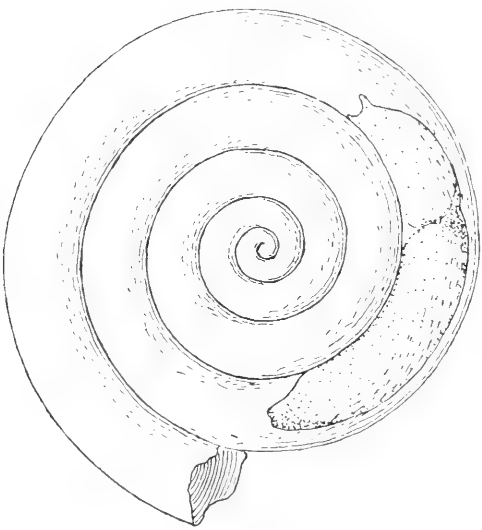


Fig. 1. Fig. 2.

Puparium of *Calobaea bifasciella* in *Limnaea truncatula*. × 10.
Fig. 1. In the shell. Fig. 2. Taken out of the shell.



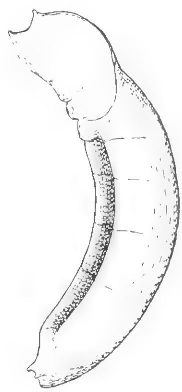


Fig. 3. Fig. 4.

Puparium of *Ctenulus pectoralis* in *Planorbis vortex*. × 10.
Fig. 3. In the shell. Fig. 4. Taken out of the shell.

surface is highly arched, but otherwise not altered; the dorsal surface has the anterior left part flat, showing at the anterior end the larval prothoracal spiracles, it is this part which covers the opening of the shell; the posterior right part is arched and bends down on the side and shows at the end the two small posterior spiracular knobs. Obliquely across the dorsal surface, between the said parts stretches a narrow groove caused by the columella of the shell; this groove ends behind towards the left in a large, hollow impression, likewise caused by the columella. All this gives the puparium a very curious aspect, so that it almost looks as if it was made up of two combined puparia.

Ctenulus pectoralis Zett. This species I have bred exclusively from *Planorbis vortex* L. The puparium sits in the shell either near the opening or more inwards to nearly a whole circumvolution. Like the foregoing it is altered in shape in accordance with its place, it is therefore curved, and it is flattened just as the lumen in the circumvolutions of the shell; in the anterior part it is really flattened dorso-ventrally, but towards the posterior end it is a little twisted and therefore here compressed, but somewhat obliquely, so that the posterior spiracular knobs are turned towards the concave side; for this reason the anterior, flattened part is curved laterally while the posterior, compressed part is curved more dorso-ventrally, the concave side being the dorsal. It is interesting to see that the puparium is always placed in exactly the same way in the shell, viz. with its dorsal side and posteriorly the right side towards the dorsal surface of the shell, and the puparium is therefore always curved in the same direction.

The third species is new, and I shall therefore here describe it.

Ctenulus punctatus n. sp. The species is quite similar to *pectoralis*; head, antennæ and palpi of quite the same shape and colour. Thorax likewise black, shining, with two a little greyish pruinose, less shining stripes, the lateral seam and the whole præsutural depression yellow; sternopleura except the upper margin black and metapleura black; for the rest the pleura yellow with a rather well defined black spot just below the anterior notopleural bristle; hypopleura more or less darkened to blackish; sternopleura as in *pectoralis* with a bristle at the upper margin. Abdomen and legs as in *pectoralis,* but the fourth joint on front tarsi often darkened.

Wings hyaline, the costal segment between second and third vein equal to or a little longer than the segment between third and fourth vein, while in *pectoralis* the former is as a rule considerably longer than the latter. Length 2,5—3 mm.

This species I have bred from several snails, most often from young specimens of *Planorbis planorbis* L., and further from *P. albus* Müll. and from youngs of *P. corneus* L. and also from *Limnaea ovata* Drap var. *peregra*. The puparium of this species is much less altered in shape than is the case with the other two, and it is much shorter and thicker than the puparium of *pectoralis*; the ventral side is arched and when sitting in a *Planorbis* this side lies towards the concavity of the circumvolution, and the dorsal surface gets a hollow impression from the opposite wall of the circumvolution; when in a *Limnaea* the puparium sits in a similar position as *Calobaea* and the dorsal surface then also gets somewhat similar impressions, but to a much slighter degree, and the puparia are of about the same shape whether they are sitting in some *Planorbis* or in *Limnaea*.

The species is, as seen, highly similar to *pectoralis*, and I should scarcely have been aware of the difference, had not the pupæ been so totally different; this difference was, however, not a sufficient reason for separating the two species, as it might well be thought possible that the same species, when pupating in various snails, might get a various shape of the puparium. A close examination gave, however, the result that the species was separated from *pectoralis* by a couple of constant characters. While *pectoralis* has a black stripe along the upper margin of the mesopleura to the wing-root, we find in *punctatus* here a well defined black spot just below the anterior notopleural bristle, and this character is quite constant in my whole material (10 males and 10 females); further the lateral yellow stripe on thorax is more pronounced than in *pectoralis*, including the whole præsutural depression, while in *pectoralis* the upper part of the depression is black. The character given for the wing is also generally well expressed, but, however, less valid as there may in this respect be a little variation in both species. The species is upon the whole smaller than *pectoralis*. — When examining the specimens in our old collection of *pectoralis*, which Zetterstedt had seen, I found them to be the present species, but as Zetterstedt says: „Pleurae rufo-flavae, vitta laterali fusca plerumque

. . . perspicuis," and as he had also had Swedish specimens, I think he has had both species before him, the specimens with the black pleural band being *pectoralis*, but the Danish specimens mentioned belong to the present species.

I have not noted the colour of the eyes of the species, but I shall mention here that when I bred *pectoralis* I noted of this species that the eyes are greenish with an upper and a lower part and an oblique median band violet, while Hendel says, that the eyes are unicolorous and adds that the same has been communicated by Girschner.

Now some questions arise as regards the habits of these three species. For the first their presence in the shells is no doubt in connection with their feeding, as it is quite improbable that they should pupate here only for refuge; for the first the cyclorrhaphous pupæ are well protected themselves, and next they must then also be found in other hiding places which is never the case, nor are they ever found free. Further *Calobaea bifasciella* and *Ctenulus pectoralis* are each found only in one species of snails though in the places where I collected them also other species of small snails were present. When we now, therefore, suppose that the larvæ have lived on the content of the shells, then there is the question whether they are parasitical or saprophagous, devouring only the dead snails. To this question I can at present give no answer, but it would seem to me rather probable that the larvæ attack the living snails, in this connection I also pay attention to Mercier's observation on *Salticella fasciata*.

In what direction now the above question may be solved it seems to me that the behaviour of these three species is very interesting, especially the influence it has on the shape of the puparia, which on account of the place where they sit get a so characteristical aspect. I know of no other case in which cyclorrhaphous pupæ are thus altered in shape in a definite way on account of outer influences. It even seems as if there might be some advancing development here, as *Ct. punctatus* choses different snails for pupation and its puparium being less altered and of about the same shape in all cases, whilst the two other species seem each to be confined to one certain snail-species and show a highly altered puparium and in each species altered in a quite definite way.

Finally I shall note that some parasitic *Hymenoptera* attack the Sciomyzids; Gercke mentions *Phygadeuon cinctorius* Grav. as common on *Sepedon sphegeus*. I have myself bred a Cryptine and a wingless Proctotrupid from *Tetanocera ferruginea*, a Cryptine and a Chalcidid from *Calobaea*, and likewise a Cryptine and a Chalcidid from *Ctenulus punctatus*, in all cases a single parasite from each pupa; from *Ct. pectoralis* thereagainst I bred no parasite.

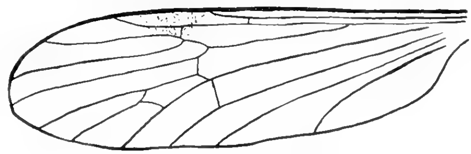
19—6—1923.

Ormosia danica n. sp.

By

Peder Nielsen, Silkeborg.

Ormosia danica n. sp. General coloration dark brown. Head dark grey. Rostrum dark greyish brown with yellowish setae. Palpi dark brown, hairy. Antennae dark brown, elongate; the joints of the flagellum are cylindrical and clothed with whitish hairs. Thorax dark greyish brown; no longitudinal stripes present. Pronotum pale yellow. Scutellum dark brown with yellowish hairs. Abdomen black brown, somewhat hairy. Hypopygium pale brown, hairy. The pleurae black greyish brown. Behind the wingroot a tuft of yellowish hairs. Halteres pale yellowish brown. Coxae and trochanters yellowish brown; legs dark brown; femora yellowish brown at their base, in the hindlegs only the tip of femora is dark brown. Wings somewhat brownish tinged, and with a distinct darker brown stigma; veins dark brown. Sc_2 at the level of the middle of Rs; r beyond, but near the fork of R_{2+3}, R_2 and R_3 not parallel but divergent at the margin. Discal cell (cell *1st* M_2) closed, basal deflection of Cu_1 (*m-cu*) close to the fork of M; $2A$ short. Length of the wing 6 mm.



Wing of *O. danica* n. sp.

The species seems to be closely allied to *O. holtedahli*, recently described from Novaya Zemlya by C. P. Alexander (Rep. Sc. Results of the Norweg. Exp. to Nov. Zeml. 1921. Nr. 5 p. 4. Kria. 1922). Although only the female sex is known of *O. holtedahli*, I have had no hesitation in regarding the Danish specimen as belonging to a new species, and I am sure that further studies of more materials will show that *O. danica* is a good and distinct species.

Of the new species only three specimens are known, and their localities are: 1 ♂ Jelling the 5th of July 1922 (the Aut. leg.), 2 ♂♂ Aabenraa the 5th ofJuly 1923 (Mr. P. Esben-Petersen leg.).

17—8—1923.

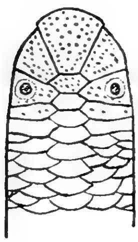
Description of a new Snake of the Genus Glauconia, from Mendoza.

By

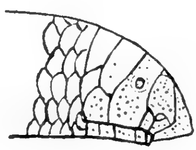
Magnus Degerbøl.

Glauconia borrichiana [1]) n. sp.

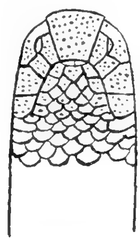
Snout very prominent, with sharp horizontal edge and inferior nostrils, nasal swollen above the nostril. No supraoculars, the oculars being separated from each other, on the top of the head,



Upper view of head.



Side view of head.



Lower view of head.

by a single shield. Rostral large, occupying about $^{1}/_{3}$ of the area in front of the eyes, not quite extending to the level of the anterior border of the eyes, nasal completely divided into two, nostril just touching first upper labial. Ocular bordering the lip between two labials, the anterior of which equals the lower part of nasal in size, only extending halfway to the level of the eye; the posterior is larger but does not reach the inferior border of the eye.

6 lower labials. Head shields granulated. 14 scales round the body. Diameter of body 60 times in the total length, length of tail 26 times. The 5 middle rows of dorsal scales are light brown,

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[1]) Ole Borch, † 1690. Danish scientist. Benefactor of graduates. Founder of Collegium Mediceum, where I am a collegian.

the borders of the scales lighter; body whitish laterally and inferiorly.

Total length: 185 mm; tail 7 mm, diameter 3 mm.

Hab.: Santa Rosa, Mendoza.

Only a single specimen was obtained by Mr. Jensen-Haarup in 1905 and presented by him to the Zoological Museum.

The specimen was handed to me in the spring-time of 1923 by Prof. Ad. S. Jensen, who considered it as new to science and asked me to describe it.

Of this little group of the Fam. *Glauconidae*, characterised by the absence of supraoculars, only 4 species have till now been described (the hab. of the two species are moreover unknown); *Gl. borrichiana* is the fifth and is easily distinguished from the others by the sharp horizontal edge of the snout. It is the first of this group assigned to Argentina, and it seems to be very approximate to *Gl. unguirostris*, Boulenger, which is the only snake of the other group (with supraoculars) that is found in Argentina (Mendoza) and only in a single specimen too.

17—8—1923.

Om Muldvarpens Fremtrængen i Vester-Hanherred.

Af
Magnus Degerbøl.

I „Videnskabelige Meddelelser fra den naturhistoriske Forening i København“ for Aaret 1901 har Seminarielærer J. Jeppesen, Ranum, offentliggjort en Undersøgelse over „Muldvarpens Vandring gennem Vester-Hanherred“. Han fastsætter heri Vestgrænsen for de sammenhængende Strøg, hvor Muldvarpen ved Aar 1900 fandtes, til en Linje, der kan trækkes fra Han-Vejle mod Nord til Havet. Der findes her en naturlig Forhindring i Terrænet, idet Bygholms Vejle og Han Vejle fra Limfjorden strækker sig saa langt mod Nord, at der knap er $^1/_2$ Mil ud til Vesterhavet. „Rigtignok er de sydligere Partier af disse Vejler udtørrede; men baade Jordbundens Beskaffenhed som gammel leret Fjordbund og den store Vandholdighed gør disse Strækninger ubeboelige for Muldvarpen. Men Nord fra naar Klitterne lige til den nordlige, ikke udtørrede Del af Han Vejle, kun hist og her afbrudte af sumpede Kær. Efter Iagttagelser af Vejassistent Mortensen i Bjerget har Muldvarpen passeret disse vanskelige Strækninger ved at gaa frem i Thistedlandevejens Rabatter og Grøftekanter.“

Vest for den nævnte Linje skulde der findes nogle højst mærkelige spredte Forekomststeder. J. Jeppesen skriver derom: „Skønt Bjerget og Egnene Syd derfor, hele Halvøen Hannæs medregnet, for største Delen er gode Muldjorder, har Muldvarpen dog aldrig vist sig der. Lige saa lidt vides den at være truffen paa de hedeagtige, kun til Dels opdyrkede Strækninger fra Bjerget til Østerild. Saa meget mærkeligere er det, at der efter fleres Udsagn findes enkelte Eksemplarer i Hjardemaal og Østerild. . . . . Endelig meddeles det, at en Mand fra Sennels fangede 2 Individer der i Fjor, mens andre Folk fra samme By aldrig har set Muldvarpe der omkring.“

For at faa oplyst om Muldvarpen siden da er trængt længere frem imod Vest eller ikke har formaaet at trænge helt frem over omtalte Forhindring og for eventuelt at faa at vide, hvorledes det nu forholder sig med de mærkelige spredte Forekomster, har jeg henvendt mig til forskellige Lærere i de tilgrænsende Egne og bedt dem meddele mig, hvad de maatte vide om disse Spørgsmaal. — Af deres elskværdige Svar, som meddeles her, fremgaar det, at Muldvarpen er i stadig Fremrykning imod Vest:

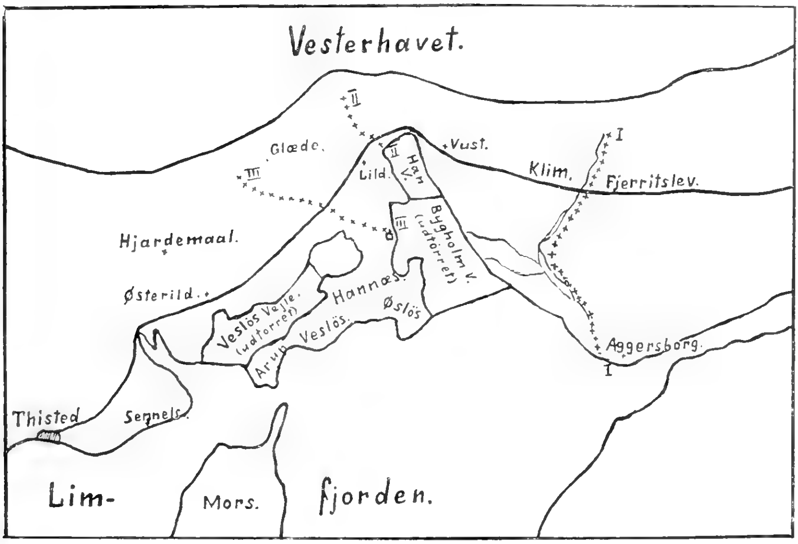
Lærer A. Ægidius, Lild, skriver (d. 4. 4. 1922): Muldvarpen er nu udbredt over hele Lild Sogn. I den vestlige Del, Glæde, er den først kommen i de allerseneste Aar.

Lærer Tranberg Christensen, Tømmerby (1.4.1922): For 20 Aar siden var der ingen Muldvarpe paa Hannæs. De er kommen langs med Landevejen Nord om Lund Fjord fra Vust. En Historie om, at de er kommen over Banedæmningen, der kom 1903—04, passer ikke. Nu er de naaet til lidt Syd for Tømmerby Kirke omtrent til Selbjerggaard. Paa Tømmerby Bys Marker er de kommen i de seneste Aar. I 1908, da jeg kom hertil, var der ingen, nu findes de i Skolens Nærhed. Paa Lynge og i Højstrup, to Byer i Tømmerby Sogn, findes de ikke endnu; heller ikke i Sognene Syd for, Øsløs, Vesløs og Arup, findes de.

Lærer M. Kirk, Hjardemaal (April 1922): Efter nu foretagen Undersøgelse skal jeg meddele, at Muldvarpen er set her i Hjardemaal Sogns nordøstlige Del for godt 2 Aar siden. Den er kommen fra Tømmerby, Lild Sogn, som støder op til den Del af Hjardemaal Sogn, hvor Muldvarpen først iagttoges her i Sognet. Den trækker stadig længere og længere mod Vest i et Klitengdrag, der strækker sig i østlig-vestlig Retning en lille halv Mil fra Havet.

Lærer H. Hedegaard, Østerild (9.4.1922): Ved at tale med flere Landmænd her i Sognet og særlig Folk, som bor nærmest Grænsen af Han Herred, har jeg faaet oplyst, at Muldvarpen endnu ikke findes her i Sognet. Grunden hertil er efter mit Skøn den, at vi er skilt fra Han Herred ved den udstrakte Vesløs Vejle, som, skønt Kortet viser, den er udtørret, dog er en Gren af Limfjorden, kun adskilt fra denne ved en Dæmning. Nord for Vejlen og Tømmerby Fjord til Havet er vi skilt fra Han Herred ved et ca. 10 km bredt Bælte Hede, hvor Grunden bestaar af gammel stenet Havbund og derover et ca. 1—2 m tykt Lag Flyvesand.

Lærer N. Sodborg, Vesløs (22. 3. 1922): Muldvarpen findes ikke i Vesløs Sogn endnu. — Derimod har Muldvarpen nu trængt frem over Bjerget Bakke og gennem Frøstrup et Stykke ind i Tømmerby By. . . . Da jeg for 30 Aar siden kom til Hannæs, var den, saa vidt jeg husker, midt imellem Vust og Bjerget Bakke, altsaa Nord for Lund Fjord (Han Vejle), saa det stemmer jo ogsaa godt med Seminarielærer Jeppesens Meddelelser.



Linjen I—I betegner Vestgrænsen 1860.
· II—II — — ved Aar 1900.
— III—III — den nuværende Vestgrænse.
□ Selbjerggaard.

Lærer S. Th. Vestergaard, Øsløs Søndre Skole (18. 5. 1922): Jeg har henvendt mig til Mænd her i Sognet, hvis Udtalelse jeg mener at kunne stole paa, og de har alle sagt, at der ikke findes Muldvarpe her.

Lærer N. T. Leegaard, Arup (28.4.1922): Muldvarpen er endnu ikke naaet til Arup Sogn.

Det vil af det foregaaende fremgaa, at Muldvarpen i sin Fremtrængen imod Vest er blevet standset af Bygholms og Han Vejle og af de Nord derfor liggende Klitter. Kun ved at følge den overordentligt snævre Passage, der dannes af Thistedlandevejens Grøfter og Rabatter, lykkedes det Muldvarpen ved Aar 1900 at trænge igennem denne Forhindring umiddelbart Nord for Han Vejle. Naaet frem til Bjerget fandt den frugtbare Jorder og gode Livsbetingelser, saa den siden da fra dette ringe Udgangspunkt har kunnet brede sig radiært mod Syd og Vest. Mod Syd er den naaet frem til Selbjerggaard i Tømmerby Sogn, mod Vest til den nordøstlige Del af Hjardemaal Sogn.

I Øsløs, Vesløs, Arup og Østerild findes endnu ingen Muldvarpe.

De af Jeppesen omtalte spredte Forekomster er det ikke lykkedes mig at opspore. Hverken i Østerild eller Hjardemaalby findes nu, som ovenfor omtalt, Muldvarpe, og for Sennels Vedkommende skriver Lærer J. R. Aarup (22. 5. 1922): „I de godt 40 Aar, jeg har boet her i Sognet, har jeg aldrig set en Muldvarp eller hørt andre Folk tale derom, heller ikke opdaget noget Muldvarpeskud ude paa Markerne.“

Jeg er derfor tilbøjelig til at antage, at der overhovedet aldrig har været en saadan pletvis Udbredelse; i hvert Fald har den ikke formaaet at holde sig eller endnu mindre at danne Udgangspunkt for videre Udbredelse. — Naar Jeppesen derfor skriver: „Foreløbig staar det uoplaret, ad hvilken Vej Vandringen er foregaaet fra Han Vejle gennem Klitter eller Heder til disse østligste Dele af Thy“, maa jeg bemærke, at Forholdene nu tyder paa, at Muldvarpen aldrig har været i disse Egne — maaske er Jordskud, frembragt af Vandrotten, blevet forvekslet med Muldvarpeskud (?) — men just nu gennem en kontinuerlig Vandring er paa Vej dér henimod.

Muldvarpen frembyder saaledes et særdeles smukt Eksempel paa et Pattedyr, som her i Landet endnu ikke ved egen Hjælp er naaet frem til alle de Egne, hvor der bydes den saa gode Livsvilkaar, at den kan leve dér, men befinder sig fremdeles paa Vandring.

Takket være Seminarielærer J. Jeppesens Undersøgelser er det nu muligt fra Tid til anden i denne Egn at fastsætte Grænserne for Muldvarpens Fremtrængen; at følge den i dens Vandring gennem de forskellige Forhindringer og Terrænformer og at se, hvor hurtigt den kan vandre gennem disse. — I de sidste 20 Aar er Muldvarpen fra Han Vejles Nordspids trængt ca. 6 km frem mod Syd og ca. 8 km mod Vest, og det erobrede Areal er ca. 20 km^2.

20—8—1923.

Paraperipatus keiensis n. sp.

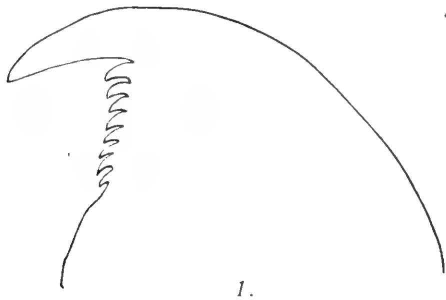
By
R. Horst, (Leiden).

During the Danish Expedition to the Kei-islands in 1922 Dr. Hj. Jensen collected on the „Goenoeng Daab", Great Kei, at the height of about 300 m, some Peripatus-specimens, which were placed in my hands for identification. They proved to belong to the genus *Paraperipatus* and, though much resembling other species of this genus, found in Ceram, New Britain and New Guinea, they could not be identified with any of the species already described. There are 6 females and 4 males; the largest of the females has a length of 48 mm, whereas the males measure from 25 to 27 mm in length. As in *Paraperipatus novae-britanniae* Will.[1]) the ground-colour of the preserved animal is on the dorsal side black, dotted over with some distant, irregularly spread, brown spots, due to the colour of the basal part of the primary papillae; however in *Paraper. novae-britanniae* these spots are arranged in four rows, one on each side above the bases of the legs and another row on both sides of the black, median dorsal tract with segmental intensifications. *Paraper. ceramensis* Muir & Kersh[2]) is also provided with such spots, but they are much more numerous and densely crowded together. The skin of the *Paraper. keyensis* between two succeeding pairs of legs shows 6 to 7 large, transverse folds, alternating with narrower ones and set with a single row of brownish (discoloured?) primary papillae and a great number of small, dark-coloured, accessory ones. As in the other species of the genus there is in the median line of the dorsum a fine, white line in the middle of

1) Zoolog. results based on the material from New Britain, New Guinea etc., Part 1, 1898, pls. I—IV.

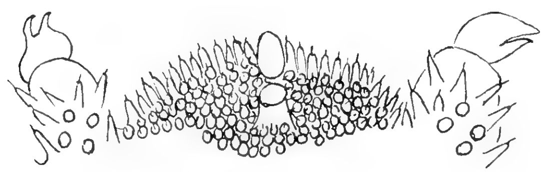
2) Quart. Journ. Micr. Science, Vol. 53, 1909, p. 737, pl. 19.

a longitudinal black band. The ground-colour of the ventral side is greyish blue with a row of large, whitish (discoloured?) spots in the median line, between the base of each pair of legs; the pads of the legs are concolourous with the underside of the body. Of the females three have 25 and the other three 24 pairs of legs, whereas in the males the number of legs varies between 22 and 23. With regard to the number of legs *P. keiensis* much agrees with *P. novae-britanniae*, which has 24 pairs in the ♀, and 22 pairs in the



1.

2.



3.

Fig. 1. Inner jaw-blade, × 110. — Fig. 2. Outer jaw-blade, × 110. — Fig. 3. Dorsal view of the posterior end of the male, enlarged.

♂. Each leg has three spiniferous pads, the distal and the proximal one nearly of the same breadth, half as broad as the median one; there are vestiges of a fourth one. The renal papillae of the 4th and 5th pairs of legs are connected with the middle of the proximal pad. The mouth is surrounded by a ring of bluish-white lobes, about seven on each side; they are wedge-shaped and set with spines. The inner jaw-blade besides the main tooth possesses eight accessory denticles, without diastema; this is a rather great number, also met with in *P. stresemanni* Bouv.[1]),

[1]) Zoolog. Mededeel. R. Museum Natuurl. Historie, Leiden, dl. III, 1917, p. 263.

whereas the other species of the genus have a less quantity. The male genital orifice is situated on a small, conical projection, visible at the dorsal side, beneath the protruded efferent duct of the anal glands, that has a cylindrical appearance. The right uterus of a large female contained a nearly full-grown young, however not pigmented. The ovary was fixed to the body-wall almost on the level of the 14th pair of legs. The loop of the slime-glands extends to the 10th pair of legs as in *P. ceramensis*.

The specimens were found in the wood under stones and fallen branches.

The presence in the Kei-islands of a member of the genus *Paraperipatus*, found in Ceram, New Britain and New Guinea,[1]) proves that the fauna of these islands agrees more with that of the Indian region than with that of the Australian Continent.

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[1]) Loc. cit. dl. VII, 1922. p. 113.

22—9—1923.

Frøaar og Egernvandring.

Af

Ad. S. Jensen.

Foredrag holdt ved Dansk naturhistorisk Forenings Møde
d. 19. November 1921 [1])
til Ære for Professor, Dr. phil. *Eug. Warming.*

I.

Her i Danmark var 1920—21 et skralt Aar for dem af Skovens Dyr, som lever af Bog og Agern, thi hverken Bøg eller Eg satte Frugt i 1920.

Ogsaa i en anden Henseende var 1920 et fattigt Aar, idet Frøsætningen hos Rødgranen (*Picea abies*) ligeledes slog fejl — der dannedes ingen Kogler paa dette vort mest udbredte og almindelige Naaletræ. Da nu Koglesætningen flere Steder ogsaa var slaaet fejl i 1919, indtraf der saadanne Steder i 1920 en total Mangel paa Grankogler med Frø i; de paa Jorden liggende eller i Granerne hængende Kogler var ikke yngre end fra Sommeren 1918, og de havde tabt deres Frø. I andre Bevoksninger derimod havde Granen sat Kogler i 1919, og i en Del af disse Kogler var der endnu i Sommeren 1920 flere eller færre Frø tilbage; men længere hen paa Aaret blev Grankogler med Frø i sjeldnere og sjeldnere, og i Vinteren 1920—21 har Kogler med Frø vist ikke kunnet opdrives, i hvert Fald ikke i nævneværdig Mængde; og selv om en og anden paa Jorden liggende Kogle endnu gemte nogle Frø, har de næppe været værd at spise.

II.

Jeg ledtes ind paa disse Iagttagelser ved i Granskove, hvor der fandtes E g e r n, at se paa Kogler, som disse Dyr havde bearbejdet. Behandlingen bestaar som bekendt i, at Egernet gnaver

1) Nogle Iagttagelser af senere Dato er tilføjede.

Skællene over for at naa til Frøene, som det lever af. Saadanne af Egern gnavede Kogler kan se meget forskelligt ud: nylig gnavede Kogler er lyse (gullige eller rødlige), ved Henliggen antager de en mørkere (brunlig) Farve, og tilsidst bliver de helt sorte. Man har saaledes i de begnavede Koglers Farve et Middel til at skønne om, hvorvidt der i Øjeblikket lever Egern i en Granbevoksning, eller om der er gaaet kortere eller længere Tid, siden de opholdt sig i Bevoksningen.

III.

I Juni 1919 besøgte jeg Vejstrup Dyrehave og Klingstrup Skov ved Skaarup (Sydfyen) og fandt i Rødgranbevoksningerne store Mængder af egerngnavede Kogler; en Del af dem var øjensynlig begnavede for nogen Tid siden, thi de var mørke (brune eller endog sorte); men mange røbede ved deres lyse Farve, at de var gnavede for ganske nylig. Jeg saa da ogsaa levende Egern paa Stedet.

I Slutningen af Maj 1920 besøgte jeg de samme Skove; men nu saa der helt anderledes ud. I Vejstrup Dyrehave fandtes kun Kogler, der var sorte og følgelig begnavede for længere Tid siden. I Klingstrup Skov laa der ogsaa store Mængder af gamle, egerngnavede Kogler, men tillige en Del, der saa ud til at være temmelig friskgnavede. Disse sidste Kogler frembød imidlertid næsten alle sammen den Ejendommelighed, at Skællene kun var fjernede paa Koglens nederste Del; det saa ud, som om Egernet, der altid begynder forneden paa Koglen og derefter arbejder sig opefter mod Spidsen og sædvanligvis kun lader Topskællene blive siddende, hurtigt havde opgivet disse Kogler. Forklaringen herpaa laa lige for: undersøgte man en saadan kun forneden begnavet Kogle, fandtes der ingen Frø under de tilbageværende Skæl. Jeg fandt kun en eneste nylig behandlet Kogle, som var gnavet højt op — formodentlig har den indeholdt Frø. Det var tydeligt, at Rødgranerne ikke havde frembragt Kogler siden 1918; i Foraaret 1919 havde Egernet endnu haft Overflod i disse Kogler, men i 1920 maa det have knebet haardt for Dyrene, eftersom de fleste Kogler nu var gnavede, og de tiloversblevne for største Delen havde tabt Frøene.

I Begyndelsen af Juni 1921 besøgte jeg igen Vejstrup Dyrehave og Klingstrup Skov, og nu var Forholdet det, at der overalt kun fandtes gamle (sorte) egerngnavede Kogler; alt tydede paa, at

Egernerne nu helt var forsvundne fra disse Skove — der saas da heller ingen af disse Dyr mere. Det var iøvrigt, hvad man paa Forhaand kunde vente. I 1920 udvikledes der nemlig heller ingen Kogler paa Rødgranerne; Egernerne, som allerede havde haft ondt ved at klare sig i Foraaret 1920 med de sidste Rester af Koglefrø fra 1918, har omsider slet ingen frøbærende Kogler kunnet finde og er forsvundne, da disse Skove heller ikke har kunnet byde anden Føde til Erstatning; thi ogsaa Ansætning af Bog og Agern var, som før nævnt, slaaet fejl i Sommeren 1920, og af Hassel er der her alt for lidt til, at det kan betyde noget som Næring for Egern. Det aller bedste Bevis for, at disse Skove ved Skaarup virkelig var egerntomme i Sommeren 1921, havde jeg deri, at Granerne paa det Tidspunkt, da jeg var der (Juni), bugnede af unge Kogler, og de var urørte.[1])

I Begyndelsen af Juni 1922 besøgte jeg atter disse Lokaliteter, hvor Betingelserne for Egernets Trivsel nu var saa gode som vel muligt: ikke alene havde Granerne sat rigeligt Kogler Aaret forud, men der saas ogsaa mange ny, endnu grønne Kogler i Granernes Toppe. Alligevel var der ingen nylig gnavede Kogler at finde.

Endelig fandtes ved et Besøg i Juni i Aar (1923) atter kun de sorte, gnavede Kogler, Vidnesbyrd om Egernets tidligere Tilstedeværelse i disse Skove.

Vi staar altsaa her overfor et Eksempel paa, at samtlige Rødgranbevoksninger i visse Skove kan undlade at sætte Kogler to Aar itræk, og at et saadant Sammentræf kan blive en Katastrofe for Egernbestanden og medføre dens fuldstændige Udryddelse.

Om Egernbestanden i Vejstrup Dyrehave og i Klingstrup Skov er død ud, eller om den har reddet sig ved Flugt til andre Skove,

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[1]) Det skræmmer aldeles ikke Egernet at give sig i Lag med ganske unge Kogler. Jeg har ofte fundet, at det gnaver Kogler, hvor Skællene endnu er grønne, og hvis Akse er temmelig tynd og saa veg, at den bliver underlig krummet efter Begnavningen. I saadanne Kogler har Frøvingerne endnu ikke løsnet sig fra Skællene og findes derfor efter Begnavningen siddende paa de afbidte Skæl. Det er egentlig ret besynderligt, at Egernet begnaver de helt nye, endnu grønne Kogler; thi de er saa saftige, at Harpiksen pibler frem i klare Draaber, naar man saarer dem.

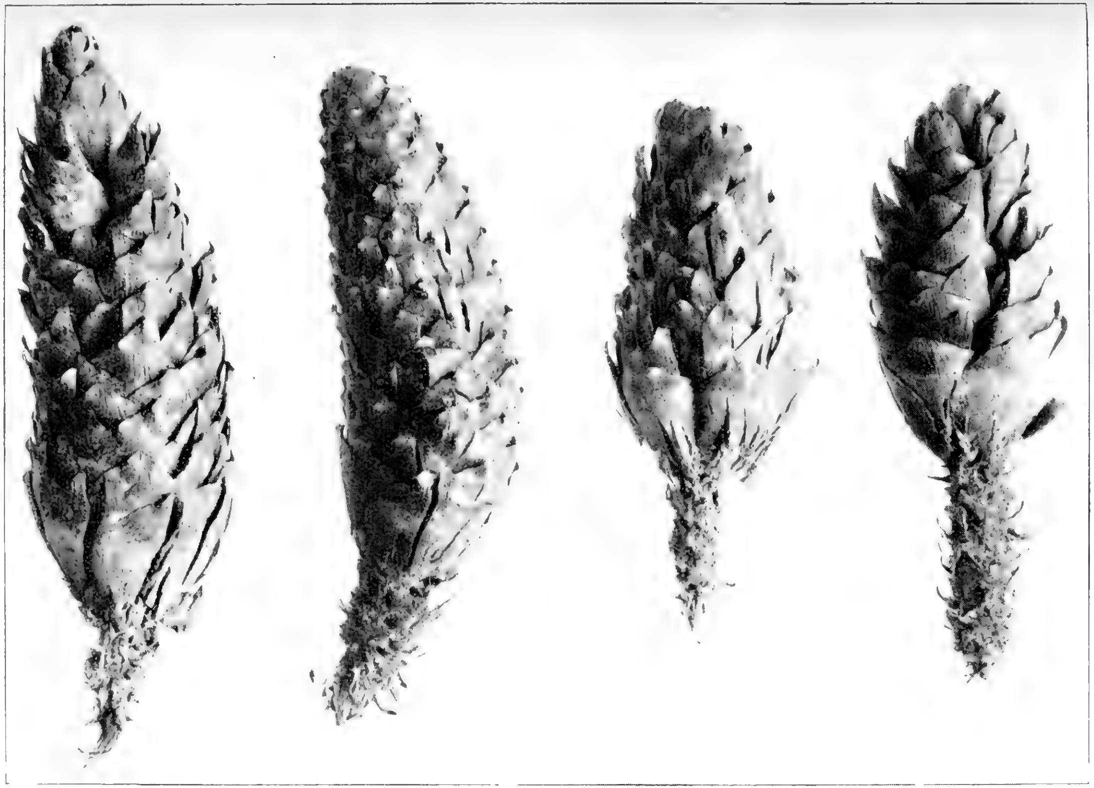
hvor Ernæringsforholdene var gunstigere, ved jeg ikke. Men jeg venter ad Aare at se Egernet dukke op igen i nævnte Skove. Thi i Aar fandt jeg Kogler, som nylig var behandlede af Egern, i Lillemølle Skov, der kun ligger ca. 1/2 Mil borte, en Strækning, som det ikke vil være uoverkommeligt for Egernet at vandre, om det ellers finder Anledning dertil.

IV.

I Rude Skov Nord for Holte (Nordostsjælland) kom der Egern for en Del Aar siden. De trivedes og bredte sig, saa at man snart kunde finde egernbehandlede Kogler alle Vegne i Granbevoksningerne.

Heri skete imidlertid en Forandring i Slutningen af 1920, idet Egernet forsvandt fra store Strækninger. Man fandt ikke længere friskgnavede Kogler, og undersøgte man de paa Jorden liggende urørte Kogler, fandtes der ingen Frø i dem, selv om Koglen var „lukket“ ɔ: havde Skællene trykte ind mod Aksen som Følge af den fra Jorden opsugede Fugtighed; Frøene var fløjne ud, inden Koglerne faldt af Træerne. I en af Bevoksningerne findes ikke saa faa Weymouths Fyr (*Pinus strobus*), og de bar det Aar frøholdige Kogler; i sin Nød havde Egernet grebet til denne Næring, som det efter min Erfaring ellers ikke er lystent efter; thi der laa under disse Fyrretræer ret mange af deres Kogler, begnavede for nylig (Slutningen af 1920). Men fra Februar 1921 hørte ogsaa disse Tegn paa Egernets Tilstedeværelse i denne enkelte Bevoksning op, og Egernet var nu kun at spore i Rude Skovs nordlige Del, i det ved Agersø's nordlige Bred voksende Granparti. Her fandtes endnu d. 20. Februar 1921 adskillige friskgnavede Rødgrankogler, som maa have indeholdt i alt Fald en Del Frø, thi Frøvinger fandtes mellem de afgnavede Skæl.

Som en Udvej i koglefattige Tider søger Egernet gerne hen til Steder, hvor der ligger ophobet Kogler fra Spetternes Maaltider. Den store Flagspette (*Dendrocopus major*) bider som bekendt Grankogler af, flyver med dem i Næbbet hen til en Eg, Bøg eller lign., hvor den har indrettet sig en Fordybning i en udgaaet Gren; her sætter Spetten Koglen fast, med Basis ned i Fordybningen, hakker den med Næbbet for at komme til Frøene og lader den efter Behandlingen falde til Jorden. Under saadanne Hakkesteder kan der



C. M. Steenberg phot.

Fig. 1. Kogler af Rødgran, først hakkede af Spetter. — Skællene viser tydelige Mærker efter Spettens Næb — og derefter begnavede forneden af Egern. $\times\ ^4/_5$.

ophobes betydelige Mængder af Grankogler, som endnu indeholder en Del Frø, navnlig i Koglens nedre Ende, som har været indkilet i Træet og derfor er urørt af Spetten. Disse paa Jorden liggende Kogler kan godt holde sig „lukkede“, saa at de tilbageblevne Frø ikke falder ud. — Her ved Agersø fandtes adskillige Grankogler, som først var hakkede af Spetter og derpaa gnavede forneden af Egern.[1]) Fig. 1 viser saadan dobbeltbehandlede Kogler.

Skønt Egernet paa nævnte Tidspunkt har udnyttet alt, hvad det har kunnet opdrive af spiseligt Granfrø i Partiet ved Agersø, har det øjensynlig knebet haardt for det at klare sig. Det slutter jeg deraf, at Egernet havde grebet til et Næringsmiddel, der næppe kan „skæppe“ ret meget, skulde man synes. Det var mig paafaldende, at der under nogle store Graner laa et helt Lag af Smaagrene, som afveg fra de Kviste, man saa hyppig finder i Granskoven, og som Stormene har knækket af, ved, at de var omtrent ens lange og i det hele taget havde et ensartet Udseende: det var lutter aargamle Skud, som var gnavede over netop ved Grunden, saa at Knopskællene (som Regel) lige var komne med, og her bar en Kreds af Knopper, der var udhulede. Egernet havde oppe i Træerne bidt Skuddene af, gnavet med Fortænderne ind i Knopperne, tømt dem for Indholdet og saa ladet Skuddene falde til Jorden, hvor de efterhaanden dyngedes op under Træerne. At det var sket for nylig, fremgik af, at de afbidte Grene endnu bar friske Naale, og at Bidfladen var ganske frisk.

Slige under Graner massevis aflejrede Smaagrene har forlængst været iagttaget af Forstmænd; men det varede længe, inden man lærte at tyde dem paa rette Maade. Man kaldte dem „Absprünge“ og nærede den besynderlige Anskuelse om dem, at det var Træet selv, som kastede disse Skud af for at sikre sig mod at blive overlæsset med Kogler — „Absprünge“ne er nemlig Skud, paa hvilke der sidder Knopper til Hanblomster. Andre mente, at det var Fugle, som brækkede disse Skud af, snart Mejser, snart Kvæker, Korsnæb, Kærnebider osv.; eller det skulde være Vinden, der havde

[1]) Jeg har for Resten ogsaa i gode Kogleaar set Egernet tage Kogler fra Spettens Hakkesteder og underkaste dem en Efterbehandling. Slige dobbeltbehandlede Kogler er derfor ingenlunde helt sjeldne; de synes dog ikke at være omtalte i Litteraturen.

revet dem af. Det sidste kunde let modbevises, idet de Skud, som Vinden rusker af, har en forreven Brudflade, ikke bærer Blomsterknopper og findes spredt overalt; de omtalte „Absprünge“ derimod er ligesom skaarne af, de bærer Blomsterknopper, som er hulede ud og tømte for det fine Indhold, og de findes massevis under visse Træer, slet ikke under andre. Imidlertid lykkedes det, i Februar 1862, en Skovrider Leypold direkte at iagttage, at

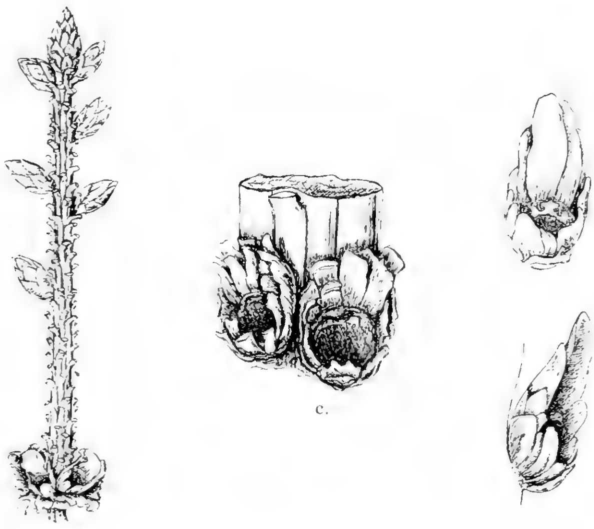


Fig. 2. a. Et af Egern afbidt Skud af Rødgran, hvis Basalknopper (Anlæg til Hanblomster) er udhulede af Egernet: Naalene er udeladt. b. En af de udhulede Basalknopper, set forfra og halvt fra Siden. c. To Basalknopper, hvis Knopskæl viser Gnavspor.

Fig. a. i naturlig Størrelse, b. og c. forstørrede.

det var Egernet, som bed disse „Absprünge“ af og hulede Knopperne ud. Andre Forstmænd har bekræftet Rigtigheden af denne Iagttagelse, og nu til Dags er der ingen, som tvivler om, at de i sin Tid for den livlige Diskussion om deres Oprindelse saa berømte „Absprünge“ er Egernets Værk; det bider de unge Skud med Knopper til Hanblomster af, huler Knopperne ud og lader Skuddene falde til Jorden.[1])

[1]) Jfr. B. Altum: Forstzoologie, I, Säugethiere, 2 Aufl., 1876, p. 87—89.

Jeg lader følge to Figurer, som viser det karakteristiske Udseende af disse „Absprünge“[1]), med Naale (Fig. 3, S. 140) og uden Naale (Fig. 2. a).

Som man vil se, er disse Smaagrene Skud fra det sidste Aar; deres Længde (maalt paa 70 Stykker) varierer fra 47—93 mm. Spidsen bærer Endeknoppen til næste Aars Skud; langs Grenen sidder Sideknopper, og nederst, lige over det Sted, hvor Grenen er gnavet over, findes en Krans af Knopper (3—5), Anlæg til næste Aars Hanblomster. Det er sidstnævnte Knopper, som er begnavede af Egernet: den bort fra Grenen vendende Side af Knopdækket er gnavet af skraat nedenfra opefter, og gennem den derved fremkomne Aabning er Indholdet taget ud; af den tidligere Blomsterknop er kun tilbage et bægerdannet Hylster, lavt fortil, højt bagtil (Fig. 2. b og c).[2]) — Hyppig er ogsaa en eller flere af Sideknopperne udhulede, Endeknoppen er i Reglen urørt, sjeldent udhulet.[3])

1) Efter at jeg først var blevet opmærksom paa disse ejendommelige egnmærkede Grene, fandt jeg dem ogsaa i andre af Rude Skovs Granbevoksninger. Denne Afbidning af Skud og Udhuling af Knopper er iøvrigt tidligere kendt her fra Landet og nævnet af J. E. V. Boas, Dansk Forstzoologi, 1896—98, p. 57.

2) Da Egernet kun bider Skud af, naar der er talrige Blomsterknopper paa dem, og en saadan Beskadigelse altsaa gaar forud for et Frøaar, førte denne Sammenhæng i Tid til den Tro, at Træet kastede sine Blomsterskud af for at beskytte sig mod en kommende Overlæsning med Kogler (jfr. Altum, op. cit. p. 87). — Paa den anden Side mener jeg, at da et rigt Frøaar vel som Regel følger paa et Aar, hvor Blomstring og Kogledannelse slaar fejl, benytter Egernet Hanblomsterne i Knoptilstand som en Nødhjælp i den forud for Frøaaret gaaende frøfattige Vinter.

3) Forstzoologer (Altum, Boas) har gjort opmærksom paa, at denne Afbidning af Skud kan forvolde Granerne følelig Skade. Jeg kan oplyse, at ogsaa Lærk (*Larix decidua*) er udsat for en haardhændet Behandling. I Efteraaret ($^{30}/_{10}$ og $^{20}/_{11}$) 1921 saa jeg i Prismekikkert Egern „arbejde“ i Toppen af høje Lærketræer i den nordøstlige Del af Rude Skov. Trods deres Behændighed kunde de ikke naa ud til Enden af Grenene, hvor Koglerne sad — Grenen er her tynd som en Snor og kan simpelt hen ikke bære Dyret. Egernet balancerede saa langt ud ad Grenen som muligt, tog derefter med Forpoterne fat om Enden af Grenen, bøjede den tilbage, ind til Munden, og bed den af. Derefter balancerede det med sit Bytte lidt tilbage til et sikrere Sæde paa Grenen, bed en Kogle af den løsnede Gren, lod denne falde til Jorden og tog saa fat paa at skrælle Skællene af Koglen for at komme til Frøene. Det blev mig da klart, hvorfra de Dyn-

Da jeg 6 Uger senere, nemlig d. 3. April 1921, atter befandt mig ved Agersø, var der ikke mere friske Spor efter Egernvirksomhed. Ingen Kogler fandtes, som var gnavede for ganske nylig. Talrige „Absprünge" undersøgtes, men de var alle af ældre Dato, hvilket saas deraf, at Bidfladen (ɔ: der, hvor Grenene var bidt af) ikke længere var frisk. Nu var Forholdet ved Agersø ganske som i alle de andre Granbevoksninger i Rude Skov, jeg havde undersøgt: ingen friske Spor efter Egernet kunde paavises — det syntes ganske forsvundet fra Rude Skov.

Her kom Egernet imidlertid ret hurtigt igen. Da jeg d. 11. August 1921 atter var ved Agersø, fandtes friskgnavede Rødgrankogler af dette Aars Koglesætning, ikke alene i Bevoksningen Nord for Søen, men ogsaa i Partiet ved Søens sydlige Bred. Men ud herover var der ingen frisk Egernvirksomhed at spore dengang.

Fra dette Egernets nye Udgangspunkt kunde jeg nu Maaned for Maaned spore, hvorledes Egernet, begunstiget af Rødgranens rigelige Koglesætning i Sommeren 1921, bredte sig sydefter i Skoven og indtog sine gamle Pladser lidt efter lidt: Mørkemose, Løjsø, Lille Egemose, Dilholmsvej, Sortedam og Svinebjerg. I Begyndelsen af Maj 1922 var Vandringen tilendebragt, og man kunde da sige, at Egernet praktisk talt var udbredt over Rudeskov i hele dens Udstrækning; det manglede ikke i nogen af de mange Rødgranbevoksninger, thi alle Vegne fandtes der nygnavede Kogler.

V.

Efterhaanden som Egernet i Vinteren 1920—21 mistede Terræn i Rude Skov for tilsidst helt at forsvinde hen paa Slutningen af Vinteren, rejste sig det Spørgsmaal for mig: Hvad blev der af Egernbestanden?

Det lykkedes mig ikke dengang at besvare dette Spørgsmaal for Rude Skovs Vedkommende. Derimod fik jeg omtrent samtidig i en anden Skov — Geel Skov ved Holte — Indblik i, hvorledes en Egernbestand k a n bevares, selv om Rødgranen paa et vist Tidspunkt fuldkommen svigter som Kilde til Ernæring.

ger af indtil alenlange Grene med friske Naale stammede, som laa under Lærkene. Paa de afbidte Grene sad der ofte Kogler (indtil 5, medens der kun fandtes Mærker efter en eneste, som Egernet havde bidt af — det synes ødselt, at Egernet kun bider een Kogle af og lader Grenen med de resterende Kogler falde til Jorden.

I Begyndelsen af Februar 1921 var Forholdet i Geel Skov det, at der ikke mere fandtes frøholdige Grankogler, og i Rødgranbevoksningerne var der da ogsaa kun at finde egernbehandlede Kogler, som var mørke, altsaa gnavede for nogen Tid siden, ingen nylig gnavede.

Da var det, at jeg d. 6. Februar under min Omstrejfen i Geel Skov kom ind i en Bevoksning af Skovfyr (*Pinus silvestris*) og der opdagede en stærk Egernvirksomhed. Det er en ret anselig, af middelstore Skovfyr bestaaende Bevoksning, som ligger tilhøjre for Vejen fra Holte Hotel til Søllerød, imellem Skovridervej og Stenvej. Under Fyrrene laa der i Tusindtal af Kogler, behandlede paa de for Egernet karakteristiske Maader. I de følgende Maaneder skete der ingen Forandring heri: ingen Egernvirksomhed i Granbevoksningerne, i Fyrreskoven stadig nye Mængder af Kogler gnavede. Men hen i Slutningen af Juni vendtes Forholdet om: i Fyrrebevoksningen fandtes der ikke mere friskgnavede Kogler, i Granskoven var der paa Træerne nu kommet Kogler, som gnavedes af Egern, skønt de endnu var grønne.

Vi har altsaa i Geel Skov iagttaget følgende:

Egernet holder almindeligvis til i Rødgranbevoksningerne, thi dette Naaletræs Frø udgør dets sædvanlige Føde. Men indtræffer det Tilfælde, at de frøholdige Rødgrankogler slipper op, vandrer Egernet ind i Fyrreskoven og lever af Fyrrekoglernes Frø. I Fyrreskoven bliver Egernet dog kun saa længe, at Rødgranen paany sætter Kogler, da vandrer Egernet tilbage til Rødgranen.

Fyrren kommer saaledes til at spille en vigtig Rolle for Egernet; thi den sikrer dets Eksistens i de Perioder, hvor Rødgranerne ikke har Frø — og saadanne Perioder kan indtræffe, som vi har set. Og det Tilfælde, at der samtidig skulde mangle frøholdige Kogler baade paa Gran og paa Fyr, vil næppe nogensinde indtræffe. For det første indtræder disse Naaletræers Frøsætning ganske uafhængig af hinanden, det saa jeg i Forsommeren 1920: medens Rødgranen ingen Steder satte Kogler, var der fuldt op af spæde Kogler paa Fyrren. Og dernæst maa man erindre, at Fyrrekoglen har en meget længere Modningstid end Grankoglen. Allerede i Løbet af det første Aar bliver Rødgrankoglen moden, aabner sig om Foraaret og lader de vingede Frø flagre ud. Fyrrekoglen derimod er endnu umoden og grøn Aaret efter, at den er dannet;

naar den er to Aar gammel, er dens Skæl bleven brune, men Koglen er endnu lukket, og først i Løbet af Koglens tredje Leveaar aabner den sig og lader Frøene komme ud. Men selv om Koglerne er grønne og deres Frø umodne i den Forstand, at de ikke er skikkede til at spredes, begnaver Egernet dem og spiser deres Frø lige saa gerne som de modne Frø i de brune Kogler. Selv om altsaa det Tilfælde skulde indtræde, at Fyrren ikke satte Kogler i et enkelt Aar — saadan som vi har hørt det om Rødgranen i 1920 — vilde der dog ikke i noget af de følgende Aar komme til at mangle frøholdige Kogler paa Fyrren, naar der da er Tale om en større Bevoksning.

VI.

Hvorledes Forholdene sidenhen har udviklet sig i Geel Skov og Rude Skov, er i Korthed følgende:

Som vi hørte i forrige Afsnit, trak Egernet i Geel Skov, efter i Vinteren og Foraaret 1921 at have opholdt sig i Fyrrelunden, atter om Sommeren tilbage til Granbevoksningerne, hvor der alle Vegne fandt en rig Koglesætning Sted efter det foregaaende Aars fuldstændige Goldhed. I 1922 slog Koglesætningen fejl i visse Afsnit af Granskoven, men ikke i andre, og til de sidste indskrænkedes Egernets Forekomst efterhaanden; skønt der ogsaa var Kogler paa Skovfyrren, benyttede Egernet sig ikke deraf — det synes, som om Egernet foretrækker Frø af Rødgran, naar dette overhovedet er at opdrive.[1])

Nu, i August 1923, staar vi atter over for den Begivenhed, at Rødgranen ingen Kogler har frembragt nogetsteds i Geel Skov. Egernet holder endnu til i de Rødgranbevoksninger, hvor der fremkom Kogler i 1922, men man kan se, at det begynder at knibe for det at finde Kogler med Frø i, og Egernvirksomheden er i stadig Aftagende der. Og samtidig har der, for første Gang siden 1921, begyndt at finde en Invasion Sted i Fyrreskoven, hvor der under nogle Træer nu ligger Masser af egerngnavede Fyrrekogler, baade af de grønne og de brune.

I Rude Skov havde, som omtalt under Afsnit IV, Egernet i

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[1]) Maaske er Grunden hertil snarere den, at det sagtens er lettere at gnave Skællene af en Grankogle end af en Fyrrekogle, hvor Skællene er meget tykkere; desuden er jo Fyrrekoglerne ret smaa.

Foraaret 1922 genvundet sin tidligere Udbredelse, d. v. s. praktisk talt over hele Skoven. Men denne Tilstand varede ikke længe. I Løbet af Vinteren 1922—23 forsvandt Egernet atter fra alle de mig bekendte Rødgranbevoksninger; hverken i Granerne eller paa Jorden fandtes Kogler med Frø; i Nærheden af Højbjerg kunde jeg finde et sidste Spor efter Egernets Tilstedeværelse i Form af en Kogle, der var gnavet for ikke længe siden, men ellers saa man ikke længere nylig gnavede Kogler. Man stod i Virkeligheden ved April 1923 over for den samme Situation som ved samme Tid for to Aar siden — Egernet syntes ganske forsvundet fra Rude Skov. Men nu lykkedes det mig at blive klar over, at Egernbestanden ikke var død ud, og at opspore, hvor den var bleven af.

Denne Gang tog jeg mig for at gaa Rude Skov grundigt efter og kom derved, i Slutningen af Maj, til et Parti, som jeg ikke tidligere havde kendt, i Skovens sydvestlige Del, den saakaldte „Sækkedam“. Paa denne Højmose trives en Bevoksning af store Rødgraner, og ved Foden af dem laa endnu hist og her en enkelt Kogle, som var gnavet af Egern for nylig. Men det var aabenbart kun undtagelsesvis, at Egernet havde fundet Frø nok i en saadan Kogle til, at det havde kunnet betale sig for det at give sig i Lag med den; i Reglen havde Dyret nøjedes med at gnave de nederste Skæl af og saa givet op, da der ingen Frø fandtes i disse gamle Kogler.

Tilstanden syntes for saa vidt ikke at være gunstigere for Egernet i denne Granbevoksning end i de andre. Af de faa, friskgnavede Grankogler fremgik imidlertid med Sikkerhed, at Egernet maatte findes her, og jeg gav mig derfor til at gaa Bevoksningen nærmere efter og fandt da, at der hist og her mellem Granerne voksede Skovfyr af en ligeledes meget betydelig Størrelse. Disse Skovfyr falder ikke stærkt i Øjnene, da de udgør en forholdsvis underordnet Bestanddel i Granskoven og staar spredt imellem Granerne; men gaar man hele Skovpartiet efter, bliver Fyrrenes Antal tilsammen ret anseligt. Og disse Skovfyr var det, som opretholdt Egernbestanden; det fremgik deraf, at der under dem laa store Mængder af nylig egerngnavede Fyrrekogler.

Tilstanden stiller sig altsaa for Tiden (August 1923) ens i Rude Skov og i Geel Skov: begge Steder svigter det Træ, hvis Frø almindeligvis yder Egernet dets Føde, nemlig Rødgranen; i dens

Sted træder Skovfyrren, den bærer, navnlig i Rude Skov, uhyre Mængder af frøholdige Kogler, og dem gnaver Egernet nu — og det maa blive ved dermed i det mindste indtil Sommeren 1924, da Rødgranen ikke har sat Kogler i Aar[1]). Imellem de to Skove er der kun den Forskel, at Fyrren i Geel Skov danner en samlet Bevoksning, i Rude Skov derimod vokser spredt i en Rødgranbevoksning, hvorfor det her kunde se ud, som om Egernet holder Stand i en Bevoksning af Rødgran. Men Forskellen er jo kun tilsyneladende, da det er Fyrrene i Granskoven, som ernærer Egernet.

Efter dette Fund indser jeg, at Grunden til, at jeg ikke kunde finde ud af, hvad der blev af Rude Skovs Egernbestand i Løbet af Vinteren 1920—1921, var den, at jeg ikke kendte den med Skovfyr blandede Granskov i Sækkedam — havde jeg den Gang undersøgt dette Parti af Rude Skov, vilde jeg nok have fundet det samme som i Aar: For at undgaa Hungersnød i de frøtomme Rødgranbevoksninger har Egernet trukket sig ned til dette Skovens sydvestlige Parti med de frelsende, frøbærende Skovfyr.[2])

VII.

Resultatet af vor Undersøgelse kan vi sammenfatte saaledes:

Størst Betydning for Egernets Trivsel her i Landet har Rødgranen (*Picea abies*), hvis Frø det særlig ynder. Men dette Naaletræ frembringer ikke konstant Kogler hvert Aar. Der indtræffer ofte Aar, hvor ikke een Gran i en hel Bevoksning sætter Kogler, af og til ogsaa Aar, hvor en Skovs samtlige Rødgranbevoksninger undlader at sætte Kogler, og det kan endog hænde, at der gaar

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1) Ejheller kan Løvskoven byde Egernet Erstatning, da der ingen Bog findes i Aar.

2) I saa at sige hver eneste Fremstilling af Egernets Biologi kommer igen den Ytring, at Egernet om Sommeren og Efteraaret samler sig Forraad af Hasselnødder, Bog, Agern, Gran- og Fyrrefrø o. l. og gemmer det i hule Træer, under Trærødder, mellem Mos, i Huler i Jorden osv

Jeg maa dertil bemærke, at jeg ingensinde har kunnet finde mindste Spor af Forraad, som kunde hidrøre fra Egern. Jeg er tilbøjelig til at tro, at der til Grund for Fortællingerne om Egernets Vinterforraad ligger en Forveksling med de Ophobninger af slige Fødemidler, som saa almindelig findes paa Musenes skjulte Spisesteder i Skoven (jfr. Ad. S Jensen: Muse- og egerngnavede Kogler; Vidensk. Medd fra Dansk naturh. Foren Bd. 71, 1920 to Aar itræk, uden at Granerne i en Skov frembringer Kogler. Disse Vekslinger i Henseende til Frøsætning fremkalder Egernvandring.

Hvis Koglesætningen slaar fejl i nogle af en Skovs Rødgranbevoksninger, men ikke i andre, vandrer Egernet over i de Bevoksninger, hvor Koglesætning finder Sted. Hvis Koglesætningen slaar fejl i en Skovs samtlige Rødgranbevoksninger, og der i denne Skov findes et større Antal Skovfyr (*Pinus silvestris*), enten som samlet Bevoksning eller som Indblanding i en Rødgranbevoksning, vandrer Egernet til Partiet med Skovfyr og lever af Fyrrens Koglefrø, indtil der paany dannes Kogler i Rødgranbevoksningerne, da vandrer Egernet atter tilbage til disse. Men hvis der ingen Fyr findes i en Skov, og Egernet ikke har dette Naaletræs Frø at falde tilbage paa, kan det medføre Egernets totale Forsvinden, i alt Fald naar der ikke fremkommer Kogler paa Rødgranerne to Aar itræk.

Skovfyrrens Betydning som Reservenæring for Egernet forøges derved, at den godt kan sætte Kogler i saadanne Aar, hvor Rødgranen slaar fejl, og dernæst ved, at Fyrrens Kogler først aabner sig og slipper Frøene i det tredje Aar efter Koglens Dannelse, medens Granen spreder Frøene allerede i Koglens første Aar — derfor vil Fyrren vist sjeldent være uden Næring for Egernet, da det gnaver saavel de modne som de umodne Kogler. Egernet kan derfor næppe tænkes at kunne dø ud af Mangel paa Næring i Skove, hvor der foruden Rødgran findes Skovfyr i større Antal,[1]) medens det kan ske i Skove, hvor der kun vokser Rødgran. Eksempler paa den første Slags Skove har vi fundet i Geel Skov og Rude Skov ved Holte, paa den anden Slags i Klingstrup Skov og Vejstrup Dyrehave ved Skaarup.

Fra mange Lande, ogsaa Danmark, foreligger der Beretninger om, at Egernet er forsvundet fra Skovstrækninger, hvor der tidligere var mange Egern. Man har søgt at forklare dette Fænomen paa forskellig Maade: Sygdomme, saasom Indvoldsorme eller Skab, har udryddet Dyrene; eller de er blevne et Bytte for Efter-

[1]) Efter hvad jeg har set i Thorsager og Hjøllund Plantager, spiller i Hedeplantagerne Bjergfyrren (*Pinus montana*) en lignende Rolle for Egernet, som Skovfyrren i de gamle Skove.

stræbelser fra Rovfugle og Rovdyr, navnlig Skovmaar; eller Granmøllet (*Phycis abietella*) har ødelagt Koglerne, som Egernet skulde leve af; eller ugunstigt Vejrlig har fremkaldt Mangel paa Næring og derved foraarsaget Udvandring; osv.

Disse Forklaringer faar staa ved deres Værd. Men ved fremtidige Hændelser af den Art kan de i denne Afhandling fremdragne Iagttagelser muligvis bidrage til at kaste Lys over Fænomenet.

* * *

Tilføjelse.

I det foregaaende er skildret Egernets periodiske Optræden og Forsvinden indenfor Skovstrækninger, hvor det er kommet ind. Hertil kunde føjes den Bemærkning, at Egernet her i Landet efter egne og andres Iagttagelser for Tiden har en stærk Tendens til at brede sig til Egne, hvor det ikke tidligere har levet. Da jeg har kunnet følge et saadant Tilfælde, og det giver et ganske godt Billede af Tempoet i Egernets Fremtrængen over et anseligt Terræn, benytter jeg Lejligheden til at omtale det her, skønt det egentlig ligger udenfor denne Afhandlings Ramme.

I Begyndelsen af Juli 1919 undersøgte jeg ret indgaaende Skovene ved Silkeborg for musegnavede Kogler. Under denne Ransagning stødte jeg i Vesterskov (nær ved Kuranstalten) ved Foden af en stor Rødgran paa nogle faa Kogler, som var gnavede af Egern, og det var sket for ganske nylig. Der kunde ikke findes flere egerngnavede Kogler end disse, hverken i Vesterskov eller i nogen af de andre Skove ved Silkeborg, ej heller havde Skovarbejderne eller stedkendte, naturhistorisk interesserede Personer nogensinde set Egern i Skovene ved Silkeborg. Det var øjensynlig det første Spor af en Nykommen, jeg her var stødt paa.

Siden den Tid har jeg hvert Aar, i Juli Maaned, kunnet se, hvordan Egernets Udbredelse skred frem. I 1920 havde det bredt sig over et anseligt Terræn i Vesterskovs nordlige Del; her fandtes mange egerngnavede Rødgrankogler, dels lyse og nygnavede, dels mørke og ældre, men dog øjensynlig gnavede i Løbet af det sidste Aarstid. Endvidere fandtes i Sønderskov 2 ganske nylig gnavede Kogler, men trods ivrig Søgen heller ikke flere — et Tegn paa, at Egernet lige var naaet til denne Skov. I ingen af de andre Skove ved Silkeborg var der Spor efter Egern.

I 1921 havde Egernet bredt sig til nye Partier af Vesterskov, men Dyret sporedes nu mest ved de mange nygnavede Kogler af Skovfyr — ogsaa i denne Skov var Rødgranens Koglesætning slaaet fejl i 1920, hvorfor Egernet havde slaaet sig paa Skovfyr, men nu gnavede det desuden de ganske unge (grønne) Rødgrankogler fra 1921.[1])

I 1922 laa der store Mængder af egerngnavede Rødgrankogler overalt i Vesterskov, og nu var de ogsaa i Mængde i Sønderskov; desuden fandtes der mange nygnavede Kogler i Østerskov, Kobskov og Nordskov. Endelig i 1923 saa jeg ogsaa i Lysbroskov store Mængder af egerngnavede Rødgrankogler.

I 1919 er Egernet altsaa kommet ind i Vesterskov, og i Løbet af 1920—23 har det naaet at brede sig over alle de Skove, der ligger ved Silkeborg — tilsammen et af vort Lands større Skovarealer[2]) — og at blive almindeligt overalt.

Egernet har ogsaa faaet Indpas i den store af Rødgran, Hvidgran og Bjergfyr bestaaende Plantage ved Hjøllund S.V. for Silkeborg. At Egernet er kommet hertil for ikke lang Tid siden, fremgaar af, at blandt de mange egerngnavede Kogler, jeg fandt der i Juli 1922, var der vel adskillige ældre (mørke), men rigtig gamle (sorte) fandtes ikke.

Denne Tydning af de begnavede Koglers Alder stemmer med en Meddelelse af den kendte Skovfrøhandler Johannes Rafn om, at han i Juli 1919 for første Gang fandt nogle faa egerngnavede Rødgrankogler i Skjærbæk Plantage, der er en østlig Udløber af Store Hjøllund Plantage. Ifølge samme Forfatter synes Snabegaard Plantage at have været et Udgangspunkt for Egernet paa disse Kanter; han skriver nemlig (i 1920)[3]): „..... i Snabegaard Skov fandtes for 5—6 Aar siden ingen begnavede Kogler og altsaa heller ingen Egern — nu findes Masser af ødelagte Kogler. I 1918

[1]) I Vinterens Løb havde Egernet ogsaa gnavet Hanblomsternes Knopper, thi der laa under Granerne mange af de før omtalte „Absprünge“ med Knopperne ved Grunden udhulede af Egern.

[2]) Dets Udstrækning er i Ø.—V. omtrent $9{,}5$ km, i S.V.—N.O. ligeledes omtrent $9{,}5$ km, og det udgør ca. 2500 ha Land.

[3]) Johannes Rafn: Skovfrøanalyser i Sæsonen 1918—19, samt lidt om Egern. (Dansk Skovforenings Tidsskrift 1920).

gik Egernet over Lystrup Aa, og i 1919 fandt jeg i den vestlige Udkant af Velling Skov de første begnavede Rødgrankogler, og allerede i sidste Halvdel af Juli saa jeg Egern sidde i Bjergfyrtoppene og fortære Kogle efter Kogle, saa Jorden var dækket med ituskaarne Koglesk;æl.“ Med Hensyn til Velling Skov kan jeg bekræfte Rafns Fremstilling; i 1917 fandt jeg intet Spor efter Egern i denne Skov, i 1923 var Rødgranbevoksningerne oversaaede med egerngnavede Kogler.[1])

Det er ikke alene i Jylland, at Egernet breder sig, ogsaa paa Fyen og Sjælland er det under Fremrykning, hvilket jeg kan illustrere ved et Par Eksempler.

I Sommeren 1919 undersøgte jeg Skovene omkring Langesø i Nordfyen (N.V. f. Odense) meget nøje uden at finde mindste Spor efter Egern. Nu i Sommer (1923) var der Mængder af egerngnavede Kogler.

Hvad Sjælland angaar, har Prof. Raunkiær, med Bistand af andre Botanikere, kortlagt Egernets Udbredelse i Sommeren 1919 paa Grundlag af en Eftersøgning i 230 sjællandske Skove efter Rødgrankogler, som var gnavede af Egern. Undersøgelsen viste, at der fandtes to Egernomraader, nemlig et større vestsjællandsk Omraade og et mindre Omraade nord for København; deres Græn-

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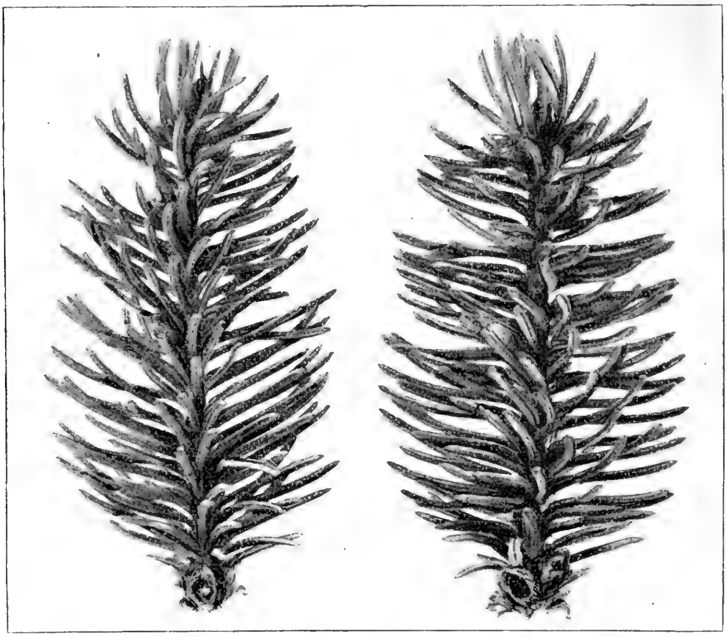
[1]) Rafn giver et ikke helt korrekt Billede af Egernets Koglegnavning, naar han skriver (l. c. p. 63): „De forholdsvis smaa *Pinus*-Kogler fortærer Egernet siddende i Træerne, medens Rødgrankoglerne altid ses at være begnavede paa Jorden; de afgnavede Kogleskæl findes ikke spredte over Skovbunden, men ligger i smaa tætte Hobe omkring den helt eller delvis afgnavede Kogle-Akse. Om Egernet selv nedskærer Rødgrankoglerne eller venter, til de kastes ned af Stormen, har jeg endnu ikke haft Lejlighed til at iagttage, men tror afgjort, at Egern først giver sig i Lag med Rødgrankoglerne, efter at de er faldet ned.“ Af dette Forhold har jeg i min før citerede Afhandling, p. 101—02, givet følgende Fremstilling: „I en Egern-Skov ..... finder man tit smaa Bunker af Skæl og Frøvinger ved Siden af de gnavede Kogler (af Rødgran), thi Egernet gaar ofte ned fra Træerne og gnaver Koglerne paa Jorden. Men desuden ser man store Mængder af gnavede Kogler spredt over Skovbunden, uden at der ligger Skæl og Frøvinger ved; det kommer af, at Egernet hyppig bider Koglerne af Grenene og gnaver dem oppe i Træerne; Skæl og Frøvinger drysser ned og spredes, og tilsidst kastes den gnavede Kogle ned.“ Paa den anden Side finder man af og til Fyrrekogler, som Egernet har gnavet paa Jorden.

ser vil ses af det Afhandlingen ledsagende Kort.[1]) Paa dette Tidspunkt dannede Geel Skov og Rude Skov Vestgrænsen for Egernets Udbredelse i Nordsjælland. Men d. 26. December 1921 fandt jeg nogle faa (3) Grankogler, som nylig var gnavede af Egern, i Frederiksdals Skov, nær ved Hulsø. Flere kunde ikke findes, men allerede i August det følgende Aar var der mange egerngnavede Kogler ikke alene i Frederiksdals Skov, men ogsaa til Bøndernes Hegn og de nærmere liggende Granbevoksninger i Store Hareskov var Egernet nu naaet.

[1]) Egern, Mus og Grankogler. En naturhistorisk Studie af C. Raunkiær. (Det Kgl. D. Vidensk. Selsk. Biol. Meddel. II, 4, 1920).



C. M. Steenberg phot.

Fig. 3. To af de saakaldte »Absprünge«, d. v. s. af Egern afbidte Skud af Rødgran (jfr. S. 130). — Naturlig Størrelse.

5—10—1923.

En pludselig masseforekomst af *Sepia*-skaller ved Færøerne i foråret 1923.

Af

R. Spärck.

(Meddelt i mødet d. 9de novbr. 1923.)

Zoologisk museum modtog i foråret 1923 fra forskellig side forespørgsler om, hvad det var for ejendommelige skaller, som i betydeligt antal begyndte at drive i land flere steder på Færøerne. En undersøgelse af skallerne viste, at disse hidrørte fra *Sepia officinalis* L. Da skallerne efter alle hjemmelmænds eenstemmige udsagn var aldeles ukendte for den færøiske befolkning, og da der ej heller i litteraturen kunde findes nogen oplysning om, at sådanne skaller var fundet på Færøerne, mente jeg, at en nøjere undersøgelse af fænomenet vilde have nogen interesse. Jeg henvendte mig til flere af de, der havde indsendt forespørgsler til museet, og bad dem søge at skaffe nøjere oplysninger om, hvor og hvornår skallerne drev ind, i hvor stort antal o. s. v. Fra d'hrr. læge R. K. Rasmussen, Ejde, og overretssagfører P. Effersøe, Thorshavn, har museet modtaget adskillige særdeles værdifulde oplysninger, der delvis ligger til grund for nedenstående lille meddelelse.

Skallerne, af hvilke en halv snes stykker blev sendt til museet, lignede i størrelse og øvrige udseende de *Sepia*-skaller, der undertiden driver op på den jyske vestkyst. Længden af de skaller, jeg har set, lå mellem 130 og 180 mm. De bar i nogen grad præg af at have ligget i vandet (kanterne undertiden slidt af o. lgn.); enkelte var grønlige på grund af grønalgebevoksning, andre helt hvide. Så godt som alle skallerne havde på undersiden nogle særdeles karakteristiske tresidede fordybninger. Efter hvad hr. mag. scient. R. Hørring elskværdigst har gjort mig opmærksom på, må disse fordybninger være fremkommet ved fuglebid, formentlig hidrørende fra måger. Også på en del af de på den jyske vestkyst ilanddrevne skaller, som findes i Zool. museum, er der sådanne mærker, og for disses vedkommende kunde det påvises, at de ganske nøje passede til overnæbbets form hos *Larus marinus*. På de færøiske skaller var fordybningerne gennemgående mindre, og må derfor antages at stamme fra mindre mågearter.

På grund af skallernes ofte ret ødelagte tilstand er det vanskeligt med sikkerhed at afgøre, til hvilken af de i sin tid af Lafont (1869 p. 11, 1871 p. 237) opstillede varieteter eller småarter (thi om andet drejer det sig næppe) de bør henregnes. Posselt (1893 p. 142) har i sin tid henført de i Danmark ilanddrevne til *S. Filliouxi* Laf. Af de færøiske skaller tilhørte ingen *S. officinalis* s. s.; efter størrelsen må de tilhøre *S. Filliouxi*, men de har ikke altid (lige så lidt som de danske) den regelmæssige begrænsning af det stribede parti, som efter Cuénot (1917 p. 323) skal være karakteristisk for denne form. Ligeledes synes det stribede parti, såvidt det kan ses til trods for den slette konserveringstilstand, hos adskillige eksemplarer at nå betydeligt over skallens midte, således som det skal være karakteristisk for *S. Fischeri* Laf. Der er således mulighed for, at begge de sidstnævnte former *Filliouxi* og *Fischeri* er repræsenterede i det færøiske materiale.

Som ovenfor nævnt drev skallerne i land i foråret 1923. Ifølge meddelelse fra læge Rasmussen er de første skaller drevet ind i vigen nord for Ejde (Østerø) d. $^{13}/_{2}$, den sidste skal drev ind her d. $^{25}/_{5}$. Heller ikke fra andre steder har jeg fået oplysning om, at skallerne er drevet ind før eller efter de nævnte datoer. Fra den omtalte vig, Mølen, nord for Ejde, har læge Rasmussen skaffet særdeles nøjagtige oplysninger (ved at betale for de skaller, der bragtes ham) både om hvilke dage, skallerne drev ind, og i hvor stort antal. Resultatet var følgende:

	Antal skaller		Antal skaller	
$^{13}/_{2}$	6	$^{23}/_{4}$	6	Stærk nordl. og nordostvind
$^{14}/_{2}$	2	$^{25}/_{4}$	17	
$^{18}/_{2}$	3	$^{26}/_{4}$	32	
Ca. $^{21}/_{2}$	2	$^{27}/_{4}$	0	Sydlig vind
Ca. $^{27}/_{2}$	3	$^{28}/_{4}$—$^{10}/_{5}$	ganske enkelte	Skiftende vind
$^{1}/_{3}$	5	$^{11}/_{5}$	1	Nordlig vind
$^{16}/_{4}$	1	$^{12}/_{5}$—$^{17}/_{5}$	25	Nordøstlig vind
$^{21}/_{4}$	1	$^{25}/_{5}$	1	

I denne lille vig er der altså inddrevet over 105 skaller, størsteparten i dagene $^{25-26}/_4$ og $^{12-17}/_5$, i begge tilfælde med stærk nordøstlig vind. Ifølge læge Rasmussens oplysninger er der endvidere drevet skaller ind på følgende steder på den nordlige del af Strømø og Østerø: Tjørnevig, Haldersvig (de første d. $^{18}/_2$), Langesand, Strømnæs, Kvalvig, Thorsvig, Øre, Nordskaale, Svinaa, Ejde (kun 1 skal, $^{28}/_4$, sydl. vind), Gjov, Funding, Fundingsbotn ($^{23}/_4$—$^{26}/_4$, ca. 50 skaller), Eldervig, Andefjord, Fuglefjord, Lervig, Gøte. Ifølge meddelelse fra overretssagfører P. Effersøe er der drevet skaller ind ved Thorshavn, på Nolsø (ca. 300, medio marts —medio maj, kun med sydøstlig vind), Hestø, Kolter (kun enkelte skaller), Skarvenæs på vestsiden af Sandø, Husvig på østsiden af Sandø (begge steder mange skaller, ved Skarvenæs kunde man på stranden samle en halv spand på een dag), Midvaag. Sørvaag (slutningen af februar—medio maj, vestlig vind). Fra de nordøstlige øer og fra Suderø haves ingen oplysninger, fra Vestmanhavn på nordvestsiden af Strømø oplyses, at ingen skaller er drevet ind. Efter dette synes skallerne at være drevet ind praktisk talt over alt, i hvert fald på de midterste øer, dog mest på de mere åbne kyster, i ringere grad i de smalle sunde mellem visse øer. Efter de nævnte tal må det for det samlede område dreje sig om tusinder af skaller, navnlig da et meget stort antal ifølge forskellige beretninger knuses i brændingen og således ikke driver op.

Som ovenfor nævnt var *Sepia*-skallerne aldeles ukendte for befolkningen på Færøerne, hvor ingen erindrede forhen at have set sådanne skaller drive ind. Dette stemmer ganske med, hvad der i litteraturen findes oplyst angående udbredelsen af *Sepia officinalis*. Mørch (1868 p. 101) omtaler ikke i sin oversigt over Færøernes bløddyr (hvor Steenstrup har skrevet afsnittet om blæksprutterne) *Sepia*, hverken som tilhørende Færøernes fauna, ej heller at skallerne driver iland dèr (dette omtales derimod for *Spirulas* vedkommende).[1] Fra Norge omtales *Sepia* af Otto Fr. Müller

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1) Det eneste, der tyder på et tidligere fund ved Færøerne, er en tilføjelse med Mørchs håndskrift) i Zool. museums eksemplar af hans ovennævnte afhandling. Det meddeles her med sysselmand Müller som kilde, at *Sepia*-skaller under navn af Grøjeskel bruges som sårmiddel på Færøerne. Det færøiske navn kan tyde på, at skallerne forhen er drevet ind her.

(1776 p. 232) og Erik Pontoppidan (1753 p. 288) uden nøjere lokalitetsangivelse. Under en diskussion ved det skandinaviske naturforskermøde 1844 (De skandinaviske Naturforskeres fjerde Møde i Christiania p. 232—33) oplyste Boeck og Rasch at der i visse år var inddrevet mange *Sepia*-skaller ved Moss og på øerne ved Frederiksværn, samt at en mængde hele dyr et år var drevet på land ved Frederiksværn. Fra Sverige omtaler Linné (1746 p. 367), at skaller af *Sepia officinalis* driver i land ved Skåne (endog „quot annis"). Lovén (1845 p. 122) omtaler, at skaller af *Sepia* hyppigt kastes i land ved Bohuslän, men tiltøjer „integra autem specimina raro obvia". Malm (1855 p. 47) meddeler at have set en *Sepia officinalis* paa Gøteborgs fisketorv. Fra danske farvande haves oplysning hos Posselt (1892 p. 142); her driver skallerne, navnlig på Jyllands vestkyst, ofte ind i hundredevis. Ved de britiske øer omtales *Sepia officinalis* hos Forbes & Hanley (1853 p. 238) som almindelig undtagen ved den nordligste del. Macgillivray (1843 p. 29) skriver f. eks. at skallerne kun sjældent findes ved Aberdeenshire, og at dyret aldrig er fundet dér.[1]) Længere mod syd, i Middelhavet og ved Frankrigs kyst, er *S. officinalis* særdeles almindelig.

Om denne blæksputtes biologi findes oplysninger hos Cuénot (1917 p. 315). Det oplyses her, at formerne *Fillouxi* og *Fischeri* i forårsmånederne (henholdsvis marts og april) kommer ind til kysterne, hvor de yngler. Når skallerne i år i så store mængder er drevet ind ved Færøerne, kan dette næppe forklares på anden måde end, at disse dyr under deres vandring ind mod kysten i vinterens løb på grund af ganske særlige strømforhold er bragt på afveje og ført mod nord, formentlig ud i Skagerak og den sydlige del af Nordhavet, hvor de i stort antal er omkommet, hvorefter en del af skallerne er ført på land ved Færøerne.

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[1]) Ifølge det engelske blad „Fishing News" (for $^{12}/_{5}$ 23) er der i foråret 1923 drevet adskillige skaller ind ved Nordskotland, hvor der iår også er fanget adskilliige levende *Sepia*.

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Summary of the Contents.

On a sudden multitudinous occurrence of *Sepia*-shells at the Faroes in the spring 1923.

I. In the spring 1923 a great number of shells of *Sepia officinalis* L. were washed ashore in several places at the Faroes. The first shells were observed on February 13th, the last on May 25th 1923. The total number of shells at all the islands must be estimated at many thousands. In small inlets about 50 shells were washed ashore on certain days.

II. In appearance the shells are very much like those sometimes washed ashore on the western coast of Jutland. The length of the shells varies from 130—180 mm. Many of the shells wore marks evidently due to bites from birds, presumably gulls. On a single *Sepia*-shell remains of the animal itself is said to have been found. The shells belong to the sub-species *Fillioux*i Laf., some few perhaps to *Fischeri* Laf.

III. *Sepia officinalis* was formerly never found at the Faroes, and the shells were totally unknown to the inhabitants. According to literature (Lovén, Forbes & Hanley, Posselt), the southern coast of Norway, the coast of Bohuslän and the northern part of Scotland seem to be the hitherto northernmost finding places of shells of *Sepia*; in these places a few whole animals were furthermore found. The sudden occurrence of thousands of shells of this south- and west-european species at the Faroes in 1923 is hardly to be explained in any other way than by supposing considerable change in the currents of the North-European seas to have taken place this year.

9—10—1923.

Fuglene ved de danske Fyr i 1921.

39te Aarsberetning om danske Fugle.

Ved

R. Hørring.

I 1921 indsendtes fra 35 af de danske Fyr og Fyrskibe til Universitetets zoologiske Museum ialt 580 Fugle af 65 Arter, faldne om Natten i Træktiderne. Sikker Efterretning haves om 1086 artsbestemte Fugle, idet Prøver af disse ere indsendte. Ifølge Fyrmestrenes Oplysninger, der dog desværre ikke have været ledsagede af Prøver, er yderligere opsamlet c. 250 Fugle, hvoraf c. 142 angaves at være Drosselfugle, 54 Lærker, 5 Vadefugle, 3 Knortegæs, 3 Ænder og Resten forskellige Smaafugle. Nøjere Efterretning haves saaledes om c. 1335 Fugles Død ved Fyrene. Ved Fyrskibene angives blot c. 100 at være faldet udenbords. I det hele synes der saaledes, at regne efter de indkomne Oplysninger, mindst at være faldet omkring 1435 Fugle.

Fuglefaldet var saaledes i 1921 i det hele meget betydeligt under det sædvanlige. Medens Foraarstrækket afspejlede sig i et nærmest normalt Fald ved Fyrene, var dette om Efteraaret langt under det normale. Grunden hertil laa lige for og skyldtes de abnorme klimatiske Forhold. I August, der var paafaldende kølig, var der næsten ingen Torden med paafølgende Regntykninger, hvilket altid giver stærkt Fuglefald; i hele September, Oktober og største Delen af November vare klare Nætter, uden Taage, Dis og Regntykning, i ganske usædvanlig Grad fremherskende. Følgen var, at saa godt som intet faldt i September, og i Oktober var der kun i ganske enkelte Nætter hen imod Maanedes Midte lidt Tilløb til størrre Fald; ogsaa i hele November faldt ganske usædvanlig lidt og fra mange Fyr meddeles det ogsaa udtrykkeligt, at Fuglefaldet dette Efteraar havde været ganske usædvanlig ringe. Det maa i denne Sammenhæng udtrykkelig bemærkes, at de lave Tal iaar ikke, som i de foregaaende Krigsaar, for en Del skyldtes, at endel Fyrskibe vare inddragne.

De Fyr, hvorfra Fugle indsendtes vare:

Graadyb Fyrskib. R. M. Nielsen, Fører (29 Fugle fra 19 Nætter).
Sædenstrand Fyr. P. Larsen, Fyrmester (1 fra 1 Nat).
Blaavands Huk Fyr. C. G. Christensen, Fyrmester (28 fra 3 Nætter).
Vyl Fyrskib. A. Rasmussen, Styrmand (116 fra 61 Nætter).
Horns Rev Fyrskib. Toftgaard Nielsen, Fører (53 fra 23 Nætter).
Lyngvig Fyr. C. A. Hansen, Fyrmester (31 fra 4 Nætter).
Bovbjerg Fyr. S. J. Beldring, Fyrmester (2 fra 1 Nat).
Lodbjerg Fyr. J. A. Tendal, Fyrmester (17 fra 5 Nætter).
Hanstholm Fyr. E. Holm-Hansen, Fyrmester (6 fra 2 Nætter).
Skagen Fyr. N. Christensen, Fyrassistent (15 fra 3 Nætter).
Hirtsholmenes Fyr. J. N. B. Høeg, Fyrmester (15 fra 3 Nætter).
Læsø Trindel Fyrskib. S. Winther, Fører (21 fra 5 Nætter).
Læsø Rende Fyrskib. A. P. Jensen, Fører (31 fra 8 Nætter).
Østre Flak Fyrskib. A. A. Porse, Fører (3 fra 3 Nætter).
Anholt Knob Fyrskib. M. Trondal, Styrmand (24 fra 6 Nætter).
Anholt Fyr. M. P. Andersen, Fyrassistent (1 fra 1 Nat).
Hesselø Fyr. K. A. Jensen, Fyrmester (39 fra 6 Nætter).
Schultz's Grund Fyrskib. E. Rasmussen, Styrmand (36 fra 14 Nætter).
Fornæs Fyr. K. Agerskov, Fyrmester (2 fra 1 Nat).
Hjelm Fyr. H. A. H. Nielsen, Fyrmester (8 fra 1 Nat).
Sejrø Fyr. J. N. Z. Nielsen, Fyrmester (3 fra 1 Nat).
Vestborg Fyr. H. V. O. Westermann, Fyrmester (13 fra 6 Nætter).
Gilleleje Flak Fyrskib. I. S. Ibsen, Fører (19 fra 12 Nætter).
Drogden Fyrskib. Jul. S. Jensen, Fører (4 fra 4 Nætter).
Stevns Fyr. H. Roed, Fyrmester (11 fra 3 Nætter).
Sprogø Fyr. E. Haubirk, Fyrmester (4 fra 1 Nat).
Kjels Nor Fyr. Chr. Ryder, Fyrmester (10 fra 5 Nætter).
Æbelø Fyr. G. A. Petersen, Fyrmester (8 fra 2 Nætter).
Helnæs Fyr. S. P. Mortensen, Fyrmester (1 fra 1 Nat).
Skjoldnæs Fyr. H. Würtz, Fyrmester (1 fra 1 Nat).
Christiansø Fyr. H. M. Hansen, Fyrassistent (5 fra 3 Nætter).

Hammeren Fyr. A. M. Dam, Fyrmester (8 fra 2 Nætter).
Dueodde Fyr. C. Liisberg Poulsen, Fyrmester (4 fra 3 Nætter).
Møen Fyr. A. P. Eliassen, Fyrmester (1 fra 1 Nat).
Gedser Rev Fyrskib. K. E. Skovgaard, Styrmand (10 fra 4 Nætter).

De Fugle, der indkom til Zoologisk Museum som faldne i 1921, vare:

1. *Anas crecca* L. 1.
2. *Pagonetta glacialis* (L.) 1.
3. *Clangula glaucion* (L.) 1.
4. *Tachybaptes minor* (Gml.) 1.
5. *Colymbus glacialis* L. 1.
6. *Procellaria leucorrhoa* Vieill. 1.
7. *Fulmarus glacialis* (L.) 1.
8. *Rallus aquaticus* L. 2.
9. *Gallinula chloropus* (L.) 1.
10. *Fulica atra* L. 2.
11. *Vanellus cristatus* Wolf & M. 2 (5 faldt).
12. *Charadrius pluvialis* L. 1.
13. *Actitis hypoleuca* (L.) 1.
14. *Totanus glareola* (L.) 1.
15. *Tringa canutus* L. 2.
16. *Tringa alpina* L. 3.
17. *Limnocryptes gallinula* (L.) 7.
18. *Gallinago scolopacina* Bp. 1.
19. *Sterna macrura* Naum. 1.
20. *Falco æsalon* L. 1.
21. *Columba palumbus* L. 2.
22. *Cypselus apus* (L.) 5 (c. 53 faldt).
23. *Cuculus canorus* L. 1.
24. *Iynx torquilla* L. 2.
25. *Corvus monedula* L. 1.
26. *Corvus frugilegus* L. 1.
27. *Ampelis garrula* (L.) 4.
28. *Hirundo rustica* L. 1.
29. *Alauda arvensis* L. 145 (205 faldt).
30. *Sturnus vulgaris* L. 71 (104 faldt).
31. *Troglodytes parvulus* Koch 1.

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32. *Accentor modularis* (L.) 1.
33. *Parus major* L. 1.
34. *Sylvia cinerea* Bechst. 2.
35. *Sylvia curruca* (L.) 1.
36. *Sylvia atricapilla* (L.) 1.
37. *Sylvia hortensis* Bechst. 8.
38. *Hypolais icterina* (Vieill.) 2.
39. *Acrocephalus arundinaceus* (Lightf.) 2.
40. *Acrocephalus phragmitis* (Bechst.) 3.
41. *Phyllopseustes trochilus* (L.) 9.
42. *Phyllopseustes rufus* (Lath.) 2.
43. *Regulus cristatus* Koch 9 (11 faldt).
44. *Anthus pratensis* (L.) 1.
45. *Anthus obscurus* (Lath.) 1.
46. *Anthus arboreus* (Gml.) 3.
47. *Turdus iliacus* L. 65 (c. 224 faldt).
48. *Turdus musicus* L. 49 (c. 207 faldt).
49. *Turdus pilaris* L. 22 (27 faldt).
50. *Turdus merula* L. 50.
51. *Saxicola oenanthe* (L.) 12.
52. *Praticola rubetra* (L.) 1.
53. *Ruticilla phoenicura* (L.) 13.
54. *Erithacus rubecula* (L.) 17 (21 faldt).
55. *Muscicapa atricapilla* L. 13.
56. *Passer domesticus* (L.) 1.
57. *Fringilla coelebs* L. 3.
58. *Fringilla montifringilla* L. 6 (38 faldt).
59. *Chrysomitris spinus* (L.) 1.
60. *Carduelis elegans* Briss. 1.
61. *Cannabina linaria* (L.) 5.
62. *Emberiza schoeniclus* L. 6.
63. *Emberiza hortulana* L. 1.
64. *Emberiza citrinella* L. 1.
65. *Emberiza nivalis* L. 2.

Af de faldne var 1, nemlig *Colymbus glacialis*, ikke faldet ved Fyrene i Løbet af de foregaaende 35 Aar. Tallet paa de Arter, der ere faldne i Løbet af de sidste 36 Aar, er dermed naaet op til 178.

Fortegnelse over de Fugle, der ere indsendte fra Fyrene som faldne om Natten.

Hver Nat henregnes til den følgende Dag.

1. *Anas crecca.* Krikand.
September: *5te* Dueodde 1 ♂ jun.
2. *Pagonetta glacialis.* Havlit.
Februar: *3dje* Stevns 1 ♂ ad.
3. *Clangula glaucion.* Hvinand.
November: *5te* Sædenstrand 1 ♂ ad.
4. *Tachybaptes minor.* Lille Lappedykker.
Oktober: *2den* Vyl 1.
5. *Colymbus glacialis.* Islom.
November: *3dje* Anholt 1 ♂ ad.
6. *Procellaria leucorrhoa.* Stor Søsvale.
September: *13de* Vyl 1 ♂.
7. *Fulmarus glacialis.* Stormfugl.
August: *16de* Graadyb 1.
8. *Rallus aquaticus.* Vandrikse.
April: *2den* Kjels Nor 1 ♂. *4de* Hesselø 1 ♂.
9. *Gallinula chloropus.* Rørhøne.
November: *28de* Bovbjerg 1 ♂.
10. *Fulica atra.* Blishøne.
Oktober: *10de* Drogden 1 ♀ jun.
November: *28de* Bovbjerg 1.
11. *Vanellus cristatus.* Vibe.
Marts: *12te* Vyl 1 ♂ (Nakkehoved 1)[1]. *17de* (Lyngvig 2).
April: *3dje* Lyngvig 1 ♂.
12. *Charadrius pluvialis.* Hjejle.
August: *13de* Gedser Rev 1 ♀ ad.
13. *Actitis hypoleuca.* Mudderklire.
August: *28de* Lodbjerg 1 ♂.
14. *Totanus glareola.* Tinksmed.
April: *4de* Hesselø 1 ♀ ad.

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[1]) I Klammer er, efter Fyrmestrenes Oplysninger, vedføjet Tallet paa de faldne Fugle, naar dette er et andet end Tallet paa de indsendte; paa samme Maade anføres efter Fyrmestrenes Oplysninger Stære og Viber, selv om intet er indsendt.

15. *Tringa canutus.* Islandsk Ryle.
Juli: *30te* Lyngvig 1 ad.
August: *24de* Graadyb 1 ♀ jun.

16. *Tringa alpina.* Ryle.
Marts: *5te* Vyl 1 ♀ ad.
August: *30te* Gedser Rev 1 ♀ jun.
September: *30te* Dueodde 1 ♀ jun.

17. *Limnocryptes gallinula.* Enkelt Bekkasin.
Marts: *6te* Graadyb 1 ♂.
April: *4de* Hesselø 1 ♂.
Oktober: *1ste* Lodbjerg 1 ♂. *8de* Schultz's Grund 1 ♀ jun. *11te* Skagen 1 ♂. *12te* Lodbjerg 1 ♀ ad., Læsø Rende 1 ♂.

18. *Gallinago scolopacina.* Horsegøg.
April: *10de* Horns Rev 1 ♀ ad.

19. *Sterna macrura.* Havterne.
August: *4de* Anholt Knob 1 ♀ jun.

20. *Falco æsalon.* Dværgfalk.
Oktober: *19de* Graadyb 1 ♂ jun.

21. *Columba palumbus.* Ringdue.
Januar: *2den* Skjoldnæs 1.
April: *2den* Hesselø 1.

22. *Cypselus apus.* Mursejler.
Maj: *9de* Hanstholm 1 ♂.
August: *12te* Blaavands Huk 2 ♀ jun. *15de* Fornæs 2 ♂ jun. (c. 50 faldt).

23. *Cuculus canorus.* Gøg.
September: *5te* Dueodde 1 ♂.

24. *Iynx torquilla.* Vendehals.
Maj: *9de* Hanstholm 1 ♀.
August: *13de* Gedser Rev 1 ♀.

25. *Corvus monedula.* Allike.
Marts: *13de* Vyl 1 ♀.

26. *Corvus frugilegus.* Raage.
November: *1ste* Horns Rev 1 ♂ ad.

27. *Ampelis garrula.* Silkehale.
November: *22de* Hesselø 3 (1 ♀ ad., 2 ♀ jun.). *24de* Sejrø 1 ♀ jun.

28. *Hirundo rustica.* Landsvale.
Maj: *19de* Vyl 1.

29. *Alauda arvensis.* Lærke.

Januar: *4de* Læsø Rende 1 ♂. *8de* Schultz's Grund 1 ♂. *9de* Schultz's Grund 1 ♂. Gilleleje Flak N. 1 ♂. *10de* Vestborg 2 (1 ♂, 1 ♀ ad.). *30te* Gilleleje Flak N. 1 ♂. *31te* Schultz's Grund 1 ♂, Vestborg 1 ♂, Stevns 4 (2 ♂, 2 ♀), Æbelø 4 ♂.

Februar: *1ste* Anholt Knob 4 ♂, Hesselø 12 ♂ (32 faldt), Schultz's Grund 13 ♂, Hjelm 8 (7 ♂, 1 ♀ ad.), Gilleleje Flak N. 4 (3 ♂, 1 ♀ jun.), Sprogø 4 ♂ (11 faldt), Christiansø 1 ♂. *2den* Vestborg 2 (1 ♂, 1 ♀ ad.). *3dje* Stevns 1 ♂. *11te* Østre Flak 1 ♂.

Marts: *1ste* Læsø Trindel 8 (6 ♂, 2 ♀ jun), Schultz's Grund 1 ♂. *2den* Vyl 1 ♂, Læsø Rende 7 (5 ♂, 2 ♀ jun.), Schultz's Grund 1 ♂, Vestborg 5 (1 ♂, 2 ♀ ad., 2 ♀ jun.), Stevns 4 (3 ♀ ad., 1 ♀ jun.), Æbelø 4 (1 ♂, 3 ♀ jun.), Gedser Rev 5 (3 ♂, 2 ♀ jun.; 8 faldt). *6te* Graadyb 1 ♂. *7de* Anholt Knob 3 (2 ♂, 1 ♀ ad.; 4 faldt). *9de* Vyl 1 ♂. *10de* Vyl 1 ♀ ad., Læsø Trindel 2 (1 ♂, 1 ♀ jun), Læsø Rende 2 ♀ (3 faldt), Vestborg 1 ♀ jun., Drogden 1 ♀ ad. *11te* Anholt Knob 8 (4 ♂, 2 ♀ ad., 2 ♀ jun., 16 faldt). *16de* Drogden 1 ♂.

April: *3dje* Læsø Trindel 1 ♀ ad. *4de* Anholt Knob 1 ♀, Hesselø 1 ♀, Schultz's Grund 1 ♀.

Oktober: *9de* Læsø Trindel 1 ♂. *10de* Skagen 2 (1 ♂, 1 ♀ jun.; 16 faldt), Østre Flak 1 ♂. *11te* Lyngvig 1 ♂. *12te* Lodbjerg 1 ♀ jun. *13de* Graadyb 1 ♂, Blaavands Huk 1 ♂, Vyl 3 ♂, Horns Rev 1 ♂. *23de* Hesselø 2 ♂ (10 faldt).

November: *3dje* Graadyb 1 ♂. *11te* Graadyb 1 ♀. *24de* Vyl 1 ♂.

30. *Sturnus vulgaris.* Stær.

Februar: *15de* Vyl 1 ♂, Horns Rev 1 ♀ ad. *16de* Vyl 1 ♀ ad., Horns Rev 1 ♂. *17de* Vyl 1 ♀ ad. *18de* (Skjoldnæs 1). *28de* Vyl 1 ♂.

Marts: *1ste* Vyl 1 ♂, Horns Rev 1 ♂, Læsø Trindel 2 (1 ♂, 1 ♀). *2den* Horns Rev 1 ♂, (Skjoldnæs 2). *6te* Graadyb 1 ♂, Horns Rev 3 (1 ♂, 2 ♀). *7de* Gedser Rev 2 (1 ♂, 1 ♀ jun.). *8de* Vyl 1 ♂. *9de* Graadyb 1 ♂, Lodbjerg 3 (2 ♂, 1 ♀ ad.). *10de* Graadyb 1 ♀, Blaavands Huk 5 (14 faldt), Vyl 1 ♂, Læsø Rende 1 ♂, (Østre Flak 1), Vestborg 1 ♂. *11te* Vyl 1 ♂. *14de* Vyl 1 ♂, Horns Rev 1 ♂. *15de* Vyl 1 ♀ ad. *16de* Vyl 1 ♂. *17de* Vyl 5 (2 ♂, 3 ♀ ad.), Horns Rev 4 (3 ♂, 1 ♀ ad.), (Lyngvig 2), Lodbjerg 1 ♂. *18de* Vyl 1 ♀ ad., Horns Rev 2 (1 ♂, 1 ♀ ad.). *19de* Vyl 1 ♂. *31* Vyl 1 ♀ jun.

April: *1ste* Vyl 1 ♂, Horns Rev 2 ♀ jun., (Stevns 2), (Kjels Nor 1). *2den* Vyl 1 ♀ ad. *3dje* Vyl 1 ♀ jun. *4de* (Rubjerg Knude 2), Hirtsholmene 1 ♂, Hesselø 1 ♂.

Oktober: *7de* (Kjels Nor 1). *8de* (Dueodde 2). *10de* (Hesselø 2). *11te* (Kjels Nor 3). *12te* Skagen 1 ♂. *13de* Blaavands Huk 1 ♀ jun. *20de* Horns Rev 1 ♂ jun. (3 faldt). *22de* (Østre Flak 1). *23de* Læsø Rende 2 (1 ♂, 1 ♀ jun.), Hesselø 2 ♂. *27de* (Kjels Nor 1). *30te* Vyl 1 ♀ ad. *31te* Graadyb 4 (2 ♂, 2 ♀ ad.), Vyl 1 ♂, (Skjoldnæs 1).

31. *Troglodytes parvulus.* Gærdesmutte.
Oktober: *5te* Gilleleje Flak N. 1.

32. *Accentor modularis.* Jernspurv.
Maj: *8de* Graadyb 1.

33. *Parus major.* Musvit.
Oktober: *22de* Vyl 1 ♂.

34. *Sylvia cinerea.* Tornsanger.
August: *12te* Blaavands Huk 2 ♂.

35. *Sylvia curruca.* Gærdesanger.
Maj: *7de* Hanstholm 1 ♀.

36. *Sylvia atricapilla.* Munkesanger.
Oktober: *8de* Vyl 1 ♀.

37. *Sylvia hortensis.* Havesanger.
Maj: *29de* Kjels Nor 1 ♂.
August: *12te* Blaavands Huk 4 (2 ♂, 1 ♀ ad., 1 ♀ jun.), Kjels Nor 1 ♂.
September: *6te* Hammeren 1 ♂.
Oktober: *1ste* Lodbjerg 1 ♂.

38. *Hypolais icterina.* Gulbug.
Juli: *30te* Lyngvig 1 ♀.
August: *12te* Kjels Nor 1.

39. *Acrocephalus arundinaceus.* Rørsanger.
August: *12te* Kjels Nor 1 ♂.
Oktober: *1ste* Lodbjerg 1.

40. *Acrocephalus phragmitis.* Sivsanger.
Maj: *9de* Kjels Nor 2 ♂.
August: *12te* Kjels Nor 1 ♂.

41. *Phyllopseustes trochilus.* Løvsanger.
Maj: *4de* Gilleleje Flak N. 1 ♂. *7de* Vyl 3. *9de* Læsø Rende 1 ♂.
August: *12te* Blaavands Huk 3 ♀ jun.
September: *5te* Christiansø 1 ♀ ad.

42. *Phyllopseustes rufus.* Gransanger.
September: *5te* Christiansø 1 ♂.
Oktober: *13de* Blaavands Huk 1 ♂.

43. *Regulus cristatus.* Fuglekonge.
April: *4de* Anholt Knob 1 ♂, Schultz's Grund 1 ♀.
Oktober: *10de* Skagen 2 ♂ (4 faldt). *11te* Schultz's Grund 1 ♀. *12te* Dueodde 1 ♂. *13de* Læsø Rende 2 (1 ♂, 1 ♀). *21de* Gilleleje Flak N. 1 ♀.

44. *Anthus pratensis.* Engpiber.
September: *9de* Vyl 1 ♀ jun.

45. *Anthus obscurus.* Skærpiber.
Marts: *10de* Vyl 1 ♂.

46. *Anthus arboreus.* Træpiber.
Maj: *3dje* Vyl 1. *8de* Horns Rev 1.
September: *5te* Hammeren 1 ♀ ad.

47. *Turdus iliacus.* Vindrossel.
Marts: *17de* Vyl 5 (4 ♂, 1 ♀ jun.), Horns Rev 1 ♀ jun., Lodbjerg 1 ♂. *18de* Horns Rev 4 (2 ♂, 2 ♀ ad.).
April: *1ste* Vyl 1 ♂. *3dje* Læsø Trindel 1 ♀ ad. *4de* Hirtsholmene 2 (1 ♂, 1 ♀ jun.), Anholt Knob 2 ♂, Hesselø 5 (3 ♂, 2 ♀ jun.; 18 faldt).
Oktober: *9de* Horns Rev 1 ♂. *10de* Vyl 1 ♀ jun., Skagen 1 ♂ (c. 50 faldt), Hirtsholmene 1 ♂. *12te* Horns Rev 1 ♀ ad. (3 faldt), Lyngvig 12 (4 ♂, 8 ♀ jun.), Lodbjerg 3 (1 ♀ ad., 2 ♀ jun.), Skagen 1 ♀ ad. (c. 50 faldt), Læsø Rende 2 ♀ jun. *13de* Blaavands Huk 1 (25 faldt), Vyl 7 (4 ♂, 2 ♀ ad., 1 ♀ jun.), Horns Rev 1 ♀ jun. (10 faldt), Læsø

Rende 3♂. *14de* Vyl 1♀jun., Læsø Trindel 2♀jun. *23de* Graadyb 1♀jun., Hesselø 2 (1♂, 1♀ad., c. 15 faldt), Schultz's Grund 1♂, Gilleleje Flak N. 1♂.

48. *Turdus musicus.* Sangdrossel.

April: *1ste* Vyl 1♂jun. *2den* Kjels Nor 1♂. *3dje* Lyngvig 6 (5♂, 1♀). *4de* Hirtsholmene 1♂, Anholt Knob 2 (1♂, 1♀jun.), Hesselø 1♂, Schultz's Grund 1♂ad., Gilleleje Flak N. 1♀ad. *5te* Møen 1♀ad.

Maj: *5te* Gilleleje Flak N. 1♀. *6te* Vyl 2♂. *7de* Horns Rev 1, Hanstholm 1♀. *8de* Vyl 2♀, Hirtsholmene 1♀. *9de* Læsø Rende 1♂.

September: *26de* Vyl 1♂. *28de* Graadyb 1♂.

Oktober: *9de* Vyl 1♂ad., Horns Rev 2♂jun., Gilleleje Flak N. 1♂. *10de* Skagen 2 (1♂ad., 1♀ad.; c. 100 faldt), Hirtsholmene 2 (1♂jun., 1♀jun.), Schultz's Grund 1♂. *11te* Vyl 1♂ad. *12te* Lyngvig 3 (1♂ad., 1♂jun., 1♀jun.), Skagen 2 (1♂jun., 1♀jun., c. 50 faldt). *13de* Vyl 2♂jun. *23de* Hesselø 3 (1♂ad., 1♀ad., 1♀jun.; c. 15 faldt), Schultz's Grund 3 (1♂jun., 1♀ad., 1♀jun.).

49. *Turdus pilaris.* Sjagger.

Januar: *1ste* Østre Flak 1♀jun. (2 faldt). *4de* Horns Rev 2♂ (6 faldt). *6te* Horns Rev 3 (1♂, 2♀jun.). *11te* Læsø Rende 1♂. *13de* Vyl 1♀, Vestborg 1♂. *14de* Vyl 1♂. *31te* Stevns 1♀jun.

Februar: *9de* Vyl 1♂.

Marts: *17de* Vyl 1♂.

April: *4de* Schultz's Grund 2.

Maj: *8de* Graadyb 1♂, Hirtsholmene 1♂.

Oktober: *23de* Hesselø 1♀jun., *28de* Horns Rev 1♂.

November: *21de* Vyl 1♀ad. *23de* Hesselø 1♀ad. *24de* Sejrø 1♀jun.

50. *Turdus merula.* Solsort.

Januar: *4de* Horns Rev 1♂. *21de* Vyl 1♂.

Marts: *1ste* Vyl 3 (2♂, 1♀jun.), Horns Rev 2♂. *2den* Horns Rev 1♂. Læsø Rende 1♂. *6te* Graadyb 2 (1♂ad., 1♂jun.), Vyl 1♀ad. *7de* Vyl 1♂ad. *9de* Lodbjerg 1♀jun. *10de* Blaavands Huk 1♂, Horns Rev 1♀, Læsø Trindel 1♀ad. *17de* Vyl 13 (5♂ad., 8♀), Horns Rev 3 (1 ♂ ad., 1 ♀ ad., 1 ♀ jun.), Lodbjerg 1 ♀ ad. *18de* Vyl 1 ♀ ad., Horns Rev 1 ♂ ad. *31te* Horns Rev 1 ♂ ad.

April: *1ste* Vyl 2 ♀ jun., Horns Rev 1 ♂ ad. *3dje* Lyngvig 2 (1 ♂, 1 ♀). *4de* Hirtsholmene 2 (1 ♂ ad., 1 ♀ jun.), Anholt Knob 1 ♂.

Oktober: *13de* Horns Rev 1 ♀ ad. *23de* Læsø Rende 1 ♀ jun. *31te* Graadyb 1 ♀ jun.

November: *7de* Graadyb 1 ♂, Vyl 1 ♀ jun.

51. *Saxicola oenanthe.* Stenpikker.

April: *3dje* Lyngvig 1 ♂.

Maj: *7de* Vyl 5 (2 ♂, 3 ♀), Horns Rev 1 ♂, Hanstholm 1 ♂. *9de* Vyl 1 ♂. *12te* Vyl 1 ♂.

September: *7de* Vyl 1 ♀. *29de* Vyl 1 ♀ jun.

52. *Praticola rubetra.* Bynkefugl.

September: *5te* Vyl 1 ♀ jun.

53. *Ruticilla phoenicura.* Rødstjert.

Maj: *7de* Vyl 2 ♂. *9de* Læsø Rende 1 ♂.

August: *25de* Graadyb 1 ♀.

September: *2den* Schultz's Grund 1 ♂. *5te* Drogden 1 ♀, Hammeren 4 (2 ♂, 2 ♀). *6te* Christiansø 1 ♂, Hammeren 1 ♂. *19de* Vyl 1 ♂.

54. *Erithacus rubecula.* Rødkælk.

April: *3dje* Læsø Trindel 1 ♂. *4de* Hirtsholmene 1 ♂ jun., Schultz's Grund 2 (1 ♂ ad., 1 ♂ jun.), Gilleleje Flak N. 1 ♀ jun. *24de* Gilleleje Flak N. 2 ♀ jun.

Maj: *1ste* Anholt Knob 1. *8de* Gilleleje Flak N. 1.

Oktober: *10de* Skagen 2 ♀ jun. (6 faldt). *12te* Lyngvig 2 (1 ♂ jun., 1 ♀ jun.), Lodbjerg 1 ♂ jun., Læsø Rende 1 ♂ jun. *14de* Læsø Trindel 1 ♂ jun. *23de* Læsø Rende 1 ♂ jun.

55. *Muscicapa atricapilla.* Broget Fluesnapper.

Maj: *7de* Kjels Nor 1 ♂. *8de* Gilleleje Flak N. 2 ♂. *9de* Hanstholm 1 ♀.

August: *12te* Blaavands Huk 7 (5 ♂, 2 ♀ jun.). *26de* Graadyb 1 ♀.

September: *5te* Hammeren 1 ♀.

56. *Passer domesticus.* Spurv.

September: *6te* Christiansø 1 ♀.

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57. *Fringilla coelebs.* Bogfinke.

September: *15de* Schultz's Grund 1 ♀.

Oktober: *16de* Graadyb 1 ♀. *19de* Graadyb 1 ♂.

58. *Fringilla montifringilla.* Kvækerfinke.

April: *4de* Hirtsholmene 1 ♂. *26de* Vyl 1 ♀.

Oktober: *10de* Skagen 1 ♂ (32 faldt). *12te* Lyngvig 1 ♂ ad. *23de* Horns Rev 1 ♀ (2 faldt), Læsø Rende 1 ♀ jun.

59. *Chrysomitris spinus.* Sisken.

November: *12te* Vyl 1 ♂.

60. *Carduelis elegans.* Stillics.

Maj: *12te* Helnæs 1 ♂.

61. *Cannabina linaria.* Graasisken.

November: *13de* Vyl 1. *14de* Vyl 2. *15de* Vyl 1. *23de* Graadyb 1.

62. *Emberiza schoeniclus.* Rørverling.

April: *4de* Schultz's Grund 1 ♂.

Maj: *8de* Hirtsholmene 1 ♂. *9de* Læsø Rende 1 ♂.

Oktober: *9de* Horns Rev 1 ♀ jun. *14de* Læsø Trindel 1 ♀. *18de* Graadyb 1 ♂ jun.

63. *Emberiza hortulana.* Hortulanverling.

Maj: *8de* Hirtsholmene 1 ♂.

64. *Emberiza citrinella.* Gulspurv.

Oktober: *18de* Schultz's Grund 1 ♂.

65. *Emberiza nivalis.* Snespurv.

November: *23de* Hesselø 1 ♂. *24de* Sejrø 1 ♀ jun.

Oversigt over de Nætter da Fugle ere komne til Fyrene.

Hver Nat henregnes til den følgende Dag. — Tallet efter Vindretningen betegner Vindstyrken efter Beauforts Skala (0—12), hvor

1 betyder	: Let Brise.		7 betyder	: Trerebet Merssejlskuling.	
2	—	: Laber Bramsejlskuling.	8	—	: Klosrebet Merssejlskuling.
3	—	: Bramsejlskuling.	9	—	: Undersejlskuling eller Storm.
4	—	: Merssejlsskuling.	10	—	: Haard Storm.
5	—	: Rebet Merssejlskuling.	11	—	: Orkanagtig Storm.
6	—	: Torebet Merssejlskuling.	12	—	: Orkan.

Andre Forkortelser: R. = Regn, Tg. = Taage, Ov. = Overtrukket, Sk. = Skyet, D = Dis.

1ste Januar.

Østre Flak. S.S.Ø. 4. Sne. Enkelte Fugle ved Fyret hele Natten; 2 Sjaggere faldt. *Anholt.* S.Ø. Haard Kuling. Sne. Sjaggere ved Fyret; 26 faldt, intet indsendt.

Turdus pilaris. Østre Flak 1 (2 faldt).

2den Januar.

Læsø Trindel. S. 3. Ov. Tg. Nogle Smaafugle ved Ruderne før Midnat; ingen faldt. *Østre Flak.* S. 1. Tg. Endel Smaafugle ved Fyret hele Natten. *Skjoldnæs.* V. S. V.—S. 2. Ov. Tg. 1 Ringdue faldt.

Columbus palumbus. Skjoldnæs 1.

3dje Januar.

Lyngvig. S.S.V. 2. Ov. Nogle Drosler og en enkelt Stær ved Ruderne. *Sprogø.* S. 1. R. D. Store Flokke Kramsfugle ved Fyret; ingen faldt. *Gedser Rev.* N.V. 2. Ov. Enkelte Smaafugle ved Fyret.

4de Januar.

Vyl. S.S.V. 3. Graat. Endel Lærker og Drosler ved Fyret. *Horns Rev.* S.S.V. 4. Ov. R. Mange Fugle ved Fyret; 7 faldt. *Lyngvig.* S. 5. Ov. R. Tg. Endel Drosler om Fyret; 1 Stær ved Ruderne. *Læsø Rende.* S.V. 2. Ov. D. Enkelte Smaafugle ved Fyret; 1 Lærke faldt. *Omø.* V. 1. 2 Lærker faldt; ikke inds. *Skjoldnæs.* N.V. 3. Ov. R. D. Træk af Drosler; 1 faldt men ikke indsendt.

Alauda arvensis. Læsø Rende 1.
Turdus pilaris. Horns Rev 2.
Turdus merula. Horns Rev 1.

5te Januar.

Lyngvig. N. 3. Ov. R. D. Omkr. 20 Drosler om Fyret; 3 faldt ikke indsendte. *Læsø Trindel.* Vind 0, senere S. 3. Ov. Tg. Fugle ved Fyret før Midnat; ingen faldt. *Østre Flak.* S.V. 3. Tg. Endel Smaafugle ved Fyret hele Natten.

6te Januar.

Vyl. S.V. 3. Sk. Enkelte Drosler og Stære ved Fyret. *Horns Rev.* S.S.V. 3. Klart. Mange Fugle ved Fyret; 3 Sjaggere faldt. *Schultz's Grund.* S.V. 2. Tg. Endel Fugle ved Fyret. *Nakkehoved.* S.S.V. 3. Ov. D. 1 Lærke faldt, ikke inds. *Hyllekrog.* V.S.V. 2. D. Endel Smaafugle omkring Fyret fra Kl. 3 til Daggry.

Turdus pilaris. Horns Rev 3.

7de Januar.

Hanstholm. S.S.Ø. 2. R. Endel Sjaggere ved Fyret om Natten.

8de Januar.

Schultz's Grund. V.S.V. 3. D. Enkelte Fugle ved Fyret; 1 Lærke faldt. *Stevns.* S.V. 2. Ov. D. Nogle Sjaggere omkring Fyret fra Kl. 2 til 6 Form. *Gedser Rev.* S. 1. Ov. Enkelte Kramsfugle ved Fyret.

Alauda arvensis. Schultz's Grund 1.

9de Januar.

Rubjerg Knude. S.V. 4. F. Tg. Mange Smaafugle ved Fyret; 1 Han-Bogfinke faldt, ikke inds. *Anholt Knob.* S.S.V. 5. Sk. 1 Lærke faldt, ikke inds. *Schultz's Grund.* S. V. 4. D. Enkelte Fugle ved Fyret; 1 Lærke faldt. *Gilleleje Flak N.* S.V. 5. R. Enkelte Fugle ved Fyret; 1 Lærke faldt.

Alauda arvensis. Schultz's Grund 1, Gilleleje Flak N. 1.

10de Januar.

Lodbjerg. V. 5. Ov. D. 2 Stære paa Ruderne. *Læsø Trindel.* S.Ø. 5. R. Fugle ved Fyret før Midnat; ingen faldt. *Vestborg.* V.S.V. 6. Ov. Tg. 2 Lærker faldt.

Alauda arvensis. Vestborg 2.

11te Januar.

Læsø Trindel. N.Ø. 4. Sne. Nogle Fugle ved Fyret før Midnat; ingen faldt. *Læsø Rende.* N.Ø. 4. Ov. R. Sne. En Mængde orskellige Fugle ved Fyret; flere faldt i Vandet, 1 Sjagger faldt paa Dækket. *Anholt Knob.* S. 2. Sne. Mange Fugle ved Fyret fra Kl. 8 til 9; 2 Drosler faldt, ikke indsendte.

Turdus pilaris 1.

13de Januar.

Vyl. S.S.Ø. 3. R. Mange Drosler om Fyret; 1 Sjagger faldt. *Sejrø.* S.Ø. 2. Ov. R. D. 1 Drossel og 1 Lærke faldt, ikke indsendte. *Vestborg.* Ø.S.Ø. 3. O. D. Mange Fugle om Fyret; 1 Sjagger faldt. *Kjels Nor.* V.—S.Ø. 5. Ov. R. 1 Drossel faldt, ikke indsendt.

Turdus pilaris. Vyl 1, Vestborg 1.

14de Januar.

Vyl. N.N.Ø. 2. Sk. Mange Drosler om Fyret om Morgenen; 1 Sjagger faldt. *Stevns.* N.N.V. 3. Ov. En Lærke ved Ruderne Kl. 12. *Gedser Rev.* N.N.V. 3. R. Mange Smaafugle omkring Fyret.

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Turdus pilaris. Vyl 1.

21de Januar.

Vyl. S.Ø. 5. Ov. Enkelte Solsorter ved Fyret, 1 faldt.

Turdus merula 1.

26de Januar.

Rubjerg Knude. S.V. 2. R. D. Enkelte Drosler ved Fyret; 1 faldt, ikke indsendt.

30te Januar.

Lyngvig. V.S.V. 5. Ov. D. Nogle faa Stære ved Ruderne; 1 Hjejle hørtes. *Bovbjerg.* S.V. 4. Ov. Tg. Mange Stære paa Ruderne. *Gilleleje Flak N.* S.V. 3. Tg. Enkelte Lærker ved Fyret; 1 faldt. *Omø.* V. 4. D. 2 Lærker faldt, ikke indsendte. *Møen.* V. 3. Ov. D. 1 Stær paa Ruderne.

Alauda arvensis. Gilleleje Flak N. 1.

31te Januar.

Graadyb. S.S.V. 2. R. 1 Stær ved Skibet. *Horns Rev.* S. 1. Ov. Flere Smaafugle ved Fyret. *Schultz's Grund.* S.V. 3. Tg. Enkelte Fugle ved Fyret; 1 Lærke faldt. *Vestborg.* S.V. 3. Ov. D. Mange Fugle om Fyret; 1 Lærke faldt. *Stevns.* S.V. 3. Ov. R. Enkelte Stære og nogle Lærker ved Fyret fra Kl. 9 til 12; 5 Fugle faldt. *Omø.* V.S.V. 3. R. D. 2 Lærker faldt, ikke indsendte. *Kjels Nor.* S.V. 4. Ov. 2 Lærker faldt, ikke indsendte. *Æbelø.* 4 Lærker faldt. *Skjoldnæs.* S.V. 4. Ov. R. D. Flere Smaafugle ved Lanterneruderne.

Alauda arvensis. Schultz's Grund 1, Vestborg 1, Stevns 4, Æbelø 4.

Turdus pilaris. Stevns 1.

1ste Februar.

Horns Rev. Vind 0. Klart. Flere Lærker ved Fyret. *Lyngvig.* S. 2. Ov. D. Enkelte Lærke og Stære ved Ruderne. *Bovbjerg.* S.V. 5. Ov. D. Mange Stære paa Ruderne. *Lodbjerg.* S. 1. Ov. D. 1 Vindrossel paa Ruderne; 1 Lærke faldt, ikke indsendt. *Læsø Trindel.* S.Ø. 4. Ov. Fugle ved Fyret før Midnat; ingen faldt. *Læsø Rende.* Vind 0. Tg. En Mængde Smaafugle ved Fyret; 4 Lærker faldt, ikke indsendte. *Anholt Knob.* Vind 0. D. Endel Smaafugle ved Fyret om Morgenen fra Kl. 3 til 4; 4 Lærker faldt. *Hesselø.* S.S.V. 2. Ov. D. Mange Lærker omkring Fyret; 32 faldt. *Schultz's Grund.* S. D. c. 200 Lærker ved Fyret; 13 faldt paa Dækket, c. 50 i Vandet. *Hjelm.* V.S.V.—S. 1. Ov. D. 8 Lærker faldt. *Sejrø.* S. 2. Ov. D. Mange Smaafugle om Lanternen; 12 Lærker faldt, ikke indsendte. *Gilleleje Flak N.* Vind 0. Tg. Enkelte Lærker ved Fyret, 4 faldt. *Sprogø.* S. 1. D. Mange Lærker ved Ruderne; 11 faldt. *Kjels Nor.* S.—S.Ø. 2. Ov. Endel Drosler ved Ruderne; ingen faldt. *Skjoldnæs.* S.S.V. 3. Ov. D. Enkelte Stære og Lærker ved Ruderne; 1 Lærke faldt, ikke indsendt. *Christiansø.* S.V. 1. D. Tg. En Flok Lærker ved Fyret; 1 faldt.

Alauda arvensis. Anholt Knob 4, Hesselø 12 (32 faldt), Schultz's Grund 13, Hjelm 8, Gilleje Flak N. 4, Sprogø 4 (11 faldt), Christiansø 1.

2den Februar.

Østre Flak. S.S.Ø. 4. Tg. Endel Smaafugle ved Fyret; ingen faldt. *Vestborg.* Ø.S.Ø. 4. Ov. D. Mange Smaafugle ved Fyret om Natten; 2 Lærker faldt. *Sprogø.* S.V. 3. D. Endel Lærker ved Ruderne.

Alauda arvensis. Vestborg 2.

3dje Februar.

Hanstholm. Ø. 3. Ov. Nogle Knortegæs omkring Fyret; 3 faldt, intet indsendt. *Anholt.* Ø. 5. Enkelte Sjaggere ved Lanternen. *Stevns.* Ø. 6. R. D. Enkelte Fugle om Fyret; 1 Havlit og 1 Lærke faldt.

Pagonetta glacialis. Stevns 1.
Alauda arvensis. Stevns 1.

4de Februar.

Skjoldnæs. Ø.S.Ø. 3. Ov. Enkelte Stære ved Ruderne.

9de Februar.

Vyl. Vind 0. Graat. En Sjagger faldt.

Turdus pilaris 1.

10de Februar.

Østre Flak. N. 2. Sne. Endel Smaafugle ved Fyret; ingen faldt.

11te Februar.

Østre Flak. V. 3. Ov. Enkelte Smaafugle ved Fyret; 1 Lærke faldt.

Alauda arvensis 1.

13de Februar.

Skjoldnæs. V.N.V. 4. Ov. En Stær ved Ruderne; 1 Lærke faldt, ikke inds.

15de Februar.

Vyl. V. 1. R. Enkelte Stære ved Fyret, 1 faldt. *Horns Rev.* V. 2. Ov. R. Flere Stære ved Fyret, 1 faldt.

Sturnus vulgaris. Vyl 1. Horns Rev 1.

16de Februar.

Vyl. N.V. 4. Letsk. 1 Stær faldt. *Horns Rev.* V. 5. Ov. R. 1 Stær faldt.

Sturnus vulgaris. Vyl 1, Horns Rev 1.

17de Februar.

Vyl. N.N.V. 2. Sk. Viber hørtes om Natten og endel saas om Morgenen flyve mod Ø.; 1 Stær faldt. *Bovbjerg.* S.V. 5. Ov. D. Mange Stære paa Ruderne. *Schultz's Grund.* S.V. D. Tg. Enkelte Lærker ved Fyret.

Sturnus vulgaris. Vyl 1.

18de Februar.

Horns Rev. N.N.V. 2. Ov. Mange Smaafugle ved Fyret. *Skjoldnæs.* N. 4. Ov. 1 Stær faldt, ikke inds.

Sturnus vulgaris. (Skjoldnæs 1).

20de Februar.

Østre Flak. Vind 0. Tg. Enkelte Smaafugle, bl. a. Stære, ved Fyret; ingen faldt.

24de Februar.

Horns Rev. S.S.Ø. 2. Klart. Omkr. 10 Raager ved Fyret.

28de Februar.

Vyl. V. 3. Sk. 1 Stær faldt. *Kjels Nor.* V. 4. Ov. En Flok Stære ved Ruderne; ingen faldt. *Skjoldnæs.* V. 4. Ov. R. 1 Stær ved Ruderne.

Sturnus vulgaris. Vyl 1.

1ste Marts.

Vyl. V. 3. Sk. 4 Fugle faldt. *Horns Rev.* V.S.V. 3. Ov. Enkelte Stære og Solsorter ved Fyret; 3 Fugle faldt. *Lyngvig.* V.S.V. 4. Ov. D. En Flok Viber om Fyret. *Læsø Trindel.* S.V. 4. Ov. Fugle ved Fyret hele Natten; 10 faldt. *Schultz's Grund.* S.V. 1. Tg. Enkelte Lærker ved Fyret, 1 faldt. *Kjels Nor.* S.V. 4. Ov. 2 Solsorter, 1 Drossel, 1 Sjagger og 3 Lærker faldt, intet indsendt. *Skjoldnæs.* V.N.V. 4. Ov. Stære og Solsorter v. Lanterneruderne; 1 Solsort faldt, ikke inds. *Dueodde.* V. 5. Ov. D. Enkelte Stære paa Ruderne.

Alauda arvensis. Læsø Trindel 8, Schultz's Grund 1.
Sturnus vulgaris. Vyl 1, Horns Rev 1, Læsø Trindel 2.
Turdus merula. Vyl 3, Horns Rev 2.

2den Marts.

Vyl. V. 3. R. 1 Lærke faldt. *Horns Rev.* S.V. 3. Sk. Enkelte Stære og Solsorter ved Fyret; 2 Fugle faldt. *Lodbjerg.* S.V. 5. Ov. D. Endel Stære paa Ruderne. *Hanstholm.* S.V. 4. Ov. Enkelte Stære og endel Viber omkring Fyret. *Læsø Rende.* S.V. 4. Ov. Et Par Viber og flere andre Fugle vare om Fyret hele Natten; 8 faldt. *Østre Flak.* S.V. 3. Ov. Enkelte Smaafugle ved Fyret hele Natten; ingen faldt. *Schultz's Grund.* S.V. 3. D. Enkelte Lærker ved Fyret, 1 faldt. *Hjelm.* V.S.V. 5. Ov. D. Enkelte Stære ved Ruderne. *Nakkehoved.* S.S.V. 3. Ov. D. 2 Lærker faldt, ingen indsendt. *Vestborg.* S.V. 5. Ov. D. Mange Smaafugle om Fyret; 5 Lærker faldt. *Stevns.* S.V.—V.S.V. 2—3. D. Mange Stære og Lærker ved Fyret fra Kl. 12 til Daggry; 4 Lærker faldt. *Omø.* S.V. 4. D. 8 Lærker faldt, ingen indsendt. *Æbelø.* 4 Lærker faldt. *Helnæs.* V. 6. Ov. 1 Stær paa Ruderne. *Skjoldnæs.* S. V. 4. Ov. D. Omkr. 50 Lærker og 4 Solsorter vare hele Natten ved Ruderne; 2 Stære faldt, intet indsendt. *Gedser Rev.* S.S.V. 3. Ov. Mange Smaafugle ved Fyret; 8 Lærker faldt.

Alauda arvensis. Vyl 1, Læsø Rende 7, Schultz's Grund 1, Vestborg 5, Stevns 4, Æbelø 4, Gedser Rev 5 (8 faldt).
Sturnus vulgaris. Horns Rev 1, (Skjoldnæs 2).
Turdus merula. Horns Rev 1, Læsø Rende 1.

5te Marts.

Vyl. V.N.V. 3. Klart. 1 Ryle faldt.

Tringa alpina 1.

6te Marts.

Graadyb. S.S.V. 2. R. Mange Viber og Smaafugle ved Skibet; 5 faldt. *Vyl.* S.V. 3. R. Endel Smaafugle ved Fyret; 1 Solsort faldt. *Horns Rev.* S.Ø.—S.V. 3. R. D. Flere Fugle ved Fyret; 3 Stære faldt. *Østre Flak.* S.S.Ø. 3. Sne. Enkelte Smaafugle ved Fyret hele Natten, ingen faldt.

Limnocryptes gallinula. Graadyb 1.
Alauda arvensis. Graadyb 1.
Sturnus vulgaris. Graadyb 1, Horns Rev 3.
Turdus merula. Graadyb 2, Vyl 1.

7de Marts.

Vyl. N.N.Ø. 3. Halvklart. Endel Lærker og Solsorter ved Fyret; 1 Solsort faldt. *Anholt Knob.* N. 4. R. Sne. Enkelte Fugle ved Fyret; 4 Lærker faldt. *Stevns.* S.V. 3. Ov. R. Nogle Stære, Lærker, Strandskader og Ryler om Fyret fra Kl. 12 til Daggry. *Skjoldnæs.* V.S.V. 4. Ov. D. R. Enkelte Stære ved Ruderne. *Gedser Rev.* N.N.V. 4. Ov. Enkelte Smaafugle ved Fyret; 2 Stære faldt.

Alauda arvensis. Anholt Knob 3 (4 faldt).
Sturnus vulgaris. Gedser Rev 2.
Turdus merula. Vyl 1.

8de Marts.

Vyl. S.V. 3. Tætsk. Endel Stære og Lærker ved Fyret; 1 Stær faldt. *Kjels Nor.* S.V.—V.—N. 2—6. Ov. Drosler, Stære og Solsorter v. Ruderne.

Sturnus vulgaris. Vyl 1.

9de Marts.

Graadyb. S.V. 2. Ov. Træk af Viber og Smaafugle; 1 Stær faldt. *Vyl.* S.V. 2. Graat. 1 Lærke faldt. *Horns Rev.* S.V. 3. Sk. Flere forskellige Fugle ved Fyret. *Lyngvig.* S.V. 4. Ov. D. Mange Stære ved Ruderne; Viber saas. *Lodbjerg.* S.V. 4. Ov. D. Endel Stære paa Ruderne; 4 Fugle faldt. *Nakkehoved.* S.S.V. 3. Ov. D. Smaafugle ved Fyret; 2 Lærker faldt, ikke indsendte. *Stevns.* S.V. 3. Ov. D. Nogle Stære og Lærker ved Fyret fra Kl. 11 til Daggry.

Alauda arvensis. Vyl 1.
Sturnus vulgaris. Graadyb 1, Lodbjerg 3.
Turdus merula. Lodbjerg 1.

10de Marts.

Graadyb. S.V. 3. Ov. Træk af Smaafugle; 1 Stær faldt. *Blaavands Huk.* S.V. 4. D. 15 Fugle faldt. *Vyl.* S.V. 2. Sk. Mange Stære ved Fyret; 3 Fugle faldt. *Horns Rev.* S.V. 3. Sk. Flere Fugle ved Fyret; 1 Solsort faldt. *Lyngvig.* S.V. 4. Ov. D. Mange Stære og Viber om Lanternen. *Bovbjerg.* S.V. 3. Ov. D. Mange Stære paa Ruderne. *Hanstholm.* S.V. 4. Ov. Endel Stære om Ruderne; flere faldt, ingen inds. *Læsø Trindel.* S.V. 5. Ov. Fugle ved Fyret hele Natten; 3 faldt. *Læsø Rende.* S.V. 3. Ov. 4 Fugle faldt. *Østre Flak.* S.V. 2. Ov. Enkelte Smaafugle ved Fyret hele Natten; 1 Stær og 1 Lærke faldt, intet indsendt. *Hjelm.* V.S.V. 4. D. Flere Smaafugle mod Ruderne; 3 faldt, ikke indsendte. *Vestborg.* S.S.V. 4. D. Ov. 2 Fugle faldt. *Drogden.* S.V. 2. Sk. Flere Lærker ved Fyret; 1 faldt. *Kjels Nor.* S.S.V. 5. Ov. Drosler og Stære ved Ruderne; 2 Drosler faldt, ikke indsendte. *Skjoldnæs.* S.V. 3. Ov. D. Mange Stære ved Ruderne.

(1921.)

Alauda arvensis. Vyl 1, Læsø Trindel 2, Læsø Rende 2 (3 faldt, Vestborg 1), Drogden 1.

Sturnus vulgaris. Graadyb 1, Blaavands Huk 5 (14 faldt), Vyl 1, Læsø Rende 1, (Østre Flak 1), Vestborg 1.

Turdus merula. Blaavands Huk 1, Horns Rev 1, Læsø Trindel 1.

11te Marts.

Vyl. S. 2. Klart. 1 Stær faldt. *Anholt Knob.* S.Ø. 3. Sk. Endel Fugle ved Fyret; 16 faldt. *Schultz's Grund.* S.V. 3. Ov. c. 25 Lærker ved Fyret.

Alauda arvensis. Anholt Knob 8 (16 faldt).

Sturnus vulgaris. Vyl 1.

12te Marts.

Vyl. 1 Vibe faldt. *Nakkehoved.* S. 3. Ov. D. 1 Vibe faldt, ikke indsendt.

Vanellus cristatus. Vyl 1, (Nakkehoved 1).

13de Marts.

Graadyb. S.Ø. 2. Klart. Træk af Smaafugle. *Vyl.* S.S.Ø. 1. Letsk. 1 Allike faldt. *Lyngvig.* S.S.Ø. 3. Ov. D. 2 Graagæs saas i Fyrstraalerne i flere Timer.

Corvus monedula. Vyl 1.

14de Marts.

Vyl. S.S.Ø. 3. Sk. Enkelte Stære ved Skibet; 1 faldt. *Horns Rev.* S. 3. Letsk. Enkelte Fugle ved Fyret; 1 Stær faldt. *Lodbjerg.* S.Ø. 3. Ov. D. Enkelte Stære paa Ruderne. *Hanstholm.* S.Ø. 2. Ov. Endel Viber flagrede om Fyret fra Midnat.

Sturnus vulgaris. Vyl 1, Horns Rev 1.

15 Marts.

Vyl. S.S.Ø. 3. Klart. Mange Smaafugle ved Skibet; 1 Stær faldt.

Sturnus vulgaris 1.

16de Marts.

Vyl. S.S.Ø. 2. Klart. 1 Stær faldt. *Østre Flak.* S. 2. Tg. Mange Smaafugle ved Fyret; ingen faldt. *Drogden.* S. 1. D. Enkelte Lærker ved Fyret om Morgenen; 1 faldt.

Alauda arvensis. Drogden 1.

Sturnus vulgaris. Vyl 1.

17de Marts.

Vyl. S.S.V. 3. Ov. En Mængde Fugle v. Fyret; mange faldt overbord, 24 paa Dækket. *Horns Rev.* S.S.V. 3. Ov. R. Mange Fugle ved Fyret; mange faldt overbord, 8 paa Dækket. *Lyngvig.*

S.S.V. 4. Ov. R. D. Mange Stære og Drosler samt enkelte Viber om Fyret; 2 Viber, 2 Stære, 2 Drosler og 1 Solsort faldt; intet indsendt. *Lodbjerg.* S. V. 4. Ov. R. Endel Fugle paa Ruderne; 3 faldt. *Hanstholm.* S. V. 4. Ov. R. En Mængde Solsorter, Stære, Viber og enkelte Drosler om Fyret. *Læsø Trindel.* S.S.V. 5. Ov. Fugle ved Fyret paa Hundevagten.

Vanellus cristatus. (Lyngvig 2).
Sturnus vulgaris. Vyl 5, Horns Rev 4, (Lyngvig 2), Lodbjerg 1.
Turdus iliacus. Vyl 5, Horns Rev 1, Lodbjerg 1.
Turdus pilaris. Vyl 1.
Turdus merula. Vyl 13, Horns Rev 3, Lodbjerg 1.

18de Marts.

Vyl. S.S.Ø. 1. Ov. 2 Fugle faldt. *Horns Rev.* S.Ø. 2 Ov. Forskellige Fugle ved Fyret; 7 faldt. *Læsø Trindel.* S.V. 3. R. Fugle ved Fyret før Midnat. *Østre Flak.* Vind 0. D. Mange Smaafugle ved Fyret; ingen faldt.

Sturnus vulgaris. Vyl 1, Horns Rev 2.
Turdus iliacus. Horns Rev 4.
Turdus merula. Vyl 1, Horns Rev 1.

19de Marts.

Vyl. V.S.V. 2. Klart. 1 Stær faldt.

Sturnus vulgaris 1.

20de Marts.

Kjels Nor. S.V. 4. Sk. Drosler, Solsorter og Stære ved Ruderne; 1 Solsort faldt, ikke indsendt.

25de Marts.

Bovbjerg. V.N.V. 1. Ov. Tg. Nogle Stære og Drosler paa Ruderne; ingen faldt.

27de Marts.

Lyngvig. V. 4. Ov. D. Smaafugle om Fyret; Strandskader, Viber og Ryler hørtes.

29de Marts.

Nakkehoved. S.V. 3. Ov. R. 1 Lærke faldt, ikke inds.

30te Marts.

Kjels Nor. S.V. 3. Ov. Haglbyger. Enkelte Drosler ved Ruderne; 1 faldt, ikke inds.

31te Marts.

Vyl. V. 4. R. Enkelte Stære ved Skibet; 1 faldt. *Horns Rev.* S.V. 3. Ov. Enkelte Fugle ved Fyret; 1 Solsort faldt. *Læsø*

Trindel. V.S.V. 6. R. Fugle ved Fyret efter Midnat. *Schultz's Grund.* S.V. 7. Klart. 1 Vibe ved Fyret.

Sturnus vulgaris. Vyl 1.
Turdus merula. Horns Rev 1.

1ste April.

Vyl. V.N.V. 4. Ov. D. Nogle Fugle ved Fyret; 5 faldt. *Horns Rev.* V.N.V. 3. Ov. Flere Fugle ved Fyret; 3 faldt. *Stevns.* V.N.V. 5. Ov. D. Nogle Stære og Drosler ved Fyret fra Kl. 11 til Daggry; 2 Stære faldt, ikke indsendte. *Kjels Nor.* V. 5. Ov. 1 Stær faldt. *Skjoldnæs.* V.N.V 5. Ov. Omkring 20 Stære ved Ruderne.

Sturnus vulgaris. Vyl 1, Horns Rev 2, (Stevns 2), (Kjels Nor 1).
Turdus iliacus. Vyl 1.
Turdus musicus. Vyl 1.
Turdus merula. Vyl 2, Horns Rev 1.

2den April.

Vyl. V. 2. Ov. 1 Stær faldt. *Bovbjerg.* V.S.V. 1. Ov. D. Nogle Bogfinker og Solsorter paa Ruderne; ingen faldt. *Hesselø.* V.N.V. 3. Ov. 1 Ringdue faldt. *Kjels Nor.* N.V. 5. Ov. D. 1 Vandrikse og 1 Sangdrossel faldt.

Rallus aquaticus. Kjels Nor 1.
Columba palumbus. Hesselø 1.
Sturnus vulgaris. Vyl 1.
Turdus musicus. Kjels Nor 1.

3dje April.

Vyl. S. 1. Klart. 1 Stær faldt. *Lyngvig.* S.V. 3. Sk. D. Mange Fugle om Fyret; 11 faldt, foruden de indsendte en stor Regnspove. *Læsø Trindel.* V.S.V. 3. D. Tg. Fugle ved Fyret fra Midnat til Daggry; 3 faldt. *Sejrø.* S. 3. Ov. D. Endel Smaafugle om Fyret; 1 Drossel faldt, ikke indsendt. *Nakkehoved.* S.S.V. 2. Ov. Nogle Stære ved Lanternen.

Vanellus cristatus. Lyngvig 1.
Alauda arvensis. Læsø Trindel 1.
Sturnus vulgaris. Vyl 1.
Turdus iliacus. Læsø Trindel 1.
Turdus musicus. Lyngvig 6.
Turdus merula. Lyngvig 2.
Saxicola oenanthe. Lyngvig 1.
Erithacus rubecula, Læsø Trindel 1.

4de April.

Hanstholm. S.V. 3. Ov. Endel Stære, Solsorter og Viber om

Fyret; flere faldt, intet indsendt. *Rubjerg Knude.* S.S.V. 2. Ov. Nogle Stære ved Fyret; 2 faldt, ikke indsendte. *Hirtsholmene.* S. 2. D. 8 Fugle faldt. *Læsø Trindel.* S.V. 3. Ov. Fugle ved Fyret hele Natten; ingen faldt. *Anholt Knob.* S. 2. Tg. Endel Fugle ved Fyret; 7 faldt. *Hesselø.* S. 3. Tg. Mange Fugle om Fyret; 24 faldt. *Schultz's Grund.* S.V. 3. D. Omkr. 50 Fugle ved Fyret; 8 faldt paa Dækket, mange i Vandet. *Hjelm.* S. 3. Ov. Enkelte Smaafugle ved Ruderne; 2 Sjaggere og 1 Rødkælk faldt; intet indsendt. *Gilleleje Flak N.* S. 2. Tg. Enkelte Fugle ved Fyret; 2 faldt. *Nakkehoved.* S.S.V. 1. Ov. Tg. Smaafugle ved Ruderne; 1 Drossel faldt, ikke indsendt. *Stevns.* S. 1. Ov. Endel Drosler, Stære, Kvækerfinker, Fuglekonger o. a. Smaafugle ved Fyret fra Kl. 11 til Daggry.

Rallus aquaticus. Hesselø 1.
Totanus glareola. Hesselø 1.
Limnocryptes gallinula. Hesselø 1.
Alauda arvensis. Anholt Knob 1, Hesselø 1, Schultz's Grund 1.
Sturnus vulgaris. Hirtsholmene 1, (Rubjerg Knude 2), Hesselø 1.
Regulus cristatus. Anholt Knob 1, Schultz's Grund 1.
Turdus iliacus. Hirtsholmene 2, Anholt Knob 2, Hesselø 5 (18 faldt).
Turdus musicus Hirtsholmene 1, Anholt Knob 2, Hesselø 1, Schultz's Grund 1, Gilleleje Flak N. 1.
Turdus pilaris. Schultz's Grund 2.
Turdus merula. Hirtsholmene 2, Anholt Knob 1.
Erithacus rubecula. Hirtsholmene 1, Schultz's Grund 2, Gilleleje Flak N. 1.
Fringilla montifringilla. Hirtsholmene 1.
Emberiza schoeniclus. Schultz's Grund 1.

5te April.

Anholt Knob. V. 4. Klart. 1 Rødkælk faldt, ikke indsendt. *Møen.* S. 2. Ov. D. Endel Drosler og 1 Skovdue paa Ruderne; 1 Sangdrossel faldt.

Turdus musicus. Møen 1.

6te April.

Anholt Knob. N. 2. D. 1 Drossel faldt, ikke indsendt. *Skjoldnæs.* N.V. 4. Ov. R. 10 Stære ved Ruderne.

10de April.

Horns Rev. Ø. 2. Klart. Enkelte Fugle ved Fyret; 1 Horsegøg faldt. *Lyngvig.* S.V. 2. Ov. D. Flere Fugle om Fyret. *Gilleleje Flak N.* Ø.S.Ø. 3. Sk. 1 lille Fugl faldt, ikke indsendt.

Gallinago scolopacina. Horns Rev 1.

1921.)

11te April.

Skjoldnæs. Ø. 2. Klart. 1 Rødkælk ved Ruderne.

13de April.

Lodbjerg. V.S.V. 4. Ov. D. Enkelte Stære paa Ruderne. *Læsø Rende.* V.S.V. 3. Ov. Sk. Enkelte Fugle ved Fyret; 1 Kramsfugl faldt, ikke indsendt.

14de April.

Bovbjerg. N.V. 4. Ov. R. D. Endel Rødkælke ved Ruderne hele Natten. *Kjels Nor.* V.—S.V. 5. Ov. 1 Sangdrossel, 1 Vindrossel og 1 Ryle faldt, ikke indsendte. *Christiansø.* V.S.V. 4. R. Drosler og Stære paa Ruderne; 1 Drossel faldt, ikke indsendt.

24de April.

Gilleleje Flak N. Ø.S.Ø. 2. Graat. Enkelte Smaafugle ved Fyret; 2 Rødkælke faldt.

Erithacus rubecula. Gilleleje Flak N. 2.

26de April.

Graadyb. Ø. 2. Letsk. 1 lille Fugl faldt, ikke indsendt. *Vyl.* Ø. 3. Klart. Enkelte Smaafugle om Fyret; 1 Kvækerfinke faldt.

1ste Maj.

Anholt Knob. S.Ø. 2. Sk. Enkelte Smaafugle om Skibet; 1 Rødkælk faldt.

Erithacus rubecula 1.

2den Maj.

Stevns. V.S.V. 2. Ov. Endel Smaafugle ved Fyret fra Kl. 11 til Daggry. *Christiansø.* Vind 0. Ov. En Flok Drosler ved Fyret, ingen faldt.

3dje Maj.

Vyl. N.N.V. 3. Sk. 1 Træpiber faldt. *Christiansø.* V.S.V. 2. Sk. Endel Rødkælke ved Fyret, ingen faldt.

Anthus arboreus. Vyl 1.

4de Maj.

Gilleleje Flak N. N.V. 2. Ov. 1 Løvsanger faldt.

Phyllopseustes trochilus 1.

5te Maj.

Gilleleje Flak N. V. 2. Sk. 1 Sangdrossel faldt.

Turdus musicus 1.

6te Maj.

Vyl. V.N.V. 2. Sk. 2 Sangdrosler faldt.

Turdus musicus 2

7de Maj.

Vyl. S.S.Ø. 3. Sk. Mange Fugle om Fyret; 10 faldt. *Horns Rev.* S. 2. Ov. Enkelte Fugle ved Fyret; 2 faldt. *Hanstholm.* S.S.Ø. 3. Ov. D. Nogle Drosler og Smaafugle samt Strandskader ved Fyret; 5 faldt, 3 indsendte. *Skagen.* V.S.V. 3. R. D. Smaafugle ved Fyret; 10 Vindrosler og 1 Rødkælk faldt, ikke indsendte. *Kjels Nor.* S. 4. Ov. R. 1 Broget Fluesnapper faldt.

Sylvia curruca. Hanstholm 1.
Phyllopseustes trochilus. Vyl 3.
Turdus musicus. Horns Rev 1, Hanstholm 1.
Ruticilla phoenicura. Vyl 2.
Saxicola oenanthe. Vyl 5, Horns Rev 1, Hanstholm 1.
Muscicapa atricapilla. Kjels Nor 1.

8de Maj.

Graadyb. S.Ø. Ov. 2 Fugle faldt. *Vyl.* S. 1. Sk. 2 Sangdrosler faldt. *Horns Rev.* S.S.V. 2. Ov. Enkelte Fugle ved Fyret; 1 Træpiber faldt. *Rubjerg Knude.* S. 2. Ov. D. Enkelte Hjejler, Drosler o. a. Smaafugle ved Fyret fra Kl. 11 til Midnat; 2 Drosler og 1 lille Fugl faldt, intet indsendt. *Hirtsholmene.* S. 4. R. D. 4 Fugle faldt. *Læsø Trindel.* S. 3. Ov. Fugle ved Fyret fra Midnat; ingen faldt. *Gilleleje Flak N.* S.S.Ø. 4. Sk. 3 Fugle faldt.

Accentor modularis. Graadyb 1.
Anthus arboreus. Horns Rev 1.
Turdus musicus. Vyl 2, Hirtsholmene 1.
Turdus pilaris. Graadyb 1, Hirtsholmene 1.
Erithacus rubecula. Gilleleje Flak N. 1.
Muscicapa atricapilla. Gilleleje Flak N. 2.
Emberiza hortulana. Hirtsholmene 1.
Emberiza schoeniclus. Hirtsholmene 1.

9de Maj.

Vyl. S.Ø. 1. Halvklart. 1 Stenpikker faldt. *Hanstholm.* S. 3. R. D. Endel Sjaggere og Drosler samt flere Smaafugle ved Ruderne; 3 Fugle faldt. *Læsø Rende.* S. 2. R. Ov. Enkelte Smaafugle ved Fyret; 4 faldt. *Østre Flak.* S. 2. R. Smaafugle ved Fyret; ingen faldt. *Hjelm.* S.V. 2. R. Tg. Flere Smaafugle ved Fyret efter Midnat; 1 Vendehals og 1 Gærdesmutte faldt; intet indsendt. *Nakkehoved.* V. 1. Ov. R. Mange Smaafugle ved Lanternen. *Kjels Nor.* S.V. 1. Ov. R. 2 Fugle faldt.

Iynx torquilla. Hanstholm 1.

Cypselus apus. Hanstholm 1.
Acrocephalus phragmitis. Kjels Nor 2.
Phyllopseustes trochilus. Læsø Rende 1.
Turdus musicus. Læsø Rende 1.
Ruticilla phoenicura. Læsø Rende 1.
Saxicola oenanthe. Vyl 1.
Muscicapa atricapilla. Hanstholm 1.
Emberiza schoeniclus. Læsø Rende 1.

10de Maj.

Sprogø. N.V. 1. R. Endel Smaafugle ved Fyret.

12te Maj.

Vyl. Ø.N.Ø. 1. Klart. 1 Stenpikker faldt. *Hjelm.* S.V. 2. R. D. Mange Smaafugle paa Ruderne; ingen faldt. *Helnæs.* N.Ø. 2. Klart. 1 Stillids faldt.

Saxicola oenanthe. Vyl 1.
Carduelis elegans. Helnæs 1.

19de Maj.

Vyl. N. 1. Klart. 1 Forstuesvale faldt.

Hirundo rustica 1.

28de Maj.

Stevns. V. 3. Ov. R. Nogle Smaafugle ved Fyret fra Kl. 11^{30} til Dag. *Sprogø.* V.N.V. 2. D. 4 Fuglekonger ved Ruderne.

29de Maj.

Kjels Nor. V. 4. Ov. R. 1 Havesanger faldt.

Sylvia hortensis 1.

30te Juli.

Lyngvig. V.S.V. 5—6. R. Regnspover hørtes og kom af og til i Fyrets Nærhed; 2 Fugle faldt.

Tringa canutus 1.
Hypolais icterina 1.

3dje August.

Anholt. S. 1. R. Endel Smaafugle ved Ruderne; 1 Gøg faldt; ikke indsendt.

4de August.

Anholt Knob. N.V. 2. R. 1 Havterne faldt. *Gedser Rev.* N.V. 3. R. Mange Smaafugle ved Fyret.

Sterna macrura. Anholt Knob 1.

5te August.

Stevns. S.V. 3. Ov. R. Nogle Regnspover ved Fyret fra Kl. 11^{30} til 12 Nat.

8de August.

Lyngvig. S.S.Ø. 4. Ov. Tg. Regnspover, Brokfugle, Stære o. a. Fugle i store Flokke om Fyret; ingen faldt.

11te August.

Gedser Rev. Ø. 3. R. Flere Smaafugle ved Fyret.

12te August.

Blaavands Huk. S.V. 3. D. 18 Fugle faldt. *Stevns.* V.N.V. 1. Ov. Enkelte Smaafugle ved Fyret fra Kl. 11 til Dag. *Kjels Nor.* S.V. 3. Ov. 4 Fugle faldt. *Dueodde.* Ø.S.Ø. 2. Ov. R. Endel Smaafugle paa Ruderne.

Cypselus apus. Blaavands Huk 2.
Sylvia cinerea. Blaavands Huk 2.
Sylvia hortensis. Blaavands Huk 4, Kjels Nor 1.
Hypolais icterina. Kjels Nor 1.
Acrocephalus arundinaceus. Kjels Nor 1.
Acrocephalus phragmitis. Kjels Nor 1.
Phyllopseustes trochilus. Blaavands Huk 3.
Muscicapa atricapilla. Blaavands Huk 7.

13de August.

Christiansø. N. 3. R. D. Torden. Endel Smaafugle i Fyrstraalerne; ingen faldt. *Gedser Rev.* N.V. 2. R. Mange Smaafugle ved Fyret; mange faldt overbord, 2 paa Dækket.

Charadrius pluvialis. Gedser Rev 1.
Iynx torquilla. Gedser Rev 1.

14de August.

Lodbjerg. N.V. 5. Ov. R. Enkelte Smaafugle i Straalerne: 4 Fluesnappere faldt, ikke indsendte. *Hanstholm.* N.V. 4. Ov. Endel Strandskader, Drosler og Smaafugle om Fyret.

15de August.

Læsø Trindel. V.N.V. 3. R. Ov. Fugle ved Fyret efter Midnat. *Fornæs.* S.V. 3. R. Omkr. 50 Mursejlere faldt.

Cypselus apus. Fornæs 2 (c. 50 faldt).

16de August.

Graadyb. V. 4. Sk. 1 Stormfugl faldt. *Læsø Trindel.* S.V. 4. R. Fugle om Fyret hele Natten.

Fulmarus glacialis. Graadyb 1.

24de August.

Graadyb. S.Ø. 2. Letsk. 1 Islandsk Ryle faldt.

Tringa canutus 1.

25de August.

Graadyb. V.S.V. 2. Ov. 1 Rødstjert faldt. *Kjels Nor.* V.N.V. 4. Ov. R. Smaafugle ved Fyret; 1 Taarnsvale faldt, ikke indsendt.

Ruticilla phoenicura. Graadyb 1.

26de August.

Graadyb. N.V. 4. Sk. 1 Broget Fluesnapper faldt. *Gedser Rev.* V.N.V. 3. R. Flere Rødkælke ved Fyret.

Muscicapa atricapilla. Graadyb 1.

28de August.

Lyngvig. S.V. 5. Ov. Strandskader, Brokfugle og Bekkasiner om Fyret; ingen faldt. *Lodbjerg.* S.V. 5. Ov. R. Endel Fugle om Fyret; 1 Mudderklire faldt.

Actitis hypoleuca. Lodbjerg 1.

29de August.

Østre Flak. Vind 0. Ov. 1 Rødkælk faldt; ikke indsendt.

30te August.

Hammeren. V.N.V. 10. Sk. 1 Tamdue faldt *Gedser Rev.* S.V. 5. Ov. Flere Smaafugle ved Fyret; 1 Ryle faldt.

Tringa alpina. Gedser Rev 1.

1ste September.

Kjels Nor. S.Ø. 3. Ov. Endel Smaafugle ved Fyret; 3 faldt, ikke indsendte.

2den September.

Skagen. S.V. 4. Ov. R. Enkelte Fugle ved Fyret; 2 Ryler og 1 Bekkasin faldt; intet indsendt. *Schultz's Grund.* S. 3. Sk. 1 Rødstjert faldt. *Stevns.* S.S.Ø. 3. Ov. R. Nogle Smaafugle ved Fyret fra Kl. 1 til Daggry.

Ruticilla phoenicura. Schultz's Grund 1.

5te September.

Vyl. N.V. 1. Sk. Nogle Smaafugle ombord; 1 Bynkefugl faldt. *Drogden.* V. 3. R. Nogle Smaafugle ved Fyret; 1 Rødstjert faldt. *Christiansø.* N.V. 4. R. Mange Smaafugle ved Lanternen; 24 faldt. *Hammeren.* N. 4. Letskyet. D. En Mængde Smaafugle om Lanternen; 6 faldt. *Dueodde.* V.N.V. 3. Ov. R. D. Enkelte Smaafugle ved Lanterneruderne; 2 faldt.

Anas crecca. Dueodde 1.
Cuculus canorus. Dueodde 1.
Phyllopseustes trochilus. Christiansø 1.
Phyllopseustes rufus. Christiansø 1.
Anthus arboreus. Hammeren 1.
Ruticilla phoenicura. Drogden 1, Hammeren 4.

Praticola rubetra. Vyl 1.
Muscicapa atricapilla. Hammeren 1.

6te September.

Christiansø. N.V. 3. Sk. Nogle Smaafugle ved Lanternen; 2 faldt. *Hammeren.* V. 3. Sk. D. 2 Fugle faldt.

Sylvia hortensis. Hammeren 1.
Ruticilla phoenicura. Christiansø 1, Hammeren 1.
Passer domesticus. Christiansø 1.

7de September.

Vyl. Vind 0. Enkelte Smaafugle ved Fyret; 1 Stenpikker faldt.

Saxicola oenanthe 1.

8de September.

Læsø Trindel. V.S.V. 3. Sk. Fugle ved Fyret efter Midnat.

9de September.

Vyl. S.S.V. 1. Letskyet. 1 Engpiber faldt. *Læsø Trindel.* S. 2. D. Fugle ved Fyret paa Morgenvagten.

Anthus pratensis. Vyl 1.

11te September.

Stevns. S.V. 2. Ov. D. Nogle Smaafugle og 1 Due ved Fyret fra Kl. 1 til Daggry.

13de September.

Vyl. N.V. 3. Sk. 1 Stor Stormsvale faldt. *Schultz's Grund.* V. 5. Sk. Mange Fugle ved Fyret.

Procellaria leucorrhoa. Vyl 1.

15de September.

Schultz's Grund. V. 5. Ov. Mange Fugle ved Fyret; 1 Bogfinke faldt.

Fringilla coelebs 1.

19de September.

Vyl. S.Ø. 4. Klart. Enkelte Smaafugle ved Skibet; 1 Rødstjert faldt.

Ruticilla phoenicura 1.

25de September.

Hanstholm. N.V. 4. Ov. R. Endel Drosler ved Ruderne; 10 faldt, ikke indsendte.

26de September.

Vyl. N.V. 3. R. Endel Fugle ved Fyret; 1 Sangdrossel faldt.

Turdus musicus 1.

28de September.

Graadyb. V. 2. Sk. 1 Sangdrossel faldt.

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Turdus musicus 1.

29de September.

Vyl. N.V. 3. Sk. Enkelte Fugle ved Fyret; 1 Stenpikker faldt. *Kjels Nor.* N.V. 4. Ov. 1 Enkelt Bekkasin faldt, ikke indsendt.

Saxicola oenanthe. Vyl 1.

30te September.

Dueodde. N.N.V. 2. Sk. 1 Ryle faldt.

Tringa alpina 1.

1ste Oktober.

Lodbjerg. V. 2. Ov. D. R. Enkelte Fugle om Fyret; 3 faldt.

Limnocryptes gallinula 1.
Sylvia hortensis 1.
Acrocephalus arundinaceus 1.

2den Oktober.

Vyl. S. 2. R. Enkelte Fugle ved Fyret; 1 Lille Lappedykker faldt. *Lodbjerg.* S. 1. Ov. D. Enkelte Solsorter, Drosler og Fuglekonger om Fyret.

Tachybaptes minor. Vyl 1.

5te Oktober.

Gilleleje Flak N. S.V. 2. Sk. Enkelte Fugle ved Fyret; 1 Gærdesmutte faldt.

Troglodytes parvulus 1.

7de Oktober.

Kjels Nor. S.S.V.—V. 3. Ov. D. 1 Stær faldt, ikke indsendt.

(*Sturnus vulgaris* 1).

8de Oktober.

Vyl. N.V. 2. Sk. Enkelte Fugle ved Fyret; 1 Munkesanger faldt. *Schultz's Grund.* V. 4. Ov. 1 Enkelt Bekkasin faldt. *Stevns.* V. 4. Ov. D. Enkelte Stære ved Fyret fra Kl. 12 til 5 Form. *Skjoldnæs.* V.S.V. 3. Ov. D. Enkelte Drosler og Smaafugle ved Ruderne. *Hammeren.* V.S.V. 6. Ov. D. En Mængde Stære paa Ruderne hele Natten. *Dueodde.* V.S.V. 3. Ov. D. Endel Stære paa Ruderne; 3 faldt, ikke inds.

Limnocryptes gallinula. Schultz's Grund 1.
Sturnus vulgaris. (Dueodde 3).
Sylvia atricapilla. Vyl 1.

9de Oktober.

Vyl. S. 1. Sk. Enkelte Fugle ved Fyret; 1 Sangdrossel faldt. *Horns Rev.* S. 1. Ov. D. Endel Fugle, mest Drosler, ved Fyret;

endel faldt overbord, 4 paa Dækket. *Lodbjerg.* S. 1. Ov. Tg. 1 Drossel paa Ruderne; Vildgæs omkring Fyret. *Læsø Trindel.* Vind 0. Ov. Fugle ved Fyret efter Midnat; 1 Lærke faldt. *Læsø Rende.* S.V. 1. Ov. D. Endel Fugle omkring Fyret; Regnspover hørtes. *Gilleleje Flak N.* V.N.V. 2. Sk. 1 Sangdrossel faldt. *Hammeren.* V.N.V. 3. Sk. 10 Kongefugle paa Lanterneruderne.

Alauda arvensis. Læsø Trindel 1.
Turdus iliacus. Horns Rev 1.
Turdus musicus. Vyl 1, Horns Rev 2, Gilleleje Flak N. 1.
Emberiza schoeniclus. Horns Rev 1.

10de Oktober.

Vyl. S. 1. Sk. Enkelte Fugle ved Fyret; 1 Vindrossel faldt. *Lyngvig.* V.N.V.—V. 1. Ov. D. Drosler og Smaafugle om Fyret; c. 20 faldt, intet indsendt. *Hanstholm.* S.Ø. 2. Tg. En Mængde Drosler ved Fyret. *Skagen.* S. 1. Ov. Tg. D. Mange Fugle ved Fyret; c. 210 faldt. *Hanstholm.* S.Ø. 1. Tg. D. 3 Fugle faldt. *Østre Flak.* S.V. 1. Ov. Nogle Smaafugle ved Fyret; 1 Lærke faldt. *Anholt.* S.V. 2. Endel Smaafugle ved Ruderne; ingen faldt. *Hesselø.* S. 2. Ov. 13 Vindrosler, 2 Stære, 1 Vandrikse, 1 Bekkasin og 4 Lærker faldt; raadnede før Indsendelse kunde finde Sted. *Schultz's Grund.* S. 1. Ov. Enkelte Drosler og mange Fuglekonger ved Fyret; 1 Sangdrossel faldt. *Drogden.* S. 1. Ov. Flere Fugle ved Fyret; 1 Blishøne faldt. *Stevns.* Vind 0. Ov. Nogle Rødkælke, Fuglekonger og andre Smaafugle ved Fyret fra Kl. 12 til 5^{30} Form. *Kjels Nor.* S.S.Ø. 3. Ov. 1 Lærke faldt, ikke indsendt. *Skjoldnæs.* S.Ø. 1. Ov. Enkelte Smaafugle ved Ruderne.

Fulica atra. Drogden 1.
Alauda arvensis. Skagen 2 (16 faldt), Østre Flak 1.
Sturnus vulgaris. (Hesselø 2).
Turdus iliacus. Vyl 1, Skagen 1 (c. 50 faldt), Hirtsholmene 1.
Turdus musicus. Skagen 2 (c. 100 faldt), Hirtsholmene 2, Schultz's Grund 1.
Regulus cristatus. Skagen 2 (4 faldt).
Erithacus rubecula. Skagen 2 (6 faldt).
Fringilla montifringilla. Skagen 1. (32 faldt).

11te Oktober.

Vyl. N.N.V. 1 Tg. Flere Stære ombord; 1 Sangdrossel faldt. *Lyngvig.* 1 Lærke faldt. *Rubjerg Knude.* S.V. 3. Ov. D. Enkelte Vindrosler ved Fyret fra Kl. 3 til 4. *Skagen.* V.S.V. 3.

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Ov. Tg. Enkelte Fugle ved Fyret om Morgenen; nogle Drosler (ikke indsendte) og 1 Enkelt Bekkasin faldt. *Schultz's Grund.* S.S.V. 2. Ov. Mange Fuglekonger og enkelte Drosler ved Fyret; 1 Fuglekonge faldt. *Kjels Nor.* S.S.Ø. 3. Sk. 2 Stære faldt, ikke indsendte. *Christiansø.* Ø. 3. Ov. Mange Kongefugle paa Lanternen; ingen faldt.

Limnocryptes gallinula. Skagen 1.
Alauda arvensis. Lyngvig 1.
Sturnus vulgaris. (Kjels Nor 2).
Regulus cristatus. Schultz's Grund 1.
Turdus musicus. Vyl 1.

12te Oktober.

Graadyb. Vind 0. Tg. Stære, Lærker, Bogfinker, Fuglekonger, Drosler, 1 Ugle og 1 Graa Krage ved Skibet. *Horns Rev.* N.V. 1. Ov. D. Endel Stære og Drosler ved Fyret; 3 Vindrosler faldt. *Lyngvig.* V.N.V.—V. 1—2. Ov. Mange Fugle om Fyret; 18 faldt. *Lodbjerg.* S.V. 1. Ov. Taage. Enkelte Drosler paa Ruderne; 6 faldt. *Hanstholm.* V. 2. Tg. En Mængde Drosler ved Fyret. *Rubjerg Knude.* S.V. 2. Ov. Mange Vindrosler ved Fyret fra Kl. 1 til 4^{30}; 5 faldt, intet indsendt. *Skagen.* Omløb. Vind. 1. Tg. D. Mange Fugle, mest Drosler og Stære, ved Fyret; c. 100 Fugle faldt. *Læsø Trindel.* Vind 0. Ov. Fugle ved Fyret efter Midnat. *Læsø Rende.* S.V. 2. Ov. D. Flere Fugle ved Fyret; 4 faldt. *Østre Flak.* V. 1. Ov. Nogle Smaafugle ved Fyret; ingen faldt. *Anholt.* V.N.V. 1. Drosler og Stære ved Ruderne; endel faldt i Søen. *Schultz's Grund.* Omløb. Vind. D. Mange Fuglekonger og enkelte Stære ved Ruderne. *Skjoldnæs.* V.N.V.—V. 1. Ov. Tg. D. Smaafugle ved Ruderne. *Christiansø.* S.V. 3. Tg. Stære og Kongefugle paa Lanterneruderne; ingen faldt. *Hammeren.* Ø.S.Ø. 3. Ov. Tg. 5 Kongefugle saas paa Ruderne. *Dueodde.* N.Ø. 2. Ov. D. Enkelte Fuglekonger paa Ruderne; 1 faldt.

Limnocryptes gallinula. Lodbjerg 1, Læsø Rende 1.
Alauda arvensis Lodbjerg 1.
Sturnus vulgaris. Skagen 1.
Regulus cristatus. Dueodde 1.
Turdus iliacus. Horns Rev 1 (3 faldt), Lyngvig 12, Lodbjerg 3, Skagen 1 (c. 50 faldt), Læsø Rende 2.
Turdus musicus. Lyngvig 3, Skagen 2 (c. 50 faldt).
Erithacus rubecula. Lyngvig 2, Lodbjerg 1, Læsø Rende 1.
Fringilla montifringilla. Lyngvig 1.

13de Oktober.

Graadyb. V.N.V. 2. Ov. Stære, Lærker og Fuglekonger ved Skibet; 1 Lærke faldt. *Blaavands Huk.* Omløb. Vind og Vindstille. Tg. 28 Fugle faldt. *Vyl.* N.V. 1. Ov. Tg. Mange Fugle om Fyret; 12 faldt. *Horns Rev.* V.S.V. 2. R. Tg. En Mængde Stære og Drosler ved Fyret; 12 faldt. *Læsø Rende.* S.V. 2. D. Tg. 5 Fugle faldt. *Østre Flak.* V.S.V. 1. D. Nogle Smaafugle ved Fyret; ingen faldt. *Stevns.* S.V. 1. Ov. Tg. Enkelte Stære ved Ruderne fra Kl. 12 til 5. *Helnæs.* V. 1. Tg. Endel Lærker ved Fyret mellem 12 og 4 Form.; ingen faldt. *Skjoldnæs.* V.S.V. 1. Tg. Ov. Endel Stære og Smaafugle ved Ruderne. *Hyllekrog.* Vind 0.—V.S.V. 2. Tg. Endel Smaafugle, mest Drosler, omkring Fyret fra Midnat til Daggry.

Alauda arvensis. Graadyb 1, Blaavands Huk 1, Vyl 3, Horns Rev 1.
Sturnus vulgaris. Blaavands Huk 1.
Phyllopseustes rufus. Blaavands Huk 1.
Regulus cristatus. Læsø Rende 2.
Turdus iliacus. Blaavands Huk 1 (25 faldt), Vyl 7, Horns Rev 1 (10 faldt), Læsø Rende 3.
Turdus musicus Vyl 2.
Turdus merula. Horns Rev 1.

14de Oktober.

Vyl. S.V. 3. Sk. 1 Vindrossel faldt. *Horns Rev.* S.V. 3. Ov. R. Enkelte Smaafugle ved Fyret; ingen faldt. *Læsø Trindel.* S.V. 3. D. Fugle ved Fyret hele Natten; 4 faldt paa Dækket, flere overbord.

Turdus iliacus. Vyl 1, Læsø Trindel 2.
Erithacus rubecula. Læsø Trindel 1.
Emberiza schoeniclus. Læsø Trindel 1.

16de Oktober.

Graadyb. V. 2. Sk. Enkelte Smaafugle ved Skibet; 1 Bogfinke faldt.

Fringilla coelebs 1.

17de Oktober.

Horns Rev. S. V. 2. Tg. Smaafugle ved Fyret; ingen faldt; 3 Krager sad i Rigningen om Natten.

18de Oktober.

Graadyb. S.S.V. 1. Tg. D. Enkelte Smaafugle ved Skibet; 1 Rørspurv faldt. *Læsø Trindel.* S.V. 3. Tg. Enkelte Fugle ved

Fyret paa Morgenvagten. *Schultz's Grund.* S.V. 2. Tg. 1 Gulspurv faldt.

Emberiza schoeniclus. Graadyb 1.
Emberiza citrinella. Schultz's Grund 1.

19de Oktober.

Graadyb. S.V. 2. Letskyet. Flokke af Smaafugle trak mod S.; 2 faldt.

Falco æsalon 1.
Fringilla coelebs 1.

20de Oktober.

Horns Rev. V.S.V. 3. Ov. Endel Stære ved Fyret; 3 faldt. *Østre Flak.* S.V. 2. R. D. Nogle Smaafugle ved Fyret.

Sturnus vulgaris. Horns Rev 1 (3 faldt).

21de Oktober.

Gilleleje Flak N. V.S.V. 3. Sk. 1 Fuglekonge faldt. *Dueodde.* V.N.V. 1. Ov. R. Endel Fuglekonger paa Ruderne.

Regulus cristatus. Gilleleje Flak N. 1.

22de Oktober.

Vyl. N.Ø. 2. Sk. 1 Musvit faldt. *Hanstholm.* Ø.S.Ø. 3. Ov. R. En Mængde Stære om Fyret; enkelte faldt, ingen indsendt. *Læsø Trindel.* Ø. 3—4. Ov. Fugle ved Fyret før Midnat. *Østre Flak.* S.Ø. 1. R. D. Nogle Smaafugle ved Fyret; 1 Stær faldt, ikke indsendt.

Sturnus vulgaris. (Østre Flak 1).
Parus major. Vyl 1.

23de Oktober.

Graadyb. S.V. 5. Sk. R. 1 Vindrossel faldt. *Horns Rev.* N. 10. Ov. R. Enkelte Fugle ved Fyret; 2 faldt. *Læsø Rende.* Ø. 9. R. 5 Fugle faldt. *Hesselø.* S.Ø. 5. R. D. En Mængde Fugle om Fyret; c. 45 faldt. *Schultz's Grund.* S. 3. Ov. Mange Fugle ved Fyret; 4 faldt paa Dækket, 5 i Vandet. *Gilleleje Flak N.* S.Ø. 5. R. 1 Vindrossel faldt. *Kjels Nor.* S.S.Ø. 4—10. Ov. R. 1 Drossel faldt; ikke indsendt. *Skjoldnæs.* S.S.Ø. 3. Ov. R. Smaafugle ved Ruderne.

Alauda arvensis. Hesselø 2 (10 faldt).
Sturnus vulgaris. Læsø Rende 2, Hesselø 2.
Turdus iliacus. Graadyb 1, Hesselø 2 (c. 15 faldt), Schultz's Grund 1, Gilleleje Flak 1.
Turdus musicus. Hesselø 3 (c. 15 faldt), Schultz's Grund 3.
Turdus pilaris. Hesselø 1.

Turdus merula. Læsø Rende 1.
Erithacus rubecula. Læsø Rende 1.
Fringilla montifringilla. Horns Rev 2, Læsø Rende 1.

26de Oktober.

Bovbjerg. N.V. 3. Ov. R. Drosler paa Ruderne; c. 30 faldt, intet indsendt.

27de Oktober.

Kjels Nor. N.V. 4. Ov. 1 Stær faldt, ikke indsendt. *Skjoldnæs.* V. 4. Ov. R. D. Stære ved Ruderne. *Dueodde.* N.N.V. 1. Ov. Tg. Endel Stære paa Ruderne.

Sturnus vulgaris. (Kjels Nor 1).

28de Oktober.

Horns Rev. N.V. 4. Ov. R. Enkelte Fugle ved Fyret; 1 Sjagger faldt. *Christiansø.* V. 3. R. Enkelte Stære paa Lanternen; ingen faldt.

Turdus pilaris. Horns Rev 1.

30te Oktober.

Vyl. V. 3. Sk. 1 Stær faldt.

Sturnus vulgaris 1.

31te Oktober.

Graadyb. V. 3. Sk. Først paa Natten faldt mange Fugle udenbords, 5 paa Dækket. *Vyl.* V. 4. Sk. 1 Stær faldt. *Læsø Trindel.* S.V. 4. R. Fugle ved Fyret hele Natten. *Skjoldnæs.* V.S.V. 3. Ov. 7 Stære ved Ruderne; 1 Stær og 1 Lærke faldt; intet indsendt.

Sturnus vulgaris. Graadyb 4, Vyl 1, (Skjoldnæs 1).
Turdus merula. Graadyb 1.

1ste November.

Horns Rev. N.V. 9. Sne og Hagl. 1 Raage faldt.

Corvus frugilegus 1.

3dje November.

Graadyb. N.N.V. 5. Sk. 1 Lærke faldt. *Anholt.* Ø. 2. 1 Islom faldt.

Colymbus glacialis. Anholt 1.
Alauda arvensis Graadyb 1.

4de November.

Nakkehoved. S.S.Ø. 4. Ov. R. Enkelte Smaafugle om Lanternen. *Dueodde.* S.Ø. 5. Ov. R. Endel Stære paa Ruderne.

5te November.

Sædenstrand. S.S.Ø. 3. Ov. R. 1 Hvinand faldt.

Claugula glaucion 1.

6te November.

Hanstholm. S.Ø. 2. Ov. Endel Drosler, Solsorter og Stære om Fyret.

7de November.

Graadyb. S.Ø. 2. Sk. 1 Solsort faldt. *Vyl.* Ø. 2. Letskyet. Enkelte Solsorter ved Fyret; 1 faldt. *Hanstholm.* Ø.N.Ø. 4. Ov. Nogle Ænder ved Fyret; 3 faldt, men intet indsendt.

Turdus merula. Graadyb 1, Vyl 1.

11te November.

Graadyb. S.Ø. 2. Sk. 1 Lærke faldt.

Alauda arvensis 1.

12te November.

Vyl. N.Ø. 1. Sne. Enkelte Smaafugle ombord; 1 Sisken faldt.

Chrysomitris spinus 1.

13de November.

Vyl. N.Ø. 2. R. 1 Graasisken faldt.

Cannabina linaria 1.

14de November.

Vyl. S. 2. R. 2 Graasiskener faldt.

Cannabina linaria 2.

15de November.

Vyl. S. 2. Ov. 1 Graasisken faldt.

Cannabina linaria 1.

21de November.

Vyl. Ø.S.Ø. 2. R. Enkelte Fugle ved Fyret; 1 Sjagger faldt. *Østre Flak.* Ø. 5. Sne. Enkelte Fugle om Fyret; 1 Drossel faldt, ikke indsendt.

Turdus pilaris. Vyl 1.

22de November.

Anholt. Ø.S.Ø. 2. Solsorter, Lærker samt Stære ved Ruderne; ingen faldt. *Hesselø.* S. 3. Ov. D. 3 Silkehaler faldt.

Ampelis garrula. Hesselø 3.

23de November.

Graadyb. Ø.N.Ø. 3. Sk. 1 Graasisken faldt. *Hesselø.* Ø.S.Ø. 3. Ov. 2 Fugle faldt.

Turdus pilaris. Hesselø 1.
Cannabina linaria. Graadyb 1.
Emberiza nivalis. Hesselø 1.

24de November.

Vyl. S.Ø. 2. Tg. Enkelte Fugle ved Fyret; 1 Lærke faldt.
Sejrø. S.Ø. 2. Ov. D. 3 Fugle faldt.

Alauda arvensis. Vyl 1.
Ampelis garrula. Sejrø 1.
Turdus pilaris. Sejrø 1.
Emberiza nivalis. Sejrø 1.

28de November.

Bovbjerg. S. 2. Tg. 2 Fugle faldt.

Fulica atra 1.
Gallinula chloropus 1.

30te November.

Anholt. V.N.V. 4. D. Drosler og Stære ved Ruderne; en Mængde faldt i Søen.

5te December.

Horns Rev. V.S.V. 2. Ov. 1 Lærke faldt; ikke indsendt.

10de December.

Hanstholm. S.V. 3. Tg. Endel Smaafugle ved Fyret.

Forskellige Iagttagelser fra Fyrene.

Graadyb Fyrskib. Januar: *31te* Flokke af Lærker trak mod N. — Februar: *18de* N.N.V. 2. Flokke af Viber og enkelte Stære trak mod N. — April: *18de* var en Skovdue ombord om Form., fløj derpaa mod Land. — August: *13de* N.V. 3. Sk. Træk af Regnspover mod S. *24de* trak Ænder mod S. — September: *1ste* var en Viptjert ved Skibet. — Oktober: *5te* trak Flokke af Smaafugle mod S. — R. W. Nielsen.

Sædenstrand Fyr. Februar: *17de* fløj 7 Svaner mod N. — Marts: *13de* fløj 3 store Flokke Graagæs mod N. — P. Larsen.

Vyl Fyrskib. Februar: *16de* saas flere Suler. *23de* opholdt endel Raager sig ombord. *24de* vare mange Raager ombord. *25de* saas endel Raager og Stære. — Marts: *5te* saas en Søkonge. *13de* vare store Flokke Ænder ved Skibet, fløj senere mod Ø. *18de* vare mange Stære ombord og mange Ænder paa Vandet om

Skibet. *23de* vare mange Ænder ved Skibet. *25de* vare enkelte Smaafugle ombord. *26de* vare 1 Stær og 1 Lærke ombord. — April: *4de* vare 2 Bogfinker ombord hele Dagen. *8de* fløj en Ugle ved Skibet tæt ved Vandet, blændet af det stærke Sollys. — Maj: *3dje* saas en Kjove jagende Maagerne. *6te* saas mange Suler. *12te* jagede en Kjove Maagerne. *29de* var en Svale ombord. — August: *26de* opholdt endel smaa Sangfugle sig ombord. — September: *27de* vare 2 Fuglekonger ombord. — November: *9de* var en Krage ombord. — A. H. Schmidt.

Horns Rev Fyrskib. Oktober: *11te* vare enkelte Smaafugle ombord; en Svane svømmede en Tid rundt om Skibet. *12te* opholdt en Hornugle sig en Tid paa Skibet. — Toftgaard-Nielsen.

Bovbjerg Fyr. September: *20de, 21de* og *22de* lejrede Flokke paa mange Tusinde Stære sig omkring Fyret. — S. J. Beldring.

Thyborøn Fyr. Februar: *27de* fløj en Flok Viber mod N. — Marts: *10de* vare 3 Strandskader ved Stranden. *13de* fløj en Flok Viber mod N. *15de* fløj en Flok Gæs mod S. — Maj: *25de* fløj en Flok Knortegæs mod N. *26de* flere Flokke Knortegæs mod N. *28de* to Flokke Knortegæs mod N. — September: *5te* fløj en Flok Knortegæs mod S. *11te* en Flok Gæs mod S. *12te* flere Flokke Vildgæs mod S. *15de* fløj flere Flokke Knortegæs mod S. — Oktober: *19de* fløj flere Flokke Krager mod S. *27de* en Flok Graagæs mod S. — November: *4de* fløj mange Krager mod S.V. — J. Nielsen.

Hanstholm Fyr. April: *10de* opholdt en Stork sig ved Fyret i c. 2 Timer og fløj derpaa mod Ø. — E. Holm Hansen.

Højen Fyr. Intet Fuglefald. — A. T. Friis.

Skagen Fyr. Maj: *14de* saas 2 Storke vadende i Mosen i Nærheden af Fyret. — November: *24de* trak 3 Svaner mod S.V. — December: *20de* saas nogle enkelte Stære paa Markerne ved Fyret. — Fra Slutningen af Oktober ses daglig store Flokke Ænder i Farvandet S. for Fyret og ved Grenen; en enkelt Lom ses af og til. — V. C. Christensen.

Læsø Trindel Fyrskib. Marts: *11te* trak adskillige Flokke Krager hele Dagen mod N.Ø. *14de* trak endel Krager hele Dagen mod N.Ø. — Oktober: *17de*, V. 3, trak adskillige Flokke Krager hele Dagen mod S.V. *19de* S.S.V. 4. Ligeledes. *21de* V.N.V. 3. Ligeledes. — S. Winther.

Læsø Rende Fyrskib. November: *1ste* fløj store Flokke Ederfugle mod V. — A. P. Jensen.

Østre Flak Fyrskib. Januar: *10de* V.S.V. 2. 8 Vildgæs fløj mod Ø. *24de* N. 3. En Flok Vildgæs fløj mod V. — Marts: *8de* V.S.V. 2; en Flok store Gæs trak mod N. *10de* S.V. 2; Flokke af Krager trak mod N.Ø. *12te* S. 1. Ligeledes. *14de* S. 2. Ligeledes. — April: *5te* V.N.V. 1; en Flok Vildgæs fløj mod Ø. — Juni: *25de* fløj 3 Ederfugle mod N. — August: *30te* var en Svale ved Skibet. — September: *18de* vare Tusinder af sorte Ænder i Farvandet Ø. for Skibet. *29de* N.V. 5. 3 Svaner mod S.V. — November: *4de* S.S.Ø. 1. En stor Flok Vildgæs fløj mod V. — *6te* S.S.Ø. 1. Flere Flokke Graagæs trak fra S.V. mod N.Ø.; 3 Svaner trak mod N. — December: *12te* S.S.V. 3. En Flok Vildgæs fløj mod V.N.V. *29de* V.N.V. 5. 3 Vildgæs fløj mod V. — A. Porse.

Hals Barre Fyr. Intet Fuglefald. — I Januar og September var der usædvanlig faa Gæs og andre Søfugle; i Oktober begyndte Gæs og Ederfugle at komme, og i Slutningen af Aaret var der mange flere end forrige Aar. — A. Jensen.

Gjerrild Fyr. Intet Fuglefald. — A. Andersen.

Anholt Knob Fyrskib. April: *11te* vare 2 Graaspurve ved Skibet hele Dagen. *26de* vare mange Smaafugle rundt om Skibet hele Dagen. *27de* Ø. 2. En stor Flok Krager mod Ø. — August: *9de* fløj 6 Graagæs mod V. — Oktober: *13de* V. 2. Tg. Store Flokke Krager mod V. *16de* V. 3. Endel Krager og enkelte Graagæs mod V. — November: *26de* fløj en Flok Ederfugle mod S. — M. Trondal.

Anholt Fyr. Januar: *11te* iagttoges Sjaggere i Omegnen. *15de* saas mange Lommer ved Øen. — Februar: *17de* saas enkelte Stære og Lærker i Omegnen. *10de* saas endel Stære, Viber og enkelte Solsorter; paa Havet saas store Flokke Sortænder, Fløjelsænder og Ederfugle. — Marts: *2den* saas Stære, Lærker, Solsorter og Sjaggere. *3dje* saas Strandskader paa Stranden. *12te* trak store Flokke Krager og Alliker mod Ø. *14de* ligeledes. *15de* trak Krager i Flokke mod Ø. *18de* trak Alliker mod Ø.; store Flokke opholdt sig paa Øen. *20de* saas Strandskader i større Mængde. — Oktober: *22de* N.Ø. 4. Om Morgenen begyndte store Flokke Krager at komme fra N.Ø.; op ad Dagen tiltog de i Mængde, og paa visse Tider kom de som en jævn Strøm. Fuglene vare i høj Grad udmattede; de kom med aabent Næb og uden Skrig, flyvende tæt over Vandfladen. Store Mængder hvilede ud paa Øen; om Aftenen steg Vindstyrken til 11 og det paafølgende Døgn rasede en orkanagtig Storm N.Ø.—N.—N.V. — December: Der iagttoges endel Ænder paa Søen, dog kun faa og smaa Flokke; det er navnlig Sortænder og Fløjlsænder. Nogle Graaænder saas. — M. P. Andersen.

Hesselø Fyr. Februar: *28de* saas Stær, Vibe og Strandskade. — Marts: *8de* saas Gravanden. — Maj: *8de* saas Svalen. — K. A. Jensen.

Spodsbjerg Fyr. Intet Fuglefald. — P. Christensen.

Hjelm Fyr. Januar: *31te* hørtes Lærken. — Februar: *24de* saas Viben og Lærken første Gang. *28de* saas 6 Strand skader ved Øen. — April: *25de* saas Svalen første Gang. — Maj: *27de* saas 4 Storke, forfulgt af 3 Høge, flyve over Øen mod Ø. Siden *24de* ruger Maager, Terner, Strandskader samt enkelte Graaænder paa Øens Lavland. — Oktober: *1ste* saas en sort Stork paa Øen. — November: *14de* og følgende Dage saas mange Silkehaler. — December: *13de*, *16de* og *18de* saas en Vibe paa Øen. — Intet Fuglefald. — H. W. Nielsen.

Sletterhage Fyr. I Januar, Februar og en Del af Marts opholdt en Del større og mindre Flokke Ederfugle sig ved Fyret, endnu i April saas enkelte mindre Flokke. I Slutningen af Januar kom de første Stære, dog først omkring Midten af Marts slog større Flokke Stære sig ned her. Fra Oktober begyndte mindre Flokke Ænder at vise sig, og i December har lejlighedsvis nogle Graagæs opholdt sig i Fyrets Nærhed. — Intet Fuglefald. — Tidemand.

Sejrø Fyr. I April saas jævnlig store Flokke Ederfugle trække mod N. I Slutningen af September og først i Oktober begyndte disse og andre Dykænder atter at samle sig i Farvandet. I November Maaned har et Par Gange Svaner været paa Revet i Flokke paa 7—8 Stkr. — J. Z. Nielsen.

Gilleleje Flak N. Fyrskib. Februar: *25de* S.S.Ø. 2. Endel Krager mod N.Ø. — Marts: *1ste* endel Smaafugle ved Skibet. *6te* S. 2. Mange Krager mod N.Ø. om Eftm. I Maanedens Løb stort Kragetræk mod N.Ø. — Oktober: *7de* S.S.Ø. 2. Flokke af Krager mod S. *10de* saas en Flok Graagæs; Flokke af Krager hele Dagen mod S. — I. S. Ibsen.

Lappegrunden Fyrskib. April: *4de* flere Flokke Ænder om Skibet. *6te* store Flokke Ænder om Skibet. *11te* fløj flere Flokke Ederfugle og Gæs i Farvandet. *13de* V.S.V. 3. Mange Krager mod Ø. *15de* store Flokke Ænder i Farvandet. *17de* flere Flokke Gæs og Ænder mod S. *18de* Store Flokke Ænder mod S. *23de* ligeledes. — Maj: *7de* flere Flokke Vildænder mod N. *13de* en stor Flok Vildgæs mod N. *21de* en meget stor Flok Gæs mod N. — I. C. Jensen.

Nordre Røse Fyr. I Løbet af Sommeren og Efteraaret har ingen Svømmefugle opholdt sig om Fyret, formodentlig paa Grund af det milde Vejr. — H. S. L. Madsen.

Drogden Fyrskib. Februar: *10de* en Lærke ved Skibet. *12te* fløj 5 Svaner mod V. om Eftm.; 2 Lærker holdt sig et Kvarter syngende over Skibet. *22de* enkelte Krager mod V. *23de* nogle Lærker ved Skibet. *26de* fløj en Flok Krager mod N.; en Solsort opholdt sig ved Skibet. — Marts: *1ste* fløj en Vibe mod N. *23de* fløj store Flokke af Smaafugle mod V.; nogle Bogfinker opholdt sig kort Tid ved Skibet. *27de* var en Bogfinke paa Skibet. — April: *2den* fløj 5 Svaner mod S.V. *5te* fløj 11 Krager i Flok mod V.; Bogfinker opholdt sig paa Skibet. *10de* fløj en Flok Storke, c. 30 Stkr., mod N. — September: *6te* fløj en Flok Gravgæs mod S.V. *19de* kredsede en Skare om Skibet og fløj mod V. *25de* fløj hele Dagen Smaafugle i smaa Flokke mod V. *26de* ligeledes. *27de* ligeledes; en Bogfinke ombord. *28de* ligeledes. — Oktober: *12te* opholdt Stære, Lærker og Fuglekonger sig paa Skibet. *19de* trak store Flokke Krager mod V. — November: *16de* flere Lærker omkring Skibet i Dagens Løb. — December: *3dje* fløj 2 Svaner om Form. mod S.V. — Jul. S. Jensen.

Stevns Fyr. November: *14de* til *18de* opholdt en Flok Silkehaler sig i Fyrets Have. — N. Roed.

Sprogø Fyr. Februar: *20de* saas 2 Viber. *26de* saas Stæren. — Marts: *2den* saas de første Strandskader. *10de* kom alle Maagerne til Øen. — E. Haubirk.

Helleholm Fyr. Januar: *12te* saas Gravanden. — Februar: *18de* saas Viben. *22de* saas Strandskaden. — P. Larsen.

Vejrø Fyr. Intet Fuglefald. — Havlitter, Brunnakker, Graaænder og Ederfugle almindelige om Vinteren omkring Øen; naar Staalgrunden er tillagt trækker store Svaneflokke ind under Øen. Enkelte Maager og Viber ruge paa Øen.

Omø Fyr. Februar: *25de* saas Strandskaden. — Nogle faa Ederfugle saas paa Revet i November og December. — G. A. Petersen.

Hov Fyr. Intet Fuglefald. — S. Dahl.

Tranekjær Fyr. Intet Fuglefuld. — P. Vilandt.

Taars Fyr. Intet Fuglefald. — W. Pedersen.

Albuen Fyr. Intet Fuglefald. H. C. Mogensen.

Strib Fyr. Marts: *5te* saas Stæren ved Fyret. *25de* trak den første Flok Graagæs mod N.Ø. I Efteraaret har der været mange Ederfugle i Beltet, mest gamle Fugle. — M. Ungerskov.

Baagø Fyr. Intet Fuglefald. — N. Hansen.

Helnæs Fyr. Januar: *15de* og senere holdt Flokke af Blaakrager til langs Stranden og paa Markerne i Fyrets Nærhed. *28de* saas enkelte Lærker. — Februar: *1ste* sang Lærken. *14de* saas Stæren. *15de* saas Viben; Flokke af Blaarygge, Havlitter og Ederfugle saas paa Søen. — April: *4de* rensede Stæren Redekasserne. I første Halvdel af April saas daglig Graaænder, Ederfugle og Strandskader trække forbi Fyret. — Maj: *5te* saas Svalen. — Juni: Gravænder saas hele Maaneden med Unger. — Ude i en Mose paa Nordenden af Helnæs har et Par Graagæs udruget 5 Gæslinger; de opholder sig stadig i Mosen og fredes af Ejeren; i Slutningen af Juni begyndte Ungerne at flyve. *22de* trak en Hejre forbi Fyret. — September: *12te* trak store Flokke Viber mod S. *14de* trak enkelte Blaakrager mod S.V. *15de* saas en Flok Ederfugle V. for Fyret. — Oktober: *3dje* og følgende Tid ses daglig store Træk af Blaakrager samt Alliker trækkende mod S.V.; særlig mange trak forbi Fyret d. *11te*; samme Dag en stor Flok Viber mod S.V. *17de* og følgende Tid tiltager Ederfuglene i Tal ved stort Træk fra N. *19de* saas en Flok Stære trække mod S. — November: *11te* og *12te* saas store Flokke Krager paa Markerne og langs Stranden; Flokke af Stære ses daglig. *13de* opholdt 4 Viber sig paa Stranden udfor Fyret. *14de* saas Flokke af Sjaggere. *15de* saas om Form. Stæreflokke passere forbi Fyret; 2 Viber saas ved Stranden. *25de* trak en Flok Stære Kl. 8 Form. mod S.V. I December saas daglig Flokke af Ederfugle og Dykænder ude paa Søen. — S. P. Mortensen.

Skjoldnæs Fyr. Februar: *18de* saas 2 Viber paa Markerne. *26de* saas 1 Vibe paa Stranden. *27de* N.V. 6 Graagæs trak mod V. — Marts: *2den* trak c. 200 Alliker mod N. Kl. 2 Eftm. — April: *19de* ankom Svalen. — November: *3dje* N.N.V. 5. 20 Svaner trak mod S.V. — H. Würtz.

Christiansø Fyr. Februar: *22de* opholdt 3 Viber sig paa Øen hele Dagen. — April: *14de* opholdt c. 50 Skovduer sig paa Øen om Form. — Maj: *5te* opholdt c. 10 Svaler sig paa Øen om Dagen. *18de* saas og hørtes Gøgen; den første Ederfugl saas i Havnen med Unger. — Ederfugle og Maager er i Aar i større Antal end sædvanlig tilstede paa Græsholmen; Ederfuglen er næsten helt tam i Yngletiden, da den med Ungerne svømmer helt ind i Havnen og æder Sildeaffald ved Fiskerbaadene. — Oktober: *27de* opholdt store Flokke Dompapper og Kramsfugle sig paa Øen; Dompapperne bleve paa Øen om Vinteren og gjorde stor Skade ved at æde Frugtknopperne i Haverne. — Det meget ringe Fuglefald i Efteraaret skyldes sikkert det usædvanlig klare Vejr, saa godt som uden Taage. — H. M. Hansen.

Hammeren Fyr. April: *4de* fløj 8 Storke mod N. *15de* fløj 12 Svaner mod N. — August: *30te* trak 20 Knortegæs mod V. — September: *5te* trak 2 store Flokke Ænder, vistn k Sortænder, mod S.V. *6te* trak c. 500 Gæs mod S.V.; Vinden var V.S.V. *18de* S.V. 1. Omkr. 1000 Gæs trak mod S.V. — Oktober: *6te* trak 18 Svaner mod V. — A. M. Dam.

Dueodde Fyr. September: *14de* saas lidt før Solnedgang 2 Flokke Graagæs paa henholdvis 12 og 42 trække mod S.; efter Solnedgang hørtes flere Flokke trække forbi Fyret. — Liisberg-Poulsen.

Møen Fyr. Januar: *8de* V.N.V. 3 Svaner trak mod V. — April: *5te* V.S.V. 8 Storke fløj om Eftm. mod N.V. — November: *6te* S.Ø. 4. Om Form. fløj 2 Svaner mod S.Ø. — A. P. Eliassen.

Harbølle Pynt Fyr. Intet Fuglefald. — Olsen.

Hestehoved Fyr. Januar: Større og mindre Flokke Havlitter laa i Farvandet om Fyret. — Februar: Mindre Flokke, c. 100 Stkr., laa hele Maaneden i Farvandet; d. 25de var meget store Flokke at se hele Dagen. — Marts: Havlitter saas hele Maaneden i aftagende Tal i Farvandet i Flokke paa 4—20 Stkr. — November: Først i Maaneden viste Havlitterne sig igen, tiltagende stærkt i Antal i December, da meget store Flokke vare at se. — J. Jensen.

Gedser Fyr. Intet Fuglefald. — C. Madsen.

Gedser Rev Fyrskib. Januar: *13de* S.V. 3 Svaner fløj mod S. Kl. 11^{30} Form. — Juni: *14de* N.N.V. 1. 7 Svaner fløj mod N.Ø. — Oktober: *30te* fløj 3 Flokke Svaner paa henholdsvis 5, 4 og 8 Stkr. mod N.V.; Vinden N.V. 2. — K. E. Skovgaard.

Hyllekrog Fyr. Intet Fuglefald. — G. Martens Petersen.

Meddelelser om mindre almindelige danske Fugle.

Anser erythropus.

En Dverggaas, ung Fugl, saas d. 27.10.1923 i en Vildthandel i København, vistnok skudt i Jylland; Stykket gik desværre tabt; meddelt af Præparator H. Madsen.

Colymbus arcticus.

En Sortstrubet Lom, en voksen Hun i ren Sommerdragt, blev skudt ved Stranden ved Rungsted d. 13.12.1922 af Cand. polyt. G. Monberg.

Fulmarus glacialis.

En Stormfugl, en ung Han, blev skudt i Sundet ved Helsingør d. 27.9.1922; modtoges til Udstopning af Frk. K. Pirtzel. En Han, af lys Race, blev skudt ved Nymindegab d. 16.10.1923 og tilsendt Museet af Hr. N. Bloch.

Otis tetrax.

En Dvergtrappe, en Han, blev skudt i Varming ved Ribe d. 27.6.1922; den var set i nogle Dage, løbende udenfor en Bondehave; Testiklerne vare stærkt udviklede, af Størrelse som Hjertet. I Maven vare Blade og Blomsterknopper af Kongepen, Ranunkler o. l. samt 15 Biller; meddelt af Stud. theol. H. Lange.

Tringa maritima.

To Sortgraa Ryler, to Hanner, bleve skudte ved Nymindegab d. 5.11.1922 af Hr. N. Bloch.

Phalaropus hyperboreus.

En Odinshane blev skudt ved Hesselager paa Fyn d. 30.9.1923; modtoges til Udstopning af Conservator C. N. Windeballe.

Phalaropus fulicarius.

En Thorshane i Vinterdragt blev skudt paa Vejlefjord d. 18.10. 1923; meddelt af Ejeren Hr. H. Houmann.

Larus minutus.

En Dvergmaage, ung Fugl, blev skudt ved Vejle d. 28.8.1922 meddeler Hr. H. Houmann.

Lestris longicauda.

En Lille Kjove, en ung Hun, blev fundet død paa Vandet Ø. for Saltholm Flak Fort d. 7.9.1922 af Fisker A. Andersen, der forærede den til Zoologisk Museum.

Fratercula arctica.

En Lunde, en voksen Han i ren Sommerdragt, blev skudt i Vejlefjords Munding d. 23.5.1922 af Direktør Dr. phil. C. G. Joh. Petersen, der forærede den til Zoologisk Museum.

Botaurus stellaris.

En Rørdrum, en Han, blev skudt i Lust ved Møgeltønder d. 27.8.1921; Skindet i Zoologisk Museum, modtaget fra Conservator H. P. Hansen.

Sula bassana.

En Sule, voksen Fugl, fangedes i en Have i Sletten ved Øresund d. 1.5.1923 og indsendtes til Zoologisk Have; det er usædvanligt at træffe denne Fugl saa langt nede i danske Farvande. Fra Nymindegab er fra Hr. N. Bloch modtaget en voksen Hun, skudt d. 20.8.1923, og en voksen Han, skudt d. 1.9. 1923.

Aquila fulva.

En Kongeørn, en ung Han, blev skudt ved Aakirkeby d. 12.11. 1922 og indsendt til Udstopning hos Conservator A. Windeballe.

Haliaëtus albicilla.

En Havørn iagttoges ved Sortedamssøen i København d. 27.10. 1923; den forfulgtes af en stor Sværm af de derværende Maager; meddelt af Assistent Blom, der indestod for Artsbestemmelsen.

Pandion haliaëtus.

En Fiskeørn saas ved Randsfjord d. 2.10.1923 flyvende langs Kysten; senere blev et Individ skudt samme Steds; meddelt af Conservator C. N. Windeballe.

Milvus ictinus.

En Glente saas d. 17.5.1922 flyvende fra Fyn over Fredericia og videre mod N., meddeler Conservator C. N. Windeballe.

Upupa epops.

En Hærfugl blev skudt ved Egebæksande i Thy d. 14.10.1919 af Isenkræmmer O. E. Lund, efter hvis Død den er indgaaet i Zoologisk Museum.

Cinclus aquaticus.

To Vandstære, Han og Hun, bleve skudte ved Follerup Mølle ved Fredericia d. 24.3.1923 og sendte til Udstopning hos Conservator A. Windeballe.

27—12—1923.

Videnskabelige Meddelelser

fra

Dansk naturhistorisk Forening i København

Bind 77.

Udgivne af Selskabets Bestyrelse.

Med 4 Tavler, 184 Figurer og 1 Tabel i Teksten.

Ottende Aartis femte Aargang. I.

København
I Kommission hos C. A. Reitzel.
1924.

Redaktionen af dette Bind er besørget af Dr. phil. *Th. Mortensen.*

Andelsbogtrykkeriet i Odense.

Indhold.

Det foreliggende 77. Bind af *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København* danner Fortsættelsen af Bindene 73 og 75 og indeholder udelukkende Afhandlinger baserede på Materiale indsamlet under Dr. Th. Mortensen's Pacific Expedition 1914—16 og Den danske Expedition til Kei-Øerne 1922.

Omkostningerne ved Publikationen af dette Bind er afholdt af et til dette Formål af Rask-Ørsted Fondet bevilget Beløb. For denne Bevilling ønsker jeg herved at bringe Direktionen for Rask-Ørsted Fondet min bedste Tak.

The present volume 77 of *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i København* forms the continuation of volumes 73 and 75 and contains exclusively papers dealing with material collected during Dr. Th. Mortensen's Pacific Expedition 1914—16, and The Danish Expedition to the Kei-Islands, 1922.

The expenses of the publication of this volume are supplied by an amount granted for this purpose by the Rask-Oersted Fund. I beg herewith to express my best thanks to the Board of Directors of the Rask-Oersted Fund for this grant.

København i December 1924.

DR. TH. MORTENSEN.

Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XIX.

New Zealand Mollusca.

(With Plates I—II and 24 text-figures.)

By

Nils Hj. Odhner, Stockholm.

Our knowledge about the molluscan fauna of N. Zealand must be admitted to be rather satisfactory thanks to the extensive works made by collectors and investigators from within and without the country. The high state of the New Zealand malacozoology was manifested in 1913 by the appearance of Suter's Manual of New Zealand Mollusca, giving a complete account of the composition of the fauna up to date of issue and invaluable to students on the same subject, on account of its modern systematic arrangement and accurate descriptions of every species.

This manual will certainly for a long time be a foundation and also a stimulation to further research with the view to bring New Zealand malacozoology to a still higher completion. As a contribution to this task, taken up by resident authors, I think the present publication may count upon interest. It deals with the abundant collections of mollusca brought home by Dr. Th. Mortensen from his exploration journey to New Zealand in 1914 and 1915. They were gathered in a great number of localities, most of them situated all round the North Island; a couple of yielding hauls were also made in the South Island, and further towards the South the collecting work was concentrated to Stewart, Auckland and Campbell Islands. A summary of all the localities from where marine mollusca were obtained begins the account, and in the following text a station number refers to this list.

In this paper are recorded 379 species of mollusca, and, among these, 29, all marine forms, are described as new to science. Most of them (19) were found on the coast of the North Island, and of these 9 come from its northernmost part (localities 1—5), which seems to have been but little explored. At Auckland Island 6 new forms were dredged, from Campbell Island 4 are described and from Stewart Island 1. Beside these new species there are added 6 species new to N. Zealand, which belong to the E. Australian and Tasmanian fauna.

Three new genera have been created (viz. *Liracraea*, *Runcinella*, *Neogaimardia*), and 7 previously extra-zealandian genera are now recorded from the Dominion, viz. *Fossarus*, *Prosipho*, *Heterocithara*, *Asperdaphne*, *Eucyclotoma*, *Cerithium*, and *Spaniorinus*. *Liracraea* and *Runcinella* are endemic genera; the latter is most nearly related to the Atlantic and Mediterranean *Runcina; Fossarus* and *Neogaimardia* are common to the Peronian region of E. Australia and Tasmania, and the latter is not known outside of this region. *Heterocithara* and *Asperdaphne* have recently been created (1922) by Hedley for Australian Turrid genera; *Eucyclotoma* Boettger, also accepted by Hedley, and *Cerithium* have a wide Indo-Pacific range. *Prosipho* is subantarctic, and *Spaniorinus*, constituted by Dall 1900, comprises only fossil forms from the Tertiary of N. America and Europe.

Three families previously not represented in the New Zealand fauna are added here: *Fossaridae* (for *Fossarus*, of which 4 new and one known species are reported), *Runcinidae* (for *Runcinella*) and *Galeommatidae* (for *Spaniorinus*).

As to the nomenclature, which offers great difficulties and is still in a state of confusion, I have followed Suter in all cases where his names have not been subsequently corrected or changed, according to nomenclatorial rules. A revision has proved to be necessary, and, above other authors, Iredale has fulfilled this task with his "Commentary on Suter's Manual of the New Zealand Mollusca", which forms a valuable and indispensable complement to Suter's work. Iredale's corrections were accepted in this paper, whenever they had been clearly proved to be well founded and inevitable from nomenclatorial or systematical points of view. In some cases, however, I have thought it better to keep the old names of genera, until convincing reasons for a changement shall have been adduced. Subdividing and nominating at random for the single reason that a genus is comprehensive anticipates a critical disentangling of the taxonomic questions, which must be based on morphological facts obviously stated, and is, to speak with Pilsbry in a similar connection, "neither good science nor sound ethics" and only encumbers the subject with meaningless names.

In illustrating the new species I have had a valuable help in Mr. G. Liljevall, whose skilful hand has drawn plate-figs. 3, 15, 24, 26, 28 and 36—39, as also the text-figures 1, 2, 23.

The collections belong to the University Museum of Copenhagen.

List of Localities of Marine Mollusca.

North Island:

1. Three Kings Islands, 65 fathoms, hard bottom, dredge. 5/1 1915.
2. Cape Maria van Diemen, 10 miles N. W., 50 fms, hard bottom, dredge. 4/1 1915.
3. Cape Maria van Diemen, the coast, shaken from algae. 4/1 1915.
4. 2 miles E of North Cape, 55 fms, hard bottom, dredge. 2/1 1915.
5. North Cape, the coast, under stones. 3/1 1915.
6. Bay of Islands, 2 fms, on Fucaceae with Bryozoa and Hydroids. 1/1 1915.
7. Bay of Islands, the coast, under stones. 31/12 1914.
8. — , muddy estuary. 1/1 1915.
9. Cape Brett, the coast, on rocks among Corallinae. 31/12 1914.
10. Little Barrier Island, 30 fms, shell bottom, dredge. 29/12 1914.
11. Hauraki Gulf (North Channel, Kawaii Isl., Moko Hinau Isl., Hen & Chickens Isl., Puhoi Rock).

11a. North Channel, Kawaii Isl., 10 fms, hard bottom. 29/12 1914.
11b. Moko Hinau Isl., 5 fms. 30/1 1914.
11c. Hen & Chickens Isl., 50 fms, hard bottom, dredge. 30/12 1914.
11d. Puhoi Rock, the coast, under stones. 29/12 1914.

12. Ponui Island, the coast, under stones. 24/12 1914.
13. Tiri-Tiri, 15 fms, mud, dredge. 29/1 1915.
14. Takapuna Beach, the coast, under stones. 23/12 1914.
15. Rangitoto, the coast, under stones. 27/12 1914.
16. Colville Channel, 35 fms, sand, mud, dredge. 21/12 1914.
17. Slipper Island, the coast, at low water. 20/12 1914.

18. Off White Island, 37^{0} 40' S, 177^{0} 1' E, 55 fms, muddy sand, dredge. 19/12 1914.
19. Mahia Peninsula, the coast, under stones, at low water. 18/12 1914.
20. Portland Island, the coast, at high water, under kelp, wood etc. 18/12 1914.
21. Cape Kidnappers, the coast. 31/1 1915.
22. Wellington Harbour, 5—10 fms, hard bottom, dredge. 16/2 1915.
23. Plimmerton, the coast. 15/1 1915.
24. New Plymouth, 8 fms, hard bottom, dredge. 12/1 1915.
25. Off Albatross Point, 25 fms, sand, dredge. 11/1 1915.
26. Manukau, the coast. 11/1 1915.
27. Onehunga, the coast. 10/1 1915.
28. Kaipara, the coast. 9/1 1915.

South Island:

29. Queen Charlotte Sound, 3—10 fms, hard, locally muddy bottom, dredge. 20/1 1915.
30. Akaroa Harbour, the coast, under stones. 27/12 1914.

Stewart Island:

31. Paterson Inlet, the coast. 18/11 1914.
32. — , 5—15 fms, mud, dredge. 17/11 1914.
33. Pegasus Bay, the coast, under stones, at low water. 26/11 1914.
34. Port Pegasus, the coast, under stones. 22/11 1914.
35. — , 25 fms, clayish mud, dredge. 20/11 1914.
36. Halfmoon Bay, the coast. 19/11 1914.

36a. — 5—7 fms, sand. 19/11 1914.

Auckland Island:

37. Port Ross, the coast, under stones, at low water. 26-27/11 1914.

37a. Port Ross, 10 fms, sand, algae, dredge. 25/11 1911.

38. Normans Inlet, the coast. 28/11 1914.
39. Amokura Harbour, the coast, at low water. 30/11 1914.
40. Carnley Harbour, the coast, under stones. 29/11 1914.
41. — , Masked Island, Figure 8 Island. 2-3/12 1914.

42. Carnley Harbour, Coleridge Bay, 25 fms, sandy mud, dredge. 4/12 1914.
43. Carnley Harbour, 45 fms, sandy mud. 6/12 1914.

Campbell Island:

44. Perseverance Harbour, the coast, under stones, at low water. 9-10/12 1914.
45. Perseverance Harbour, 20 fms, sandy mud, dredge. 10/12 1914.

Species Obtained.

Polyplacophora.

Lepidopleurus inquinatus Reeve (?*iredalei* Ashby).
(Pl. I, figs. 1, 2.)

South Island: 29, 3 sps., l.[1]) 10. — Stewart Island: 31, 4 sps., l. 12. — 32, 1 sp., l. 13. — Auckland Island: 37a, 1 sp., l. 10. — 43, many sps., l. 8. — Campbell Island: 45, 2 sps., l. 9.

Remark. There is some variation in the sculpture in this species, the grains being somewhat larger than usual, by which their radial arrangement at the lateral areas may be less distinct on account of their crowded disposition; this is obvious in the specimens from Campbell Island (fig. 1). Mr. Ashby (1921 and 1923a) has discussed identity and nomenclature of this species.

Ischnochiton maorianus Iredale (=*longicymba* Quoy & Gaimard, non Blainville).

North Island: 7, 4 sps., l. 30. — 11a, many sps., l. 38. — 11d, many sps., l. 26.5. — 17, many sps., l. 35. — 19, many sps., l. 35. — South Island: 30, 3 sps., l. 34. — 36, 2 sps., l. 12. — 34, many sps., l. 22. — Auckland Island: 37, many sps., l. 16. — 39, 1 small sp. — 41 (Masked Island, the coast), 1 small sp. The confusion between the present species and *Stenochiton longicymba* Q. & G. has been discussed by Ashby, 1923 (b).

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[1]) l., h., d., br. = abbreviations for length, height, diameter, breadth. The following number indicates the measure in mm.

Ischnochiton luteoroseus Suter.

North Island: 11a, 3 small sps. — 11b, 4 sps., l. 6.5. — Auckland Island: 37a, 3 sps., l. 7. — 42, 1 sp., l. 8.

Ischnochiton campbelli (Filhol) (=*parkeri* Suter).

Auckland Island: 37, 1 sp., l. 12.5. — 40, many sps., l. 17. —41, Figure 8 Island, the coast, under stones, at low water, 1 sp., l. 10. — Campbell Island: 44, many sps., l. 19. — 45, 1 sp., l. 13.5.

Callochiton empleurus (Hutton).

Campbell Island: 45, 6 sps., l. 9. They are probably not full-grown, since there are 6—7 pits on the sides of the lateral areas. Suter has not stated the number of slits in the terminal valve, because of the scarceness of his material. They amount to 14. In the anterior valve there were about 23 irregularly disposed ones. Miss Mestayer (1921) examined a specimen from Foveaux Strait and found 11 slits in the posterior valve and 14 in the anterior.

Callochiton mortenseni n. sp.
(Text-figs. 1, 2).

Shell ovate, dark-brown, shining, smooth, bluntly keeled dorsally, slightly convex at the lateral slopes. Anterior valve a little broader than the posterior one, with a few concentric growth-lines (in the one specimen with 4 concentric regularly distant sulci), otherwise smooth and showing only microscopic radiating striae and impressed dots which are densest towards the margin. Intermediate valves beaked, with elevated lateral areas, totally smooth except for lines of growth (and occasional impressed dots towards the margins, and furrows: 4 concentric ones in one specimen), microscopically striated longitudinally. Posterior valve with a premedian mucro; its central area separated, by means of straight lines, from the posterior elevated area, which has a straight or slightly concave slope. All valves porous, the pores appearing as microscopical regular dots all over the surface. Eyes in a small number, occupying a median ray on the lateral areas, most obvious in their upper parts. Girdle narrow, rusty brown, lighter at the margin, with close elongate scales and fringed with short acicular ones. Interior of the valves crimson; anterior valve with 16 slits, posterior one with 12, median valves with 4 or 5; teeth solid, propped outside, eaves porous, sutural plates united, sinus shallow, broad. — Gill cordon extending from the anterior corners of the foot to near the foot end.

Locality: Campbell Island, 45, 2 sps., max. l. 13, br. 8.5 mm.

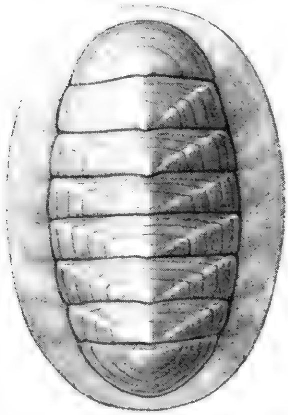

Fig. 1. *Callochiton mortenseni* n. sp. × 4.

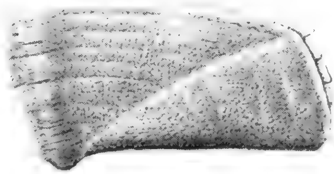

Fig. 2. Right half of an intermediate valve of *Callochiton mortenseni* n. sp. × 10.

Compared with *C. steinenii* from South Georgia, which has a similar colour, the present species shows much smaller and denser girdle-scales, as well as completely smooth, not granulose, and distinctly microscopically striated valves; in the latter respect it differs also from *C. platessa*, in which a tendency to granulation of the lateral and central areas appears. The number of slits of the intermediate valves (in *C. steinenii* 2, in *C. platessa* 3) is another point of distinction.

Callochiton sulculatus Suter.

North Island: 11a, 1 sp., l. 10. — Colour coralline red, lateral areas white clouded; 6th and 7th valve of a whitish colour (except the red apices) which occupies also the adjacent part of the girdle. In its sculpture the present specimen shows the peculiarity of having the sulci of the lateral areas most distinct on plate 6 and 7, 2 and 1.

Plaxiphora caelata (Reeve).

North Island: 2, 3 sps., l. 7. — 9, many small sps., l. 15.

Plaxiphora aurata (Spalowsky) (=*superba* (Pilsbry).

North Island: 26, 2 small sps. — Auckland Island: 37 numerous sps., l. 70. — 40, 2 sps., l. 57. — 41, 1 sp., l. 30. — 39, 1 small sp. — Campbell Island: 44, many sps., l. 90.

Acanthochiton zelandicus (Quoi & Gaimard).

North Island: 7, many sps., l. 17. — 11a, 1 sp., l. 16. — 12, 7 sps., l. 12. — 15, 2 sps., l. 15. — 19, 2 sps., l. 13. — 28, 3 sp., l. 19. — South Island: 29, 4 sps., l. 17. — Stewart Island: 31, many sps., l. 30. — 33, 1 sp., l. 13. — 34, 4 sps., l. 32. — Mr. Ashby (1920) records this species from N. S. Wales.

Cryptoconchus porosus Burrow.

North Island: 22, 2 sps., l. 35. — South Island: 29, 5 sps., l. 34. — Stewart Island: 31, 2 sps., l. 40. — Stewart Island, without definite locality, 20 fms, hard bottom, 16/11 1914, 2 sps., l. 50.

Craspedochiton rubiginosus (Hutton).

North Island: 1, 1 sp., l. 16. — 10, 2 sps., l. 13. — 11a, 6 sps., l. 12. — 13, 1 sp., l. 18. — South Island: 29, 6 sps., l. 18. — Stewart Island: 32, 1 sp., l. 7.

Loboplax violaceus (Quoy & Gaimard).

North Island: 11a, 7 sps., l. 38. — 14, 1 sp., l. 24. — 22, 2 sps., l. 58. — 23, 1 sp., l. 28. — For the name see Ashby 1920.

Sypharochiton pellisserpentis (Quoy & Gaimard).

North Island: 7, 1 sp., l. 18. — 11a, many sps., l. 16. — Stewart Island: 31, 2 sps., l. 27.

Var. *sinclairi* (Gray).

North Island: 12, 3 sps., l. 14. — 15, 1 sp., l. 12. — 19, 2 sps., l. 13. Mr. Ashby (1922) considers *Sypharochiton sinclairi* as a smooth variant of *S. pellisserpentis*.

Amaurochiton glaucus (Gray) (=*Chiton quoyi* Deshayes).

North Island: 7, 5 sps., l. 20. — 11a, 1 sp., l. 22. — 11d, 3 sps., l. 25. — 12, some sps., l. 18. — 17, many sps., l. 40. — 19, many sps., l. 40. — South Island: 30, many sps., l. 23. — Stewart Island: 31, many sps., l. 25.

Rhyssoplax aerea (Reeve).

Auckland Island: 40, 1 sp., l. 20.

Rhyssoplax canaliculata (Quoy & Gaimard).

North Island: 17, 1 sp., l. 27. — 22, 1 sp., l. 15. — South Island: 29, many sps., l. 18.5. — Auckland Island: 40, 3 sps., l. 40.

Rhyssoplax huttoni (Suter).

North Island: 15, 2 sps., l. 25. — 17, 4 sps., l. 35. — 19, 5 sps., l. 35. — South Island: 30, many sps., l. 35. — Stewart Island: 31, numerous sps., l. 20.

Rhyssoplax suteri (Iredale) (=*Chiton stangeri* Suter).

North Island: 11a, 1 sp., l. 6.2. Colour red, with white apices and white spots on the lateral areas; girdle white and red banded.

Eudoxochiton nobilis (Gray),

North Island: 17, 1 sp., l. 50. — 23, 1 sp., l. 55. — Stewart Island: 34, 1 sp., l. 73.

Onithochiton marmoratus Wissel (=*nodosus* Suter).

North Island: 17, 1 sp., l. 8.

Onithochiton neglectus Rochebrune (=*O. undulatus* Quoy & Gaimard).

North Island: 17, 7 sps., l. 29. — South Island: 29, 3 sps., l. 10. — Stewart Island: 31, 6 sps., l. 19. — 34, 4 sps., l. 33. — Auckland Island: 37, 4 sps., l. 26 (+ var. *subantarcticus*). — 40, many sps, l. 35 (+ var. *subantarcticus*). — 41, Masked Island, under stones at low water, 1 sp., l. 23, and on rocks with Melobesia, 2 small sps. — 1 mile S of Auckland Island, on floating

Lessonia, 28/11 1914, 4 sps., l. 23. — Campbell Island: 44, many sps., l. 45 (+ var. *subantarcticus*). — Mr. Iredale (1915) considers *subantarcticus* as a species of its own.

Gastropoda.

Fam. **Acmaeidae**.

Acmaea campbelli (Filhol).

Campbell Island: 44, many sps., l. 5.5; 7.2 (dead), on Macrocystis.

Acmaea cantharus (Reeve).

Stewart Island: 36, 2 sps., l. 7. — Auckland Island: 37, many sps., l. 10. — 38, 1, l. 13. Iredale (1915, p. 429) considers this form as not distinct from *A. pileopsis*.

Acmaea unguis-almæ Lesson (=*fragilis* Chemnitz).

North Island: 17, many sps., l. 12. — 19, 2 sps., l. 12.5.

Acmaea pileopsis (Quoy & Gaimard).

North Island: 17, some sps., l. 14. — Auckland Island: 37, numerous sps., l. 33. — 39, many sps., l. 30. — 1 mile E of Auckland Island, on floating Lessonia, 28/11 1914, some small sps. — Campbell Island: 44, 1 sp., l. 13.5.

Acmaea helmsi Smith (=*septiformis* Quoy & Gaimard by Suter).

Auckland Island: 37, numerous sps., l. 19. — 39, many sps., l. 8.3. — Campbell Island: 44, 6 sps., l. 19.

Patelloida (Acmaea) stella (Lesson).

North Island: 4, 1 dead shell, l. 19. — 9, many sps., l. 8 (var. *corticata* Hutton).

Fam. **Patellidae**.

Nacella fuegiensis (Reeve).

Auckland Island: 37, 8 sps., l. 13. — Campbell Island: 44, many sps., l. 46.

Cellana (Helcioniscus) denticulata (Martyn).

Stewart Island: 31, many sps., l. 51.

Cellana (Helcioniscus) ornata (Dillwyn).

North Island: 19, 4 sps., l. 30. — South Island: 30, many sps., l. 24. — Stewart Island: 31, many sps., l. 40. — 36, many sps., l. 31.

Cellana (Helcioniscus) radians (Gmelin).

North Island: 11d, 1 sp., l. 14. — 17, some sps., l. 20. — 19, many sps., l. 50, (+ var. *flavus* Hutton, many sps., l. 44, and other var.) — Stewart Island: 31, 2 sps., l. 46. — 36, 2 sps., l. 36. — Auckland Island: 37, 3 sps., l. 36 (+ var. *decorus* Philippi; many sps., l. 70). — 40, 1 sp., l. 29. — Campbell Island: 44, 1 sp., l. 51 (+ var. *decorus*, 3 sps., l. 59).

Cellana strigilis (Hombron & Jacquinot) (=*Helcioniscus redimiculum* Reeve).

Stewart Island: 36, 8 sps., l. 30.

Cellana (Helcioniscus) stellifera (Gmelin).

Stewart Island: 31, 1 sp., l. 25.

Fam. **Scissurellidae.**

Schismope brevis Hedley.

North Island: 3, 1 small sp. — 9, 1 sp., diam. 0.9 mm.

Fam. **Haliotidae.**

Haliotis australis Gmelin.

North Island: 17, 2 sps., l. 53. — 19, 2 sps., l. 68. — Stewart Island: 34, 1 sp., l. 53.

Haliotis iris Martyn.

Nort Island: 4, 4 sps., l. 50. — 17, 5 sps., l. 48. — 19, 8 sps., l. 71.

Haliotis virginea Gmelin.

Auckland Island: 37, 5 sps., l. 61. — 40, many sps., l. 59. 41 (Masked Island, under stones, at low water, 3/12) 2 sps., l. 50.

Fam. **Fissurellidae**.

Incisura lytteltonensis (E. A. Smith).

North Island: 3, many sps., l. 1.3 mm.

Emarginula striatula Quoy & Gaimard.

North Island: 1, 1 fragment. — 10, 2 sps., l. 10. — 11a, 2 sps., l. 8.5. — 16, 4 sps., l. 16.5.

Tugalia (Subemarginula) parmophoidea (Quoy & Gaimard).

North Island: 4, 3 sps., l. 28. — 10, 1 sp., l. 14.7. — 17, many sps., l. 35. — Island Bay, the coast, 22/1 1915, 1 small sp. — South Island: 29, 5 sps., l. 27.

Scutus ambiguus (Chemnitz).

North Island: 15, 1 sp., l. 52 (animal). — 17, 1 sp., l. 35 (animal). — South Island: 29, 2 sps., l. 9 (shell). — Stewart Island: 31, 1 sp., l. 17 (shell).

Puncturella demissa Hedley.

Stewart Island: 36a, 5 shells, l. 2.2.

Fam. **Trochidae**.

Thoristella (Trochus) chathamensis (Hutton).

Auckland Island: 37, some small sps., diam. 6.5. — Campbell Island: 44, 3 sps., d. 6.5.

Thoristella (Calliostoma) aucklandica (E. A. Smith).

Auckland Island: 40, 2 sps., d. 3.7. — 42, 1 sp., d. 6, h. 5.2 mm.

Thoristella (Trochus) oppressa (Hutton).

North Island: 19, 1 dead shell, d. 4.5.

Trochus tiaratus Quoy & Gaimard.

North Island: 11a, 1 sp., d. 14. — 25, 1 sp., d. 12. — South Island: 29, many small sps., d. 16.

Trochus viridis Gmelin.

North Island: 24, 1 sp., h. 15. — South Island: 29, 4 sps., h. 20.

Monodonta coracina (Troschel).

North Island: 19, 3 sps., d. 16. — Auckland Island: 37, many sps., d. 17.5. — 38, many sps., d. 11. — 39, 2 small sps. — 40, 4 sps., d. 12.5. — 41, Masked Island, the coast, on stones at low water, 2 sps., d. 19.

Monodonta aethiops (Gmelin).

North Island: 12, 1 sp., d. 10. — 19, many sps., h. 21. — 28, 1 sp., h. 24. — 20, some sps., h. 17.5. — South Island: 30, many sps., d. 17, h. 16.5. — Stewart Island: 31, some sps., h. 30.

Monodonta corrosa (Adams).

Auckland Island: 41, Masked Island, the coast, under stones, at low water, 1 dead shell, h. 16. — 37, many sps., h. 24.

Monodonta lugubris (Gmelin).

North Island: 17, 2 sps., d. 14. — 19, 5 sps., d. 12.

Monodonta crinita (Philippi).

North Island: 8, 7 sps., h. 13.5.

Cantharidus dilatatus (Sowerby).

North Island: 22, 3 sps., h. 6.5. — 23, 1 sp., h. 7. — South Island: 29, 4 sps., h. 8. — Stewart Island: 32, many sps., h. 8. 36a, 1 sp., h. 5.5.

Cantharidus opalus (Martyn).

North Island: 5, 1 sp., h. 43. — 24, 2 sps., h. 39. — Stewart Island: 35, 1 sp., h. 44.5. — 36a, 2 sps., h. 35.

Cantharidus capillaceus (Philippi) (=*pruninus* Gould).

Auckland Island: 37, many sps., h. 18. — 38, 1 sp., h. 22. — 40, 2 sps., h. 19. — Campbell Island: 44, numerous sps., h.

22. — 45, 1 sp., h. 4.3 (without external shell layer, thus entirely nacreous, with deeper spiral striae than usually, when living on Macrocystis).

Cantharidus purpuratus (Martyn).

North Island: 4, 2 sps., h. 22. — 11a, 2 sps., h. 24. — South Island: 29, 3 small sps., h. 21.5.

Cantharidus tenebrosus A. Adams.

North Island: 12, 1 sp., h. 8. — South Island: 30, 1 sp., h. 6. — Stewart Island: 31, many sps., h. 13.

Margarella (Photinula) antipoda (Hombron & Jacquinot).

Auckland Island: 37, 4 sps., h. 9. — Campbell Island: thrown on the shore, 1 small sp.

Margarella (Photinula) decepta (Iredale).

Stewart Island: 36, 2 sps., d. 8.5. — Auckland Island: 37, many sps., d. 8, h. 7. — 40, many sps., d. 9. — Campbell Island: many sps., d. 8.5.

Gibbula fulminata (Hutton).

North Island: 2, 2 small sps.

Gibbula micans Suter.

North Island: 19, 5 sps., h. 6. — Stewart Island: 36a, 1 fragm.

Gibbula mortenseni n. sp.
(Pl. I, fig. 3.)

Shell globose solid, finely rimate, whorls flattened, angled above, obtusely rounded below, base slightly convex, suture impressed. Sculpture consisting of spiral ridges separated by a little narrower furrows, ridges beaded on the spire, smooth on the base, their number 5 on the penultimate whorl, 10 on the base: the 3 upper furrows on the penultimate whorl with a fine intercalating thread. Colour white with red spots on the ribs set in longitudinal series, spire crimson, grooves with a light greenish nacreous lustre. Protoconch smooth, white, of 1 1/2 whorls, the following 5 whorls spirally lirate. Aperture quadrangular, oblique, iridescent and lirate within, outer lip thin, slightly indented. Columella vertical, white, with a submedian tubercle and a narrow callous reflection; no callous covering on the parietal wall. Dimensions: H. 5.5, d. 5.2 mm. Locality: Auckland Island, Carnley Harbour, 45 fms, sandy clay, 4/2 1914, 2 sps.

Gibbula scamnata Fischer.

North Island: 21, 4 sps., h. 3.8. — Stewart Island: 36a, 2 sps., h. 8.

Gibbula suteri (E. A. Smith).

North Island: 20, 1 sp., h. 3.6.

Solariella (Monilea) egena Gould.

Stewart Island: 36a, 1 sp., d. 4.

Solariella (Monilea) plicatula (Murdoch & Suter). (=*Minotia plicatula* Murd. & Suter).

North Island: 16, many sps., d. 2.5. — 18, 1 sp., d. 2.2. — Stewart Island: 31, 2 sps., d. 4.5.

Calliostoma pellucidum (Valenciennes).

North Island: 10, 3 sps., h. 34. — 11a, 1 sp., h. 22.

Calliostoma punctulatum (Martyn).

North Island: 11a, 5 sps., h. 30. — 11b, 1 sp., h. 32. — 19, 1 sp., h. 41. — 22, 1 sp., h. 26. — 24, 1 sp., h. 23. — South Island: 29, 3 sps., h. 30.

Calliostoma tigris (Martyn).

North Island: 10, 1 sp., h. 25. — 11b, 1 sp., h. 54.

Calliostoma trepidum Hedley.

North Island: 2, 1 small specimen, h. 3, d. 2.7 mm; whorls 4. — 16, 1 empty shell, h. 2.5.

The colour and the sculpture of the present shell are entirely in accordance with the descripton and the figure given by Hedley (1907, p. 490, pl. XVI, fig. 3). Hedley describes the apex as "minute, rather tilted, unsculptured, of a whorl and a half". In the present specimens the apex has a finely reticulated sculpture consisting of fine elevated lines surrounding small oval depressions. This sculpture of the protoconch seems to be common in the genus *Calliostoma* though generally obliterated by wearing. I have observed it in *C. pellucidum,* the new *C. onustum*, and in the European *C. conulus*, and Suter mentions it in *C. tigris.* It will certainly prove to be a characteristic feature of the genus.

Calliostoma onustum n. sp.

(Pl. I, fig. 4.)

Shell small, conic-elongate, solid, imperforate, white and nacreous. Whorls 7 1/2, flattened, separated by a shallow suture, the 2 first papillate, spirally lirate and with traces of reticulated sculpture as in *C. trepidum* (cf. above), the subsequent ones with about 5 spiral keels and longitudinal costae (18 in the last and the penultimate whorl), nodose in the points of intersection, the nodules most prominent in the 2 lowest lirae of the whorls. Last whorl angulated at the periphery; below the 5th spiral lira there are 2 thinner ones at the angle; they are limited on the base by a broad furrow; base flattened, carrying 6 or 7 coarse lirae, the outermost one almost smooth, bipartite all along, the remaining ones regularly granose. Aperture subquadrate, white and nacreous within; lower lip subcrenate, outer lip simple, columella straight, rounded below, forming a nearly right angle with the parietal wall, which does not show any trace of a callous covering. Dimensions: H. 6.6, br. 4 mm. — Locality: North Island: 2, 2 shells, the larger one with a Pagurid. The second, small specimen has a broader conic shape and 8 basal spiral cords. The reticulation of its protoconch is very distinct.

Euchelus bellus Hutton.

North Island: 7, 1 sp., h. 6. — 11d, 2 sps., h. 6.7. — 14, 2 sps., h. 6.

Fam. **Vitrinellidae**.

Brookula corulum (Hutton).

Two dead specimens of the present form, referred by Hutton to *Lissospira* but established by Iredale (1915) as a genus of its own, were found at North Island: 2, 1.1.

Fam. **Turbinidae**.

Turbo smaragdus (Martyn).

North Island: 12, many small sps. — 14, 1 sp., d. 23.5. — 19, 7 sps., h. 41, d. 42. — South Island: 30, many sps., h. 42, with *Siphonaria cookiana*.

Turbo granosus (Martyn).

Stewart Island: 35, 2 sps., h. 28.

Astraea heliotropium (Martyn).

North Island: 16, 1 sp., d. 97. — Stewart Island: 33, 2 sps., d. 85. — Stewart Island: 20 fms, hard bottom, 16/11 1914, 4 sps., d. 92.

Fam. **Umboniidae**.

Umbonium (Ethalia) zelandicum (Hombron & Jacqinot).

North Island: 5, 3 sps., d. 17. — Stewart Island: 36a, many sps., d. 16.

Fam. **Neritidae**.

Nerita melanotragus E. A. Smith.

North Island: 17, many sps., l. 23. — 19, 5 sps., l. 28.

Fam. **Cocculinidae**.

Cocculina compressa Suter.

North Island: 16, 1 sp., l. 4.5.

Fam. **Littorinidae.**

Littorina cincta Quoy & Gaimard.

North Island: 3, some small sps. — Stewart Island: 36, 4 sps., h. 11.5. — Auckland Island: 37, many sps., h. 18.

Littorina infans E. A. Smith.

North Island: Cape Maria v. Diemen, shaken from algae, some small sps., max. h. 1.3 mm, whorls 4.

Compared with specimens of this species from Sydney, sent by the Australian Museum, the samples at hand prove to be identical, as they have the same dark-brown colour with the yellow basal band appearing most clearly within the aperture. The specimens are not full-grown, and may be taken for juvenile stages of *L. cincta*, but they have a smoother incremental sculpture. The species is now for the first time recorded from N. Zealand.

Littorina mauritiana (Lamarck).

North Island: 3, some small sps. — 9, 2 small sps. — 11d, some small sps. — 19, numerous small sps., h. 11, high above the water, or in pools beneath plants. — Island Bay, Wellington, the coast, 22/1 1915, 4 small sps.

Laevilitorina antipodum (Filhol).

Campbell Island, 44, numerous sps., h. 5.

Fam. **Fossaridae.**

Fossarus ovatus n. sp.
(Pl. II, fig. 58.)

Shell small, fragile, elongate-ovate, hyaline white, shining, rimate. Whorls 4 1/2, separated by a deep suture. Protoconch (the first 2 whorls) smooth; apex somewhat obliquely flattened; the subsequent whorls convex. Spire as high as aperture, with convex outline; base slightly convex. Sculpture: very fine spiral striae at regular intervals, the two uppermost striae below the suture broader; besides fine lines of growth, a little flexuous, here and there somewhat elevated to fine longitudinal riblets causing an indistinct reticulation.

Aperture narrowly ovate, angled above, its left contour slightly concave throughout (parietal wall not convex); peristome thin, continuous; outer lip sinuous below the suture, produced below the middle, under lip somewhat retreating, and slightly bent down, forming a shallow and broad sinus. Columella oblique, slightly curved, straight in the middle, columellar lip rather broadly reflected limiting an umbilical fissure and continuous on the parietal wall in a thin but distinct callus. Dimensions: H. 2.6, br. 1.4 mm. — Locality: North Island: 16, a few dead shells.

No representative of the genus *Fossarus* was until now known in New Zealand. In this paper 5 species are recorded. The present one seems to be closely related to *F. bulimoides* Tenison-Woods figured by Tate & May (1901, pl. XXVI, fig. 66).

Fossarus conicus n. sp.
(Pl. II, fig. 59.)

Shell small, fragile, conical, opaque white, a little shining, rimate. Whorls 6, convex; suture subcanaliculate. Apex obliquely flattened; protoconch (2 whorls) smooth, of a yellowish-brown colour. Spire as high as aperture, with straight outlines; base slightly convex. Sculpture indistinct, consisting of faint distant spiral threads, visible only in places, and irregular flexuous lines of growth here and there appearing as low riblets. Aperture narrowly ovate, angled above, its left contour undulating (parietal wall convex, columella concave); peristome thin, outer lip protracted below the middle, and lower lip sinuous as in the preceding species; columellar lip narrow, reflected, bounding a very narrow umbilical fissure; parietal callus very thin. Dimensions: H. 3, br. 1.7 mm. — Locality: North Island: 16, 3 empty shells.

Fossarus productus n. sp.
(Pl. II, fig. 60.)

Shell small, fragile, turreted, dull white, opaque, rimate. Whorls 5 1/4, convex, suture deep, apex papillate; protoconch of 2 whorls, smooth; next whorl smooth, the 4th and subsequent with regular close, revolving cords and narrower sulci between them, the uppermost 4 cords stronger, with somewhat broader interspaces, the uppermost cord separated from the suture by a smooth (or faintly sulcate) zone; lines of growth rather inconspicuous. Spire about 1 1/2 times the aperture in height, with straight outlines; base slightly convex. Aperture narrowly ovate, rounded above; peristome thin, continuous; outer lip a little produced below the middle; under lip narrowly sinuous with a few oblique furrows within, corresponding to the spiral cords; columella perpendicular, slowly curved; columellar lip narrow, reflected and appressed, limiting an umbilical groove; parietal callus very thin. Dimensions: H. 2.7, br. 1 mm. — Locality: North Island; 16, 3 empty shells.

Fossarus hyalinus n. sp.
(Pl. II, figs. 61, 62.)

Shell minute, ovate-conic, fragile, hyaline white, umbilicate. Spire a little exceeding the aperture in height, with slightly convex outlines, base a little convex. Whorls 5, convex, sometimes a little flattened above the middle; suture deep, subcanaliculate. Apex blunt; protoconch of 2 smooth whorls, the following smooth or with very indistinct distant spiral striae and fine lines of growth; a more conspicuous, though yet very faint, impressed line in the middle of the last whorl. Aperture ovate, angled above and distinctly incavated by the convex parietal wall. Peristome discontinuous, thin; outer lip sometimes thickened at the inside, sinuous above, much produced below its middle, under lip much retreating to form a deep semicircular sinus, columellar lip simple below, reflected and appressed above; columella perpendicular, convex or carrying an indistinct tooth in its middle; umbilicus comparatively broad but shallow. Dimensions: H. 2, br. 1.3 mm. — Locality: North Island: 16, several empty shells.

The closest relative of this species seems to be *Fossarus minutus* Petterd, described and figured by Tate & May (1901, p. 458, pl. xxvii, fig. 85). The single difference seems to be the smaller size of the type (h. 1.1, br. 0.7 mm), which, however, has 4 whorls only, its continuous peristome and its varicose outer lip. The new species is somewhat varying as to the convexity of the whorls, the more or less pronounced protraction of the outer lip and the presence or absence of a tooth on the columella. Together with *F. minutus* the new species will certainly, as Tate & May mean, prove to merit generic distinction.

Fossarus minutus Petterd.

North Island: 16, several empty shells, max. h. 1.5, br. 1 mm; whorls 5.

To this species I refer a form which at the first glance resembles a small *Rissoa* but which appears to be akin to *F. hyalinus*, from which it differs in its smaller size, more solid shell, continuous peristome, less produced outer lip, and rather shallow sinus of lower lip. The spire varies somewhat in height, being in the largest specimens, with 5 whorls, about $1^1/_2$ times the aperture in height, in smaller ones the spire is proportionally shorter. There is, however, no distinct tooth on the columella in any of the specimens, though a faint convexity may be present. The outer lip may be varicose or not.

Fam. **Risellidae.**

Risellopsis varia (Hutton).

North Island: 3, many small sps. — 9, 3 small sps. — Stewart Island: 31, 2 sps., d. 4.5 (var. *carinata* Kesteven).

Fam. **Rissoidae.**

Rissoa cheilostoma Tenison-Woods.

North Island: 11b, 1 sh., h. 3.

Rissoa foveauxiana Suter.

Stewart Island: 36a, many shs., h. 2.4. — The shells are indistinctly shouldered, the uppermost 4 spiral ridges are stronger than the subsequent ones and have interspaces of the same breadth as the ridges; the remaining ones are narrower. In the penultimate whorl the upper ridges are solely present, the lower ones being extremely faint; there are about 11 spirals in all.

Rissoa roseola Iredale (=*rosea* Hutton, non Deshayes).

Auckland Island: 40, many sps., h. 1.9. — 41, Figure 8 Island, under stones at low water, 2/2 1915, many sps. — 41, Masked Island, on rocks, some sps., h. 1.9.

Rissoa subfusca Hutton.

North Island: 6, 1 small sp. — 19, 2 sps., h. 2.7. — Auckland Island: 40, many sps., h. 2.2. — 41, Figure 8 Island, under stones at low water, many sps.

Rissoa zosterophila Webster.

North Island: 6, many small sps. — 21, many small sps. — Stewart Island: 36a, many sps., h. 2.5. — Auckland Island: 40, 4 sps., h. 2.

Rissoa cylindrella n. sp.
(Pl. I, fig. 14.)

Shell ovate-cylindric, contorted, fragile, slightly shining, imperforate, white. Whorls 5, appressed in their upper half, then convex, the last whorl of half the shell height, base rounded; suture impressed, margined. Protoconch semiglobose, of 1 1/2 whorl, finely spirally striate; subsequent whorls with coarser spiral lirae, numerous (about 24) on the last whorl, broader on the base, and strong, somewhat flexuous, longitudinal costae, about 18 on the last whorl fading below the periphery as well as towards the suture. Aperture ovate, sharply angled above; peristome thin, continuous, outer lip somewhat produced below, thin, not varicose; columella oblique, sinuous; parietal wall with a distinct callus; no umbilicus. Dimensions: H. 2.5, br. 1.1 mm. — Locality: North Island: 2, 1 empty shell.

Rissoa exerta Suter seems to be the next akin species, but differs i. a. in its fewer costae. *R. maccoyi* Tenison-Woods figured by Hedley 1900 (pl. XXVI, fig. 11) is very similar but less contorted, and its costæ appear to reach the suture.

Rissoa semen n. sp.
(Pl. I, figs. 10, 11.)

Shell minute, elongate-ovate, solid, imperforate, polished. Sculpture varying from entirely smooth to showing traces of spiral striae; sometimes a pair of strong revolving keels in the periphery of the last whorl and an obscure one on the base. Colour fulvous, somewhat lighter on the aperture side; inner lip reddish orange. Protoconch finely spirally striated. Spire about 1 1/2 the height of the aperture. Suture shallow. Whorls 5, slightly convex, margined at the suture, the last one rounded in the periphery, flattened above and below. Aperture broadly ovate, fulvous within; peristome thick, continuous, double on account of a small swelling of the lip inside its edge, its colour white, except the reddish-orange columellar lip, which is sunk and sharply set off from the body whorl. Columella short, sinuous. Operculum ovate with a thicker disc on the inside, the margin of which forms a crest along the columellar edge of the operculum. Dimensions: H. 1.5, br. 0.7 mm. — Locality: North Island: 3, a few specimens.

This species belongs to the same group as *R. incidata* and *R. lampra* as well as the new *R. erosa*, but it is more slender; it recalls the first-named in the occasional appearance of a pair of spiral keels.

Rissoa erosa n. sp.
(Pl. I, figs. 12, 13.)

Shell minute, conical, solid, imperforate. Whorls 5, flattened, suture canaliculate. Spire about 1 1/2 times the aperture in height. Protoconch of 1 1/2 whorls, reddish-brown and sculptured with minute grains in many very close spiral lines; subsequent whorls light yellowish-brown with longitudinal costae separated by narrower furrows; above the suture a strong revolving thread; on the last whorl the upper half carrying about 22 longitudinal costæ; the periphery encircled by a pair of strong spiral cords; base flattened and bearing an additional cord. Except for the strong costae and ribs only fine lines of growth. Aperture oblique, rounded-ovate; peristome thick, continuous, and double, with an interior swelling rising from above and below and extending beyond the primary lip externally. Columella oblique, sinuous; columellar lip sunk, brownish. Dimensions: H. 1.5, br. 0.8 mm. — Locality: North Island: 1, some few specimens.

Operculum (fig. 13) ovate, with a thin outer layer and a thick inner one forming a crest-like edge on the columellar side.

Rissoina achatina n. sp.
(Pl. I, figs. 5—9; text-fig. 3.)

Shell elongate conic, imperforate, solid, shining, with faint and obsolete axial sculpture, and fine, sharp, undulating spiral striae indistinct on the base. Colour pure white or white with a brown design in shape of a row of stripes on a white band below the suture, often combined with fulgurating longitudinal lines, which may predominate; often the brown colour markings may be confluent into 1—3 brown bands leaving a white subsutural line or zone; apex and base white. Spire about twice the aperture in height. Whorls 7, slightly convex, the last somewhat more than half the shell height; suture slightly impressed. Protoconch papillate, of 1 1/2 smooth whorls. Aperture oblique, semiovate, subcanaliculate below, angled above; external lip somewhat expanded at the middle. Columella excavated, obliquely truncate at the channel. Operculum (pl. 1, fig. 9) elongate ovate, horny, its inner margin with a small projecting angle near the base below the claviform process, which is situated at the third of the operculum height.

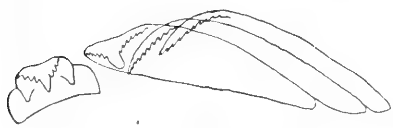

Fig. 3. Radula of *Rissoina achatina* n. sp., half a row. × 440.

Locality: North Island, 11a, 1 sh., h. 4.2. — 11b, many sps., max. h. 6.2, br. 2.2.

In shape and colour this species is very similar to *R. zonata* Suter and above all to *R. variegata* Angas, but it differs in its almost completely failing axial sculpture. The whole shell is peculiarly pierced by fine fissures, here and there widened to short lacunae appearing as opaque white maculations. This may be due to occasional circumstances, e. g. boring organisms.

This species may perhaps be included in *R. hanleyi* of Suter. Having no access to authentic specimens of Suter's species, I prefer to describe and illustrate the species at hand which differs from *R. hanleyi* Schwartz in its faint sculpture. Compared with *R. rugulosa* Hutton the present species is more slender with less convex whorls and less impressed suture, its aperture is less oblique.

Some of the specimens bore egg-capsules deposited on their shells (one is figured).

The radula (text-fig. 3) has the general shape of the teeth; the median tooth has 3—4 denticles on each side of the cusp, the lateral tooth 6 and the 2 marginal teeth many.

Rissoina hanleyi Schwartz.

North Island: 5, 1 sp., h. 5.3. — 7, 1 shell, h. 6.5.

Rissoina emarginata Hutton.

North Island: 16, 1 sh., h. 2.5.

Rissoina chathamensis Hutton (=*rugulosa* Hutton).

North Island: 11d, many sps., h. 6.2. — 19, many sps., h. 7.

Eatoniella (Rissoina) cuvieriana (Suter).

North Island: 3, some very small sps., whorls convex, very indistinct spiral sculpture, shell rimate, colour ashy as in *R. fuscozona*.

Eatoniella (Rissoina) fuscozona (Suter).

North Island: 3, many small sps.

Eatoniella (Rissoina) limbata (Hutton).

North Island: 6, many sps, h. 2.4.

Eatoniella (Rissoina) olivacea (Hutton).

North Island: 3, (var. *lutea* Suter), numerous small sps. — 9, (var. *annulata* Hutton), many small sps. — Auckland Island: 37, many sps., h. 3. — 40, many sps., h. 3.

Fam. **Hydrobiidae**.

Potamopyrgus badia (Gould).

North Island: Lake Takapuna, Auckland, 23/12 1914, many sps., h. 6.

Potamopyrgus corolla (Gould).

North Island: Lake Takapuna, Auckland, 23/12 1914, many sps., h. 4.

Potamopyrgus spelaeus (Frauenfeld).

North Island: Moko Hinau Isl., Hauraki Gulf, brack water pool, 30/12 1914, many sps., h. 2.3 mm (var. *pupoides* Hutton).

Fam. **Cerithiidae.**

Cerithidea bicarinata (Gray).

North Island: 8, many sps., h. 25.

Cerithidea subcarinata Sowerby.

North Island: 7, some sps., h. 11.5. — 19, on Corallinae, numerous small sps., h. 13.

Cerithidea tricarinata Hutton.

North Island: 11d, 1 sp., h. 12. — 12, numerous sps., h. 14. — 15, 1 sp., h. 12.

Cerithium invaricosum n. sp.
(Pl. I, fig. 15.)

Shell turreted-conic, light fawn-coloured with a violet band below the suture. Whorls 9, slightly convex; suture deep, broadly canaliculate. Protoconch of 2 1/2 whorls, smooth, brown, the next whorls reticulate, with three spiral cords and radial ribs of the same breadth; on the penultimate and last whorl 22 longitudinal ribs and 5 flattened spiral cords appearing only in the interstices between the ribs; base with 8 spiral cords (and neck with 2 additional ones) the uppermost (peripherial) one strongest and limiting the ends of the ribs which are not continuous on the base. Aperture rounded square with a very short oblique canal notched in the end. Columella perpendicular. Outer lip simple, inner lip reflected; a very narrow umbilical fissure at the columella. Dimensions: H. 9, br. 4, h. of aperture 2.8, h. of last whorl 4.7 mm. — Locality: North Island: 11b, 1 empty shell. — The total absence of varices and the reticulate sculpture give this species an appearance like a *Cerithidea*.

Fam. **Cerithiopsidae.**

Cerithiopsis canaliculata Suter.

North Island: 16, 1, h. 4.

Cerithiopsis dirempta n. sp.
(Pl. I, fig. 16.)

Shell small, biconical, with convex outlines. Whorls 8 (except the broken protoconch), flat; suture indistinct, impressed and margined. Sculpture: upper whorls with 2 revolving bands with series of uniformly strong subquadrate gemmulae leaving a median zone of the same width showing only axial riblets (low and narrow) combining the gemmulae; their number in the last whorl 17. On the antepenultimate whorl an intermediate riblet appears forming tubercles on the axial costae and increasing in size distally, gemmulae thus getting larger, but still remaining smaller than those of the bands, the upper of which becomes, finally, the broadest. Base with 2 thick entire revolving ridges, the upper one thinner proximally (on the parietal wall above the mouth). Colour reddish-brown, lighter towards apex and base; revolving bands (especially upper one) purplish-brown, gemmulae dirty white. Aperture subquadrate, narrowly canaliculate above, outer lip somewhat produced below, inner lip forming a small tooth when reflected on the upper basal ridge. Columella regularly sinuous, with a thick reflected lip, truncated below; canal very short, curved, with a notched end. Dimensions: H. 3, br. 1.2 mm. — Locality, North Island, 2, 2 empty shells.

From the known New Zealand species of the genus this form is well distinguished in shape and sculpture: on the upper part of the spire there are 2 distant gemmuliferous cinguli, further below there are 3. It seems to be most nearly related to Queensland species such as *C. pinea* Hedley 1909, p. 440, pl. XL., fig. 55).

Cerithiopsis sarissa Murdoch.

North Island: 11a, 1 sp., h. 6. — Auckland Island: 43, 1 sp., h. 7.

Cerithiopsis trizonalis n. sp.
(Pl. I, fig. 17.)

Shell small, turreted, whith straight outlines; whorls 11, plane, suture impressed, not deep. Sculpture: apical 1 1/2 whorls smooth, the subsequent whorl with dense somewhat flexuous axial costae; third whorl with 2 revolving ridges, the under one stronger; in the subsequent whorls coarser axial costae (their number 20—21 on the last whorl), knob-bearing in the crossing points and ending above, below the sutures, with a series of tubercules non combined spirally; below, close above the suture, a fine simple thread, getting coarser on the last whorl and accompanied on the base by a further spiral ridge. Colour grayish-white. Aperture square, with a short canal, notched in the end. Dimensions: H. 3.9, br. 1.1 mm. — Locality: North Island, 16, 1 empty shell.

This species recalls in its sculpture (especially in the existence of a basal riblet) *C. marginata* Suter, which differs, however, in being larger and having only 8 whorls with 2 series of gemmulae, as well as *C. styliformis* Suter, which has only 15 axial costae on the last whorl.

Seila dissimilis Suter.
(Pl. I, fig. 18).

Campbell Island: 45, 10 empty shells, h. 3.8, br. 1.1, whorls 8. — Suter has described and figured (1908) the species from a not full-grown specimen. I give a figure from an adult one. The colour is pale-brown (apex lighter), costae and canal whitish. To Suter's description of the sculpture may be added that the basal spiral ridge appears on the 3—4 lower whorls as a weak thread immediately above the suture.

Seila terebelloides (Hutton).

North Island: 11a, 3 sps., h. 9.5.

Fam. **Triphoridae**.

Triphora infelix Webster.

North Island: 10, 1 sp., h. 8.4.

Triphora lutea Suter.

North Island: 16, 2 sps., h. 3.

Triphora tribulationis Hedley.

To this species I refer a specimen from St. 2 (10 miles off Cape Maria v. Diemen, 50 fms, hard bottom). Its colour is yellowish with rusty bands. The only difference from the type, as it is described and figured by Hedley (1909, p. 440, pl. XL, figs. 53, 54), seems to be its nearly perpendicular canal and the almost simple (not beaded) upper basal riblet. The apex was broken, the remaining whorls were 9. Dimensions: H. 4, br. 1.2 mm. — The type comes from Hope Island, North Queensland.

Fam. **Vermetidae.**

Serpulorbis sipho (Lamarck).

North Island: 17, 3 sps., l. 33.

Serpulorbis zelandicus (Quoy & Gaimard).

North Island: 1, 1 sp., l. 20.

Fam. **Caecidae.**

Caecum suteri n. sp.
(Pl. I, fig. 19.)

Shell tubular, slightly curved, smooth, shining, calcareous white, its length about 5 times the breadth, aperture only little wider than apex, and circular. Apical septum with a small broad mamillate projection above on the right side. Nepionic shell spiral, discoidal, more excavated on the left side, consisting of 2 1/4 whorls, with no other sculpture than the growth lines. Maximum length 1.2, breadth 0.25 mm.

Locality: North Island, 16, some empty shells.

This may be the same species as Suter (1913) mentions and (1915) figures under the name of *Cæcum digitulum* Hedley, and which differs from Hedley's type in its less rapid tapering, according to a remark made by Iredale and quoted by Suter (l. c. p. 265).

Fam. **Turritellidae.**

Turritella fulminata Hutton.

North Island: 10, 9 sps., h. 25. — 16, 2 sps., h. 20. — 13, 2 sps., h. 22.

Turritella pagoda Reeve.

North Island: 25, 6 sps., h. 27.5.

Turritella rosea Quoy & Gaimard.

South Island: many sps., h. 69. — Stewart Island: 31, 2 shells, h. 35. — 32, 4 sps., h. 41. — 35, 1 sp., h. 37. — 36a, 2 small shells. — Stewart Isl., without definite locality, 20 fms, hard bottom 16/11 1914, 1 sp., h. 41 and 35 fms, sand, 20/11 1914, 1 sp., h. 39.

Turritella symmetrica Hutton.

Stewart Island: 35, 1 sp., h. 37. — 36a, many sps., h. 16.

Turritella vittata Hutton (=*T. carlottae* Watson).

North Island: 2, 3 sps., h. 69. — 10, many sps., h. 52. — 13, 3 sps., h. 44. — 16, 5 sps., h. 42. — E. A. Smith has reintroduced Hutton's name which was rejected by Murdoch & Suter (1906) on the inadequate presumption that it had been preoccupied by Lamarck.

Fam. **Struthiolariidae.**

Struthiolaria papulosa (Martyn).

North Island: 13, 1 sp., h. 54. — 16, 2 fragments and many small shells. — Stewart Island: 36a, 4 sps., h. 85.

Struthiolaria vermis (Martyn).

North Island: 10, 1 sp., h. 42. — 16, 1 sp., h. 52.5. — South Island: 29, 2 sps., h. 37. — Stewart Island: 36a, 1 sp., h. 21.

Fam. **Xenophoridae.**

Xenophora corrugata (Reeve).

North Island: 16, many sps., h. 70.

Fam. **Calyptraeidae.**

Calyptraea tenuis (Gray) (=*scutum* Lesson).

North Island: 10, 6 sps., d. 15.5. — 16, many sps., d. 17.5. — 22, 2 sps., d. 12. — 25, many sps., d. 13. — Stewart Island: 32, 1 sp., d. 18. — South Island: 29, 1 sp., d. 13.

Calyptraea alta (Hutton).

North Island: 1, 3 sps., d. 17. — 2, 1 sp., d. 22. — 11a, 3 sps., d. 28. — 14, 1 small sp. — 16, 6 sps., d. 16.5. — 17, 1 sp., d. 19. — 19, 1 sp., d. 24. — 24, 1 sp., d. 18. — 25, many sps., d. 17. — South Island: 29, 5 sps., d. 26. — Stewart Island:

32, 1 sp., d. 24. — Auckland Island: 37a, 4 sps., d. 19. — Campbell Island: 45, many sps., d. 24.

Crepidula costata Sowerby.

North Island: 7, 3 sps., l. 25. — 17, many sps., l. 39.

Crepidula monoxyla Lesson.
(=*C. crepidula* Hutton).

North Island: 10, 1 sp., l. 9.5. — 16, 2 sps., l. 30. — 25, 1 sp., l. 21.5. — South Island: 29, 2 sps., l. 22.5. — E. A. Smith (1915) has identified the species and drawn attention to the difference between it and *C. crepidula* Linné.

Fam. **Lamellariidae.**

Lamellaria verrucosa n. sp.
(Pl. I, figs. 20—22; text-fig. 4.)

Body depressed, semiglobose; mantle rugose, sparsely and irregularly verrucose with small tubercles simple or composed by smaller pustules. Underside of mantle margin smooth, with radiating muscle fibres. A distinct inspiratory canal in the front margin produced into a short siphon. No exspiratory canal. Head large, conical; tentacles digitiform, with flattened bases, carrying the sessile eyes in about one third of their length. Foot large, broadly rounded behind, widest in front, and with shortly projecting anterior corners. Its frontal margin fissured transversally, in all its breath forming a rudimentary propodium. Osphradium ovate, bipectinate, about 2/3 of the gill length and like

Fig. 4. Teeth from the radula of *Lamellaria verrucosa* n. sp. *a* median tooth and 2 lateral teeth, *b* a lateral tooth from below. × 40.

this pale-brownish in colour. Colour of the body pale rosy (in alcohol). — Dimensions: L. 37, br. 29 mm.

Shell (Pl. I, fig. 22) a thin hyaline membrane, without trace of calcareous substance; whorls 3 1/2, convex, apex mamillar, protoconch membraneous, of a grainy consistency.

Radula (text-fig. 4) broad, of the formula 1. 1.1 (breadth 1.4 mm); median tooth with divergent basal legs and a short and broad cusp; its height considerably smaller than that of the laterals (length about 0.22 and breadth 0.25 mm); laterals broad, curved, inner edge thin and with about 6 small denticles, the cusp strong and pointed with its outer edge finely serrated; length of the laterals about 0.45 mm.

Locality: Auckland Island: 41, 1 sp.

This new and large species of the genus *Lamellaria* resembles *L. mollis* Smith in its membraneous shell, but externally it differs in its verrucose notum.

Fam. **Naticidae**.

Natica zelandica Quoy & Gaimard.

North Island: 10, 1 sp., h. 10.5. — 13, 1 sp., h. 12. — 16, 1 small sp. — 22, 1 sp., h. 23. — 25, 2 sps., h. 19. — Stewart Island: 36a, 3 sps., h. 17.

Fam. **Trichotropidae**.

Trichotropis inornata Hutton (=*clathrata* Sowerby).

South Island: 29, 6 sps., h. 17. — Stewart Island: 32, 1 sp., h. 22.

Fam. **Cymatiidae**.

Argobuccinum tumidum (Dunker) (=*argus* Gmelin, by Suter).

Stewart Island, without definite locality, 1 empty shell, h. 108 mm. Iredale and Hedley consider the Australian-Neozelanic form as a distinct species not identical with *A. argus* from the Cape Colony.

Argobuccinum australasia (Perry).

North Island: 1, 1 small sp.

Fam. **Cassididae.**

Cassidea labiata pyrum Lamarck.

North Island: 25, 1 shell, h. 55 mm.

Fam. **Epitoniidae.**

Epitonium philippinarum (Sowerby).

North Island: 10, 1 shell, h. 10. — 16, several small shells.

Epitonium zelebori (Dunker).

Auckland Island: 43, 1 sp., h. 7.

Aclis semireticulata Murdoch & Suter.

North Island: 18, 1 sp., h. 3. — 16, many sps., h. 3.5.

Aclis succincta Suter.

North Island: 16, many shells, h. 3.

Fam. **Pyramidellidae.**

Syrnola (Pyramidella) pulchra Brazier.

North Island: 16, 3 sps., h. 4.5.

Turbonilla zealandica (Hutton).

North Island: 16, 1 sp., h. 3. — Auckland Island: 40, 1 sp., h. 5. — 43, 3 sps., h. 3.

Turbonilla campbellica n. sp.
(Pl. I, fig. 23.)

Shell slender, small, with 10 convex whorls separated by a deep suture; protoconch of 1 whorl, smooth and heterostroph; subsequent whorls with strong longitudinal costae (18—20 on the last whorl), confluent on the base, so that the furrows between the costae finish abruptly below the periphery; thus there is no distinct basal keel. Colour brownish or light yellowish-gray without bands. Aperture ovate. No umbilicus. Dimensions: H. 7, br. 2 mm. — Locality: Campbell Island, 44, 2 shells.

The large size of this shell approaches it to the Australian

Turbonillas such as *T. fusca* Adams, from which it differs in lacking spiral bands. Whether it is identical with any of them is not to be established without a good material for comparison; in lack of this I prefer to describe and figure the form as a new species.

Odostomia inornata Suter.

North Island: 16, many sps., h. 4.

Odostomia dolichostoma Suter.

North Island: 11a, 1 sp., h. 3.7.

Odostomia stygia Suter.

North Island: 16, 1 shell, about 4 mm (apex broken).

Evalea (Odostomia) liricincta (Suter).

Auckland Island: 41 (Figure 8 Island, low water under stones), 1 sp., h. 3.3.

Fam. **Eulimidae.**

Eulima aucklandica Suter.

Auckland Island: 40, 1 sp., h. 6; spire bent to the right. — 41, (Masked Island), many sps., h. 5; spire in some specimens straight.

Fam. **Fasciolariidae.**

Fusinus spiralis (A. Adams).

North Island: 16, 1 canal.

Latirus (Taron) huttoni Suter.

North Island: 7, 1 sp., h. 8.7.

Fam. **Mitridae.**

Mitra albopicta Smith.

North Island: 11b, 1 sp., h. 5.3.

Mitra mortenseni n. sp.
(Pl. I, fig. 24.)

Shell small, shortly fusiform, solid, a little shining; spire much shorter than (about 2/3 of) aperture; suture deep. Whorls 6 1/2, convex, the apical 1 1/2 smooth, the remaining ones sculptured with strong longitudinal costae (about 14 on the last whorl) disappearing on the base, and spiral lirae separated by impressed lines, most distinct between the costae and on the shoulder; on the base the spiral lirae become much coarser and are here separated by interstices of the same breadth. Colour grayish with 3 fulvous bands on the last whorl (the upper one below the shoulder, the lower on the base, and a faint median one); a light zone beneath the suture; shell everywhere reticulated with very fine brown meshes; aperture with the brown bands shining through. Last whorl somewhat ascending in front; aperture narrow, slightly widened in the middle, with a small sinus above, contracted below to a short canal; outer lip simple, somewhat flexuous, inner lip very fine, ill-defined; columella straight, equidistantly 4 plaited, the upper plait horizontal, the others gradually more oblique. Dimensions: H. 14.4, br. 7.3 mm. — Locality: North Island: 5, 1 shell.

The shape and sculpture of this shell are very characteristic and separate it distinctly from the previously known N. Zealand species of the genus *Mitra*.

Vexillum marginatum (Hutton).

North Island: 16, 6 sps., h. 6.5. — 18, 1 sp., h. 4.

Vexillum pseudomarginatum (Suter).

North Island: 16, 1 empty shell, h. 3.8.

Vexillum rubiginosum (Hutton).

North Island: 17, 1 sp., h. 9.5. — 19, 1 sp., h. 5.5.

Fam. **Chrysodomidae**.

Verconella maxima (Tryon).
(=*Megalatractus maximus* Suter).

North Island: 10, 1 sp., h. 80. — The genus *Verconella* was constituted by Iredale (1914) for the N. Zealand shells referred to *Siphonalia*, a Japanese group with no close relationship to the former, and to *Megalatractus*.

Verconella (Siphonalia) nodosa (Martyn).

North Island: 10, 5 sps., h. 44. — 13, 1 sp., h. 39. — 16, 5 sps., h. 51. — 22, 1 sp., h. 46. — 24, 2 sps., h. 37. — 25, numerous sps., h. 45.

Verconella (Siphonalia) caudata (Quoy & Gaimard).

North Island: 7, 1 sp., h. 18.2. — 11a, 1 sp., h. 15. — South Island: 29, 1 sp., h. 35.

Verconella (Siphonalia) mandarina (Duclos).

North Island: 22, 1 sp., h. 110.

Euthria flavescens (Hutton).

South Island: 29, 1 sp., h. 31. — Stewart Island: 31, 6 sps., h. 27. — 36, 3 sps., h. 26.5; 2 of these specimens are cream-coloured, the third violet brown with two ligth bands.

Euthria linea (Martyn).

North Island: 17, 1 sp., h. 34. — South Island: 29, many sps., h. 38. — Stewart Island: 30, 6 sps., h. 27. — 31, numerous sps., h. 31.5. — Auckland Island: 37, many sps., h. 47. — 37a, 4 sps., h. 28. — 40, many sps., h. 30. — 41 (Masked Island), many sps., h. 30. — Campbell Island: 44, 5 sps., h. 24.

Euthria littorinoides (Reeve).

North Island: 7, 1 sp., h. 15.5. — 11d, 1 sp., h. 14.2. — 28, 1 sp., h. 18.5. — Auckland Island: 37, numerous sps., h. 27.

Euthria strebeli Suter.

North Island: 17, many sps., h. 25. — Stewart Island: 36, 3 sps., h. 26.

Euthria striata (Hutton).

South Island: 30, 1 sp., h. 10.

Fam. **Buccinidae.**

Cominella campbelli (Filhol).

Campbell Island: 44, many sps., h. 30.

Cominella eburnea (Reeve) (=*costata* Quoy & Gaimard).

North Island: 19, some sps., h. 13. — 28, 1 sp., h. 15.

Cominella quoyana (A. Adams) (=*huttoni* Kobelt).

North Island: 5, 1 sh., h. 16.5 (with 10 costae). — 10, 2 sps., h. 20. — 11b, many sps., h. 20.5 (with 10—11 axial costae).

Cominella lurida (Philippi).

North Island: 7, 1 sp., h. 22. — 8, 1 sp., h. 26.

Cominella adspersa (Bruguière) (=*maculata* Martyn).

North Island: 7, 2 sps., h. 30. — 11a, 1 sp., h. 40. — 11b, 4 sps., h. 40. — 28, 1 sp., h. 47. — South Island: 29, 2 sps., h. 55. — 30, 1 sp., h. 20.

Cominella maculosa (Martyn).

North Island: 15, 5 sps., h. 35. — 19, 7 sps., h. 29. — 28, 2 sps., h. 29.

Cominella nassoides (Reeve).

South Island: 29, 1 sp., h. 22 (variety with turreted spire about 1 1/2 times the aperture in height). — Stewart Island: 31, 7 sps., h. 49.5.

Cominella virgata H. & A. Adams.

North Island: 15, 1 sp., h. 23.5. — 19, 1 sp., h. 31. — Stewart Island: 31, 3 sps., h. 25. — Stewart Island, without definite locality, 20 fms, hard bottom, 16/11 1914, 1 sp., h. 35.

Cantharus fuscozonatus Suter.

North Island: 17, 2 sps., h. 16.

Prosipho chariessa (Suter) (=*Daphnella chariessa* Suter).
(Pl. I, fig. 25.)

North Island: 16, 1 shell, h. 4.7. — I include the present species in the genus *Prosipho* Thiele 1912, on account of its fusiform shape and lack of a distinct sinus of the aperture, its strong spiral cords and the smooth protoconch which is limited in front by a straight line, in the present specimen further a little thickened to recall an indistinct varix; in front of that edge the permanent sculpture immediately appears. The protoconch has its second whorl remarkably high, as Suter states. A similar shape and smoothness of the protoconch are characteristic of the genus *Prosipho*. Congeneric with the present species are probably also *Daphnella conquisita* and *crassilirata*, possibly further *D. acicula, amphipsila* and *psila*.

The genus *Prosipho* has nearly all its known representatives in the Antarctic and Subantarctic Regions. Smith (1915) records *P. cancellatus* from off Rio de Janeiro but thinks this locality to be due to some mistake.

Prosipho chariessa has a general appearance most similar to *Daphnella totolirata* Suter, which is, however, referred by Hedley (1922) to his genus *Nepotilla* belonging to the group *Daphnellinae* of Fam. *Turridae*, on account of the spirally sculptured apex It is possible that also some of the spirally lirate species of *Alcira* from New Zealand belong to *Prosipho*. According to Hedley (1922, p. 259) some representatives of the genus are also present in Australia, formerly included in *Mitromorpha*.

Fam. **Muricidae**.

Murex (Pteronotus) angasi Crosse.

North Island: 4, 1 sp., h. 15.

Murex (Hexaplex) octogonus Quoy & Gaimard.

North Island: 10, 8 sps., h. 50. — 11a, 1 sp., h. 26. — 16, 2 sps., h. 52. — Stewart Island: 35, 1 sp., h. 26.

Murex zelandicus Quoy & Gaimard.

North Island: 10, 8 sps., h. 45. — 11c, 2 sps., h. 42. — 13, 1 sp., h. 31. — 16, 7 sps., h. 50, + 1 small sp. with 8 varices. — 18, 4 small sps. + 1 sp., h. 32 (with 5 varices).

Trophon ambiguus (Philippi).

North Island: 22, 1 sp., h. 10. — South Island: 29, 1 sp., h. 30. — 30, many sps., h. 14.

Trophon aucklandicus (Smith).

Stewart Island: 33, 2 sps., h. 8.5. — Auckland Island: 37a, 8 sps., h. 12.5.

Trophon corticatus (Hutton).

South Island: 29, 2 sps., h. 14.

Trophon curtus Murdoch.

North Island: 11a, 1 sp., h. 8.

Trophon plebeius (Hutton).

South Island: 30, 1 sp., h. 10.

Trophon pusillus Suter.

North Island: 10, 1 sp., h. 6. — 22, 1 sp., h. 6.5. — 24, 1 sp., h. 7.2. — Auckland Island: 43, 4 sps., h. 10.

Trophon mortenseni n. sp.

(Pl. I, figs. 26, 27; text-fig. 5.)

Shell turreted, spire equalling aperture with canal in height. Whorls 7, convex, distinctly shouldered, suture deep. Sculpture: the 2 apical whorls entirely smooth, subsequent whorls with strong longitudinal costae, 12—13 on the two last whorls, evanescent on the canal, separated by as broad interstices and crossed by strong revolving cords, 2—3 in the 3rd and the next whorls, 13 on the last, of which 1 small on the shoulder and 5—6 on the canal; angular keel strongest, grooved all along (or both parts wholly separated); grooves between the spiral cords narrower than these latter; irregular elevated lines of growth besides giving the surface a crispulate appearance. Colour faintly cream-white, sometimes with a light brownish hue translucent into the interior of aperture. Aperture ovate, its outer lip thin; columella with an indistinct fold below limiting the narrow, slightly bent canal, the length of which somewhat exceeds the height of aperture. Dimensions: H. 12.6, br. 5.8 mm. Operculum (Pl. I, fig. 27) lanceolate ovate with subapical apex.

Fig. 5. A row of teeth (one median and each one lateral) from the radula of *Trophon mortenseni* n. sp. × 440.

Localities: Auckland Island: 41 (Masked Island), 1 shell, h. 8. — 42, 1 living and 3 dead sps. (h. 13.5, dead, 12.4 living). — 43, 2 living and 3 dead sps.

In general appearance this species comes nearest to *T. pusillus* Suter, which is, however, much smaller and has fewer costae and cords. Compared with *T. aucklandicus*, with which it shares the smooth protoconch (consisting, however, of 1 whorl in *T. aucklandicus*) the new species has a more distinct and elaborate sculpture, a longer canal, more convex whorls and a whitish (not dark-brown) colour.

The radula (text-fig. 5) has a similar shape as in *T. aucklandicus* figured by Suter (1915, pl. 19, fig. 4); its breadth is 0.06 mm.

Fam. **Thaisidae**.

Haustrum (Thais) haustrum (Martyn).

North Island: 15, 1 sp., h. 38. — 19, 10 sps., h. 50.

Neothais succincta (Martyn).

North Island: 17, 6 sps., h. 45. — 19, 1 sp., h. 41. — 28, 3 sps., h. 33.

Neothais lacunosa Bruguière (=*striata* Martyn).

North Island: 14, 1 sp., h. 21. — Auckland Island: 37, 3 sps., h. 38. — 41, (Masked Island), 10 sps., h. 28. — South Island: 30, 1 sp., h. 24. — Stewart Island: 31, many sps., h. 35. — Campbell Island: 44, 1 sp., h. 35.

Lepsiella (Thais) scobina (Quoy & Gaimard).

North Island: 12, 4 sps., h. 20. — 14, 4 sps., h. 15 (var. *albomarginata* Deshayes). — 15, 1 sp., h. 23.5. — 17, 1 sp., h. 15. — 19, 3 sps., h. 22. — South Island: 30, 12 sps., h. 17. — Stewart Island: 36, 1 sp., h. 16. — Auckland Island: 40, 1 sp., h. 15.

Fam. **Pyrenidae.**

Mitrella choava (Reeve).

North Island: 10, 1 sp., h. 7.5. — 11b, 3 sps, h. 4.3. — 11d, 1 sp., h. 5.6. — 16, 3 shells, h. 4. — Stewart Island: 36a, 1 sp., h. 8 (entirely brown).

Mitrella pseudomarginata Suter.

Auckland Island: 37a, 1 shell, h. 8. — Campbell Island: 44, 1 sp., h. 6.

Mitrella websteri Suter.

North Island: 11a, 1 shell, h. 3, br. 1 mm; whorls 5.

Alcira sanguinea Suter.

Campbell Island, west coast, on the shore, 10/12 1914, many shells, h. 6.5.

Alcira sulcata Hutton.

Stewart Island: 36a, 1 sp., h. 9.

Alcira transitans (Murdoch).

Auckland Island: 40, many sps., h. 7.7. — Campbell Island: 44, 3 sps., l. 7 mm. — The species varies much in sculpture, from smooth to engraved with shallow distant spiral furrows.

Fam. **Volutidae.**

Fulguraria gracilis (Swainson).

Stewart Island: 31, 1 sp., h. 77. — 36a, 1 sp., h. 91.

Fam. **Olividae.**

Ancilla australis (Sowerby).

North Island: 11b, 5 sps., h. 23.5.

Ancilla novaezelandiae (Sowerby) (=*bicolor* Gray, by Suter).

North Island: 11b, 4 sps., h. 12.5. — 13, 4 sps., h. 7.5.

Ancilla mucronata (Sowerby).

North Island: 4, 1 sp., h. 30.5. — 10, 2 sps., h. 15. — 13, 2 sps., h. 30. — 16, 9 sps., h. 23. — 18, 1 small sp. — 19, 1 sp., h. 35. — 25, many sps., h. 25. — South Island: 29, 2 sps., h. 15.

Fam. **Marginellidae.**

Marginella albescens Hutton.

North Island: 11b, 6 sps., h 4.4.

Marginella mustelina (Angas).

North Island: 19, 4 sps., h. 8.

Marginella coma n. sp.
(Pl. I, fig. 28.)

Shell small, solid, oval, white; spire about one third of the aperture. Sculpture: very fine and close longitudinal threads, lower half of the shell besides with fine and close revolving striae. Whorls 5, the 2 uppermost papilliform, smooth. Aperture narrow, channelled above, not widened below; columella with 4 plaits at equal distance from each other, the uppermost strongest; a slight callus above and below them on the columella. Outer lip thick, simple, without varix, appressed on the last whorl and not ascending the spire. Dimensions: H. 5.4, br. 3.4 mm. — Locality: North Island, 2, 1 shell.

This species is intermediate between *M. parvistriata* and *plicatula*; its shape is like that of *M. pygmaea*, which is however, entirely smooth.

Cryptospira ficula Murdoch & Suter.

North Island: 18, 1 sp., h. 4.

Fam. **Turridae.**

Bathytoma nodilirata (Murdoch & Suter).

North Island: 10, 2 shells, h. 17.5. — 16, 4 shells, h. 13.3, br. 4.6.

Austrodrillia rawitensis Hedley (=*Drillia angasi* Suter).

North Island: 16, 1 shell, h. 12. Hedley states (1922) that Hutton's and Suter's *Drillia angasi* is different from the type by Crosse and proposes the name used here.

Melatoma (Splendrillia) laevis Hutton.

North Island: 4, 1 shell, h. 12. — 10, 1 shell, h. 17. — 16, 1 shell, h. 6.5. Hedley (1922) proposes the subgenus *Splendrillia* for comprising this and some related species.

Sçrinium (Bela) neozelanicum Suter.

North Island: 11b, 1 shell, h. 9.5. This species has been referred by Hedley (1922) to the genus *Scrinium* Hedley.

Heterocithara mediocris n. sp. (Pl. I, fig. 29.)

Shell small, turreted, apex pointed, spira exceeding the aperture a little in height. Sculpture: apical whorl first smooth, then spirally punctured; two next whorls with fine spiral striae and numerous thin equidistant, somewhat flexuous, longitudinal costae; fourth and subsequent whorls with coarser, more distant axial ribs and 4—5 spiral threads, the second one strongest, forming nodules when crossing the axial ribs; axial costae continuous over all the spire, their number in the penultimate whorl 11; spiral lines on the body whorl 10 (besides one or two intermediate ones) as well as 6—7 on the canal. Interstices everywhere with fine spirals of microscopic grains. Suture rather deep. Colour white. Aperture narrow, vertical, with a deep sinus in the broad varix limited at each side by a short tooth; on the inside of the lip one further tooth (or indistinct). Edge of outer lip with some short furrows corresponding to the spiral ribs, sinuous below. Canal short. Dimensions: H. 5.5, br. 2.3 mm. — Locality: North Island: 16, 4 dead shells.

This species comes near in sculpture and shape to *H. seriliola* and *concinna* of Hedley (from Queensland) described in his splendid and useful revision on the Australian *Turridae* (1922).

Guraleus (*Mangilia*) *sinclairi* (Smith).

North Island: 7, 1 small shell. — South Island: 29, 1 sp., h. 11. — Stewart Island: 36a, 1 sp., h. 10. — Hedley (1922) refers the present species to his genus *Guraleus*.

Veprecula cooperi Mestayer.

North Island: 16, 1 shell, h. 5. The type was recorded by Mestayer (1919) from Hen & Chickens Isl., 25 — 30 fms, and from North Cape.

Asperdaphne (*Mangilia*) *dictyota* (Hutton).

North Island: 16, 1 shell, h. 5.5. According to Hedley (1922) the present species forms the New Zealand representative of the genus *Asperdaphne*.

Eucyclotoma (*Mangilia*) *quadricincta* (Suter).

North Island: 16, some shells, h. 4. — 18, 1 shell, h. 6, whorls 6. This species has a spirally striated nucleus and prominent keels on the whorls, characters which indicate its position to be in Boettger's genus *Eucyclotoma*. The number of costae in the present specimens vary from 18 to 22 on the earlier whorls to about 32 on the penultimate, where the costae grow much more irregular. The specimens are typical in the feature of the canal which does not bear any sculpture on its back side. The axial costae are more or less lamelliform and produce vaulted scales or knobs where they cross the cinguli, according to their sharpness; hence the sculpture recalls vividly that of a small *Trophon*, above all *T. crispulatus* Suter, which differs only in having 5, instead of 4, revolving lines.

Liracraea epentroma (Murdoch) n. gen.
(=*Clathurella epentroma* Murdoch 1904).

Auckland Island: 43, 3 shells, h. 5.5 (var. *whangaroaensis* Murdoch). — Auckland Island: 43, 2 shells, h. 5.5. Murdoch (1904) described this species as a *Clathurella*, and Suter (1913) included it in *Mangilia* together with a lot of species having smooth or microscopically sculptured protoconch. Suter himself has drawn attention to the very characteristic apex in which the present species differs from all other *Mangiliinae* so essentially in its coarse revolving ribs, that the creation of a new genus for its reception seems well founded. This peculiar protoconch places this genus in a section of its own, differing as well from the smooth-tipped *Mangiliinae* as from the *Daphnellinae* with their minute spiral or elaborate sculpture of the protoconch. *Liracraea* may besides this type of the genus comprise the similarly equipped *Mangilia devia* of Suter, which, however, I had no opportunity to examine.

Fam. **Acteonidae.**

Acteon craticulatus Murdoch & Suter.

North Island: 16, 3 shells, h. 9.

Fam. **Tornatinidae.**

Tornatina decapitata Suter.

Stewart Island: 36a, 5 sps., h. 2.4. — Auckland Island: 43, 1 sp., h. 3.8.

Volvulella reflexa (Hutton).

North Island: 16, 2 shells, h. 4. — 18, 1 sp., h. 4.5.

Fam. **Scaphandridae.**

Cylichna pygmaea Adams.

North Island: 16, 2 sps., h. 4.7.

Cylichna thetidis Hedley.

North Island: 16, 2 shells, h. 7.

Fam. **Aceridae.**

Haminea zelandiae (Gray).

North Island: 28, 1 sp., h. 14.

Fam. **Philinidae.**

Philine constricta Murdoch & Suter.

North Island: 16, 2 sps., h. 13.5 (shell), l. 24 (animal), var. *auriformis* Suter. — Stewart Island: 32, 1 sp., h. 17 (shell), l. 26 (animal), var. *auriformis.*

Philine umbilicata Murdoch & Suter.

North Island: 18, 2 sps., h. 3.3 (shell).

Fam. **Aglajidae.**

Aglaja cylindrica (Cheeseman).

North Island: 13, 1 sp., l. 3.5 (animal).

Fam. **Runcinidae.**

Runcinella zelandica n. gen. n. sp.

(Pl. I, figs. 30—32; text-figs. 6—9.)

Animal small, ovate, rather high, destitute of a shell; back covered with a disc of firm cutaneous consistency, shallowly bilobed in front, with sessile eyes shining through the skin, slightly incurved behind; margin a little projecting all around. Foot broadly ovate, everywhere, except in front, exceeding the notum, with thin simple margins. Anus behind the end of notum, submedian, a little to the right, surrounded by 4—5 gills consisting of radiating lamellae with a few short lateral branches. Genital opening to the right of the anus; right side of the body with an open furrow serving as vas deferens leading to the penis close to the mouth.

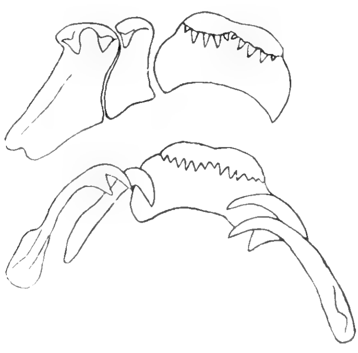

Fig. 6. Radula of *Runcinella zelandica* n. sp.; lateral teeth seen from their upper surface above, from the margin below. × 440.

Colour fulvous on back and gills; sides of foot paler yellowish. Length 2.2, breadth 1.3, height 1 mm.

Radula (fig. 6) with the formula

1\. 1. 1. 1. 1., containing 19—22 series of teeth. Its length 0.32, breadth 0.12 mm. Median tooth broad, with a slight middle incision of its edge, carrying 4—6 conical denticles on each side of it, the innermost and outermost ones smallest. Lateral tooth narrow, with a strong bent cusp. Marginal tooth broad, with 2 strong cusps, separated by a deep incision; no denticles on the external teeth.

Gizzard armed with 4 hyaline chitinous crest-like bodies, composed of about 8 thick triangular pieces attached to a common basal plate.

Locality: North Island, Cape Brett, the coast, among large Corallinae (St. 2), several sps., adult as well as young ones.

Remarks. The features stated above, chiefly of the external habitus, are already sufficient to establish the systematical position of this interesting little mollusc in the close vicinity of the genus *Runcina* belonging to the Tectibranchiate Opisthobranchia. With this genus it shares the general organization, absence of shell, position of anus, armature of stomach, and so on. At the same time, however, important differences are striking, above all the place and arrangement of the gills and the structure of the radula (in *Runcina* and *Ildica* having the formula 1.1.1.), characters justifying the creation of a new genus for the reception of the new species. Though the genus *Runcinella* thus occupies a position apart from the other genera of fam. *Runcinidae* it is the most convenient to retain it within this same family, which, as far as hitherto known, constitutes a well defined group of the Cephalaspidea.

Anatomy.

(Text-figs. 7—9.)

A l i m e n t a r y c a n a l. In the muscular pharynx which is fixed to the body wall by means of muscle cords, a pair of thin membraneous jaws are lodged. The structure of these jaws is similar to that of the jaws in *Runcina* described by V a y s s i è r e (1883, pl. 1, fig. 7), thus showing their surface closely beset with small rhomboidal corpuscles, each with a central denticle. A pair of tubular salivary glands debouch at the sides of the oesophagus. This soon opens into the very muscular gizzard. On the left side of the debouching point a short diverticle, like the one described by C o l o s i (1915) in *Runcina calaritana*, is inserted. It has the same lining epithelium as the gizzard, viz. large glandular cells secreting small yellowish-brown granules. In the gizzard four chitinous masticatory plates are situated, as already mentioned, and these latter are arranged symmetrically, the longitudinal axis passing through the middle of two opposite ones. From the distal end of the gizzard issues the second part of the oesophagus, which soon opens into the stomach. The latter is surrounded by the liver and receives from it a single large posterior duct. A close examination

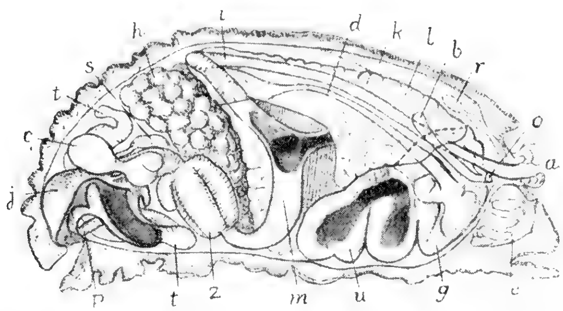

Fig. 7. Longitudinal section through *Runcinella zelandica* n. sp. *a* anus surrounded by gills; *b* bursa copulatrix; *c* cerebral ganglion; *d* vas deferens; *e* opaline gland; *g* shell gland; *h* hermaphrodite gland; *i* intestine; *j* jaw; *k* kidney; *l* liver; *m* stomach; *o* genital orifice; *p* penis; *r* pericard; *s* salivary gland; *t* terminal gland of the penis; *u* mucous gland; *z* gizzard.

shows that the duct is, in reality, made up by two pairs of large canals, one coming from the right, the other and larger from the left, but pressed secondarily towards the middle. The common liver duct is very short, a fact explaining the diverging opinions about the number of ducts in *Runcina* (cf. Colosi 1915, p. 11). In any case, there is no stomachal epithelium separating the two branches which, consequently, cannot be considered as a pair of ducts. In the left upper portion of the liver the intestine appears as a narrow canal; its walls contain the same yellowish-brown corpuscles as the gizzard, and they lend it a reddish tint in specimens dissected. The intestine describes a curve towards the right side of the body and, from this side gradually approaching the middle line, debouches by the anus somewhat to the right of the middle.

After the alimentary system the genital one is the most spacious. It consists of two separate portions, the hermaphrodite and the male ones, combined only by means of the external ciliated furrow. In the median part of the body we find the hermaphrodite gland situated to the right of the liver and extending beneath it backwards and above the gizzard in front. Its ovarial acini are arranged peripherically. On its posterior and upper side, just beneath the point where the intestine traverses it, the spermoviduct takes its origin. It follows the left side of the intestine backwards. In front of the rectum it widens to an ampulla, which after some convolution opens in the large, much folded albuminiparous gland. With the same gland, which has a thick cyanophil epithelium, is connected a shell gland with an erythrophil granular epithelium of high cells. From the right side of the gland complex the uterus issues, describes some coils, and opens to the right in the posterior end of the body. Before its mouth it receives a narrow duct which differs from the spermoviduct in lacking in its interior the ciliated epithelium; it ends blindly and is certainly to be interpreted as a bursa copulatrix.

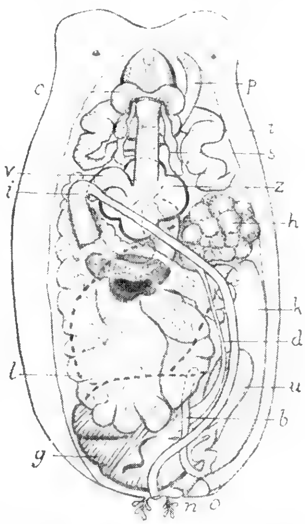

Fig. 8. Scheme of the anatomy of *Runcinella zelandica* n. sp. Notation as in fig. 6; *n* nephroproct.

From the genital pore the seminal groove leads, as mentioned, to the male opening at the side of the mouth. The penis consists of two portions, a narrow and muscular atrial one, the penis proper, and a tubular gland forming a posterior prolongation of the former, somewhat wider than that and composed of large glandular cells. The penis is a muscular cord with a fine central canal allowing the secretion of the tube to pass. The whole apparatus lies freely beneath and to the right of the pharyngeal bulb.

The kidney is a large sac on the right side and has its walls entirely smooth. It extends from the hermaphrodite gland in front, close beneath the tissues of the notum, to the surroundings of the anus, where it forms some small descending lobes. The nephroproct is a simple fissure in its wall, and above it the kidney detaches a lobe which becomes more and more narrow and lastly communicates with the pericard. The latter is rather small, as is the heart too. Its place is somewhat in front of and above the genital opening, thus on the right side, and close outside the intestine.

The nervous system corresponds to the description of the same in *Runcina coronata* given by Vayssière (1883) and in *R. caprecnsis* (Mazzarelli 1893), thus showing two visceral ganglia, without direct connection with each other.

Opaline gland. Beneath the anus a small pore appears, being the outlet from a rounded sac, otherwise entirely closed and lined with a thin epithelium. This sac contains 7 date-like corpuscles attached with their anterior ends to the front wall of the sac and freely projecting into its interior. The corpuscles prove to be glandular formations. They consist of an outer cutaneous sheath made up by two cell layers and forming a fold from the anterior wall of the sac, and an inner bottle-shaped acinus with a narrow efferent canal opening by a terminal pore; the walls of this canal are similar to those of the sheath thus proving the origin of the glandula by means of invagination (text-fig. 9). The bottom part of the gland is formed by large glandular cells with median nuclei and vividly stained contents (by haematoxylin); among them narrower cells with small apical nuclei and unstained contents appear. The small cells predominate, and the large ones disappear, towards the canal.

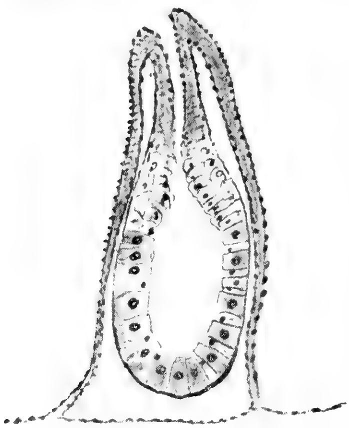

Fig. 9. *Runcinella zelandica* n. sp., section through one corpuscle of the anal (opaline) gland. × 300.

This gland is certainly homologous with the so called opaline gland in *Aplysia* and other genera (also named "grape-shaped" gland or glandula of Bohadsch; cf. Mazzarelli 1893 a), which has become dislocated together with the whole anal tract, and further peculiarly specialized and modified by the folding of the walls of the primarily simple glandular sac.

Conclusions.

From the above examination follows that the genus *Runcinella* is well separated from *Runcina*, above all in the following particulars: Anal and genital apertures are situated in the real posterior end of body; gills 4—5 with a doridoid arrangement round the anus; opaline gland consisting of isolated glandulae enclosed in an infra-anal sac; male opening close at the mouth; penis with a tubular gland but lacking terminal vesicula seminalis; vagina with a simple tubular bursa copulatrix.

Runcinella represents a more advanced and specialized type, though in a few characters (e. g. penis) more primitive, than *Runcina*, with which it shares its chief organization. Its systematical position thus is to be established within the same family. This, beside *Runcina*, contains the genus *Ildica* of Bergh with a single species. The genus *Runcina* comprises the following 5 species: *R. coronata* Quatrefages 1844, *capreensis* Mazarelli 1893, *calaritana* Colosi 1915, *prasina* Mörch 1863 and *inconspicua* Verrill 1903.

Colosi (1915) arrives at the conclusion that the fam. *Runcinidæ* should be removed from the Cephalaspidea (Bullidea) and made the type of a coordinate group Runcinidea. His opinion is, however, in some cases, e. g. concerning the genital system, based on interpretations of facts which seem to be debateable. In the present species at least the structure of the genital apparatus entirely corresponds to the Cephalaspidean type (type I in Lang, 1900), and there is no other character (except the gills) in which it differs properly and positively — the absence of a shell being, of course, insufficient to motive a separation, as a reduction of the shell is more or less complete in many Bullomorph genera.

Fam. **Pleurobranchidae.**

Bouvieria (Pleurobranchus) aurantiaca Risso.

Stewart Island: 34, 1 sp., l. 18 (animal). — Auckland Island: 41 (Masked Island), 1 sp., l. 9 (animal).

Bouvieria (Pleurobranchus) ornata Cheeseman.

North Island: 17, 2 sps., l. 30 (animal). — 19, 1 sp., l. 7 (animal). — See Addenda p. 86.

Pleurobranchaea maculata (Quoy & Gaimard).

South Island: Cloudy Bay, 19 fms, 19/1 1915, 1 sp., l. 30 (from Capt. Bollons, "Hinemoa").

Pleurobranchaea novae=zealandiae Cheeseman.

North Island: 10, 1 sp., l. 10. — 25, 1 sp., l. 19. — South Island: 29, 5 sps., l. 35.

Fam. **Goniodorididae**.

Acanthodoris molicella Abraham.

Campbell Island: 44, many sps., l. 30. — Auckland Island: 40, 1 sp., l. 20.

Fam. **Dorididae**.

Doris nanula (Bergh).

Auckland Island: 43, 5 sps., l. 20.

Rostanga rubicunda (Cheeseman).

North Island: 4, 1 sp., l. 11.

Alloiodoris lanuginata (Abraham).
(Pl. I, figs. 33, 34; text-figs. 10—13.)

North Island: 5, 1 sp., l. about 20 (reddish-brown with a series of black spots along each side of the back). — 17, 1 sp., l. 31

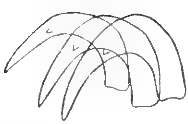

Fig. 10. Three of the innermost teeth of the radula af *Alloiodoris lanuginata.* × 150.

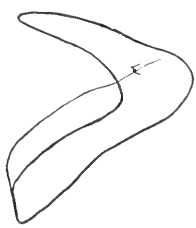

Fig. 11. The 20th tooth in a row from the radula of *Alloiodoris lanuginata.* × 150.

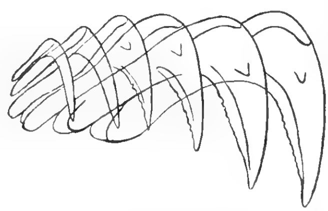

Fig. 12. The 6 uttermost teeth in a row from the radula of *Alloiodoris lanuginata.* × 150.

(colour rosy). — South Island: 29, 1 sp., l. 8. — Campbell Island: 45, 1 sp., l. 35 (colour white).

In the size of the radula and the shape of the teeth the present specimens (text-figs. 10—12) seem to differ from the type described by Eliot (1907, p. 333). In two specimens examined the radula had 18 (+ 2 incomplete) rows, the largest with about 40 hamate teeth on each side of the bare rhachis; each tooth with a bifid or trifid denticle at the outer side of the cusp (text-fig. 11). Penis (text-fig. 13) and vas deferens were armed with series of small hooks in two specimens, but in one (from Campbell Island) the hooks were replaced by sac-shaped projections with inflated ends. In the characters of the labial disc, where the elements were indistinct, and of the separate hermaphrodite gland the specimens exhibited the typical features.

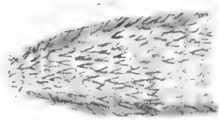

Fig. 13. Armature of the penis of *Alloiodoris lanuginata*. × 75.

Chromodoris amoena Cheeseman.

North Island: 5, 1 sp., much contracted, l. 24 mm. Though the specimen is decolorated, the mantle margin as well as the back of the foot still show a deeper yellowish tint than the body in general. The radula is large with about 100 rows, the largest containing about 100 teeth, and these agree, as do the radula and the armature of the labial disc, in all the characters described by Eliot (1907, p. 345).

Aphelodoris luctuosa (Cheeseman).
(*A. cheesemani* Eliot).

South Island: 29, 1 sp., l. about 30, of an ivory-white colour; the radula contained only 21 rows of teeth which are in complete accordance with the description by Eliot (1907).

As to the name of the present species, Eliot (1907, p. 343) states its identity with *Doris luctuosa* Cheeseman, but maintains that this specific name is to be rejected, because at the time when the species was referred to *Aphelodoris*, viz. 1907, there was already an *Aphelodoris luctuosa* described by Bergh in 1905. As, however, Cheeseman's name dates from 1882, it has priority and must be considered valid, and, for the same reason, the later described species (from Tasmania), which can, according to Eliot, hardly be the same, has to take a new name. This may suitably become *Aphelodoris berghi.*

Fam. **Aeolidiidae.**

Cuthona zelandica n. sp.

(Pl. I, fig. 35; text-fig. 14.)

Body very slender, tapering backwards, foot narrow, with rounded anterior corners and thin margins. Rhinophores smooth, equalling the tentacles in length. Dorsal papillae elongate, linear, a few with bifid tops, set in about 15 transverse rows, the foremost 5 rows a little separated from the sequent ones; the largest rows, 5 and 6, containing each 9—10 papillae on each side. Genital orifice beneath the 4th row of papillae; anus close behind the genital pore. Glans penis conical, without any armature. Colour of the papillae (in spirit) pale brown, tips whitish; colour of foot and head whitish.

Fig. 14. A tooth from the radula of *Cuthona zelandica* n. sp., seen from above and from the side. × 440.

Jaws with one row of minute denticles at the masticatory margin. Radula with 60 series of arched teeth (text-fig. 14) with a strong but not much prominent central cusp and 6 smaller denticles on each side decreasing in size towards the base, the innermost denticle often very slender and shorter than its neighbour. Basal processes lodged in an articulatory hole on the under side of each preceding tooth. Breadth of radula 0.12 mm, length of teeth 0.12 mm.

Dimensions: Length of animal 15, breadth 4, br. of foot in front about 2 mm. — Locality: Auckland Island: 41 (Masked Island), 1 sp.

This species is a true *Cuthona*, differing, however, from the mass of congeneric species in the unusual length of its radula, a feature that it shares with the British *C. stipata* Alder & Hancock. The genus lacks further representatives in N. Zealand and even in Australia.

Fam. **Fionidae**.

Fiona pinnata Eschscholtz (=*marina* Forskål).

Campbell Island: 44, 2 sps., l. 60.

Fam. **Ellobiidæ** (=**Auriculidae**).

Marinula (*Cremnobates*) *parva* (Swainson).

Auckland Island: 37, close to the high water line, 24/11 1914, en masse, l. 6.8. — 38, 1 sp., l. 6. — Connolly (1915) in dealing with the genus *Marinula* includes this form and regards *Cremnobates* as synonymous; cf. also Iredale 1915. — See Addenda p. 86.

Fam. **Amphibolidae**.

Amphibola crenata (Martyn).

North Island: 8, 1 sp., h. 22.

Fam. **Siphonariidae**.

Siphonaria cookiana Suter.

North Island: 17, many sps., l. 27. — South Island: 30, 2 sps., l. 10 (on *Turbo smaragdus*). — Stewart Island: 36, many sps., l. 25.

Siphonaria obliquata Sowerby.

Auckland Island: 37, many sps., l. 35.

Siphonaria zelandica Quoy & Gaimard.

North Island: 19, 1 shell, l. 13.

Kerguelenia innominata Iredale.
(=*Siphonaria lateralis* Gould, by Suter).

Auckland Island: 37, en masse, l. 19. — 39, 1 sp., l. 7.

Fam. **Ancylidae**.

Latia neritoides Gray.

North Island: Lake Takapuna, Auckland, 23/12 1914, many sps., l. 8.7. — The anatomy of this species has been recently described by Eales (1923).

Fam. **Zonitidae.**

Hyalinia cellaria (Müller).

North Island: Lake Takapuna, Auckland, 23/12 1914, 1 sp., d. 9.5.

Fam. **Helicidae.**

Helix aspersa Müller.

Auckland, under stones, 2 sps., d. 26.5.

Fam. **Endodontidae.**

Thalassohelix zelandiae (Gray).

Stewart Island, Port Pegasus, under wood or stones, 21/11 1914, 1 sp., d. 11.

Allodiscus planulatus (Hutton).

Auckland Island, under wood or stones, 25/11 1914, 5 sps., d. 2.7.

Thermia expeditionis Suter.

Auckland Island, under wood or stones, 25/11 1914, 1 sp., d. 2.7, h. 1.9, whorls 4 1/2; base with microscopic striae. — Adams Island, Auckland Island, under wood, 28/11 1914, 1 sp., d. 2.7.

Therasia antipoda (Hombron & Jacquinot).

Adams Island, Auckland Island, under wood, 28/11 1914, 1 sp., d. 6.

Flammulina zebra (Le Guillou) (=*phlogophora* Pfeiffer, by Suter).

Stewart Island, Port Pegasus, under wood or stones, 21/11 1914, 2 sps., d. 8.

Ranfurlya constanceae Suter.

Auckland Island, Amokura Harbour, under wood in the forest, 1/12 1914, 2 sps., l. 10.5. Suter's specimen measured 6 mm.

Charopa (Endodonta) benhami Suter.

Auckland Island, under wood or stones, 25/11 1914, many sps., d. 2.9, h. 1.6. — Adams Island, under wood, 28/11 1914, 3 sps., d. 2.7, h. 1.3, h. of aperture 1 mm, whorls 6.

Charopa (Endodonta) pseudocoma Suter.

Palmerstone, Febr. 1915, 8 sps., d. 5.5.

Fam. **Bulimulidae.**

Placostylus hongii (Lesson).

Cape Maria van Diemen, Dec. 1914, 3 shells, h. 75.

Fam. **Rhytididae.**

Paryphanta hochstetteri (Pfeiffer).

N. Zealand, without definite locality, 3 sps., d. 64.

Fam. **Athoracophoridae.**

Athoracophorus verrucosus Simroth.

Auckland Island: Amokura Harbour, under wood in the forest, 1/12 1914, many sps., l. 34 (var. *fasciatus* Simroth). — Adams Island, under wood, 1 sp., l. 34, 28/11 1914 (var. *fasciatus*).

Athoracophorus martensi Suter.

Auckland Island: Amokura Harbour, under wood in the forest, 1/12 1914, many sps., l. 28.

Fam. **Onchidiidae.**

Onchidella campbelli Filhol.

Stewart Island: 33, many sps., l. 9. — 34, many sps., l. 10. — 36, many sps., l. 8. — Auckland Island: 37, close to the high water line, numerous sps., l. 19. — 40, 3 sps., l. 10. — Campbell Island: 44, 2 sps., l. 8.

Onchidella flavescens Wissel.

North Island: 15, 1 sp., l. 11.

Onchidella nigricans (Quoy & Gaimard).

North Island: 7, 8 sps., l. 10. — 28, 1 sp., l. 10.

Onchidella patelloides (Quoy & Gaimard).

North Island: 7, 6 sps., l. 10. — 15, numerous sps., l. 17.

Scaphopoda.

Dentalium nanum Hutton.

North Island: 10, 1 sp., l. 37; anterior 3/5 of the shell without costae, only with fine radiating striae, posteriorly with 13 ridges. — 16, 2 sps., l. 29. — 18, 2 sps., l. 20. — 25, 1 sp., l. 12.

Dentalium zelandicum Sowerby.

North Island: 11c, 1 sp., l. 41. — Stewart Island: 35, 2 sps., l. 83.

Cadulus spretus Tate & May.

North Island: 16, numerous sps., l. 5.5.

Lamellibranchiata.

Fam. **Solemyidae.**

Solemya parkinsoni Smith.

North Island: 23, 1 shell, l. 40.

Fam. **Nuculidae.**

Nucula hartvigiana Pfeiffer.

North Island: 12, 2 sps., l. 7. — 13, 1 sp., l. 4.3. — 18, 1 small sp. — 22, 1 small valve. — South Island: 29, 2 sps., l. 9. — Auckland Island: 41 (Masked Island), 2 sps., l. 8.

Nucula nitidula Adams.

North Island: 16, many sps., l. 8.

Nucula simplex Adams (=*strangei* Adams).

North Island: 16, some small sps. — 18, some small sps.

Fam. **Ledidae**.

Nuculana (Leda) bellula Adams.

North Island: 16, many sps., l. 11. — 18, many valves, l. 8. — Auckland Island: 43, many sps., l. 8.

Malletia australis (Quoy & Gaimard).

North Island: 13, 1 sp., l. 22 + 3/2, l. 31. — 18, 1 small valve.

Fam. **Anomiidae**.

Anomia huttoni Suter.

South Island: 29, 1 sp., l. 25.

Anomia walteri Hector.

North Island: 7, 2 sps., l. 52.

Fam. **Arcidae**.

Arca novæ-zealandiæ Smith (=*decussata* Sowerby in Suter).

North Island: 4, 3 sps., l. 4 + 3/2, l. 20. — E. A. Smith (1915) points out the specific distinctness of this form.

Bathyarca (Arca) cybaea Hedley.

North Island: 16, 3 valves, l. 4. — 18, some small valves.

Glycymeris laticostata (Quoy & Gaimard).

North Island: 11a, 2 sps., l. 54. — 11b, 1 sp., l. 9.

Glycymeris modesta (Angas).

North Island: 11a, 2 sps., l. 18. — 3 1/2, l. 20. — 11b, 6 sps., l. 19. — 16, many sps., l. 13. — 22, 4 sps., l. 13.

Fam. **Limopsidae**.

Lissarca aucklandica Smith.

Auckland Island: 37a, 2 sps., l. 3.3. — 41, (Masked Island), numerous sps., l. 3.5. — 41, (Figure 8 Island), some very small sps. — 43, some sps., l. 5.

Fam. **Philobryidae.**

Philobrya filholi Bernhard.

North Island: 2, many sps., l. 1.4.

Philobrya meleagrina (Bernard).

North Island: 3, many sps., h. 3.5. — 9, some sps., h. 5.7.

Fam. **Mytilidae.**

Mytilus planulatus Lamarck.

North Island: 3, many small sps. — 28, 1 small sp. — Stewart Island: 31, many sps. — 11, 6 sps., l. 96. — Auckland Island: 37, many sps., l. 100. — 38, many sps., l. 42. — 40, 2 valves, l. 135, overgrown with calcareous algae. — Campbell Island: 44, 1 sp., l. 84.

Oliver (1923) has shown that the species which Suter named *Mytilus edulis* is identical with the Australian *Mytilus planulatus* Lamarck, which differs from the Linnean type in having 2—3 teeth placed inside the apex, not on an expanded lip. A good discriminating character is offered by the muscle scars: in *M. planulatus* that of the anterior adductor is small and shorter than the scar of the anterior retractor, whereas the latter scar is shorter than the former in *M. edulis.* Oliver gives the maximum length of the species as 89 mm, but from the present collections I have larger specimens (135 mm; cf. above) at hand.

Mytilus canaliculus Martyn.

North Island: 3, 4 sps., l. 70. — 19, 1 sp., l. 45. — 28, some sps., l. 37. — Auckland Island: 39, 1 sp., l. 50. — 40, 1 shell, l. 20. — 41, (Masked Island), 1 sp., l. 33. — Campbell Island: 44, many sps., l. 54.

Mytilus magellanicus Lamarck.

South Island: 29, many sps., l. 43. — Stewart Island: 31, many sps., l. 57. — 32, 2 sps., l. 70. — Auckland Island: 38, 2 sps., l. 42. — 39, some sps., l. 85. — 37, many sps., l. 56. — 41, (Figure 8 Island), some small sps., on a *Macrocystis.* — 41 (Masked Island), many sps., l. 71.

Modiolus neozelanicus Iredale
(=*ater* Zelebor, non Molina).

North Island: 3, many small sps. — 26, some small sps. — 28, 1 small sp. — Auckland Island: 37, 2 sps., l. 27 (close to the high water mark). — 38, many sps., l. 30. — 39, 1 sp., l. 21.

Modiolus australis Gray.

North Island: 2, 1 sp., l. 17. — 24, 4 sps., l. 46. — South Island: 29, 4 sps., l. 38. — Auckland Island: 41 (Masked Island), 1 small sp.

Modiolaria impacta (Hermann).

North Island: 3, many small sps. — 15, 6 sps., l. 26. — 21, 1 sp., l. 15. — 22, 3 sps., l. 40. — 28, 1 small sp. — South Island: 29, many sps., l. 43. — Stewart Island: 32, 2 sps., l. 26.

It may be according to a strict application of the nomenclatory rules that Iredale rejects the generic name *Modiolaria* in favour of *Musculus* Bolten, but as this genus is a conglomeratic one and comprises also *Anodonta*, and in first case is synonymous with *Anodonta*, it seems most convenient to me to make no exchange of *Modiolaria* Beck.

Lithophaga truncata (Gray).

North Island: 11d, 1 sp., l. 26.

Dacrydium radians Suter.

North Island: 16, 8 valves, l. 4.5.

Fam. **Pectinidae**.

Pecten medius Lamarck.

North Island: 10, 3 sps., l. 72. — 16, 6 sps., l. 69. — South Island: 29, 4 sps., l. 7.

Chlamys campbellicus n. sp.
(Pl. II, figs. 36—39.)

Shell of medium size, solid, both valves equally convex; ears very unequal, sharply set off from the valve by means of a sharp furrow, the anterior ears large, posterior less than half the anterior in length. Sculpture: Right valve, about 22—24 high regular ribs, bifurcating towards front and hind margins and becoming tripartite towards under margin by the appearing of a marginal furrow along each side of the ribs; interstices as broad as the ribs and sculptured with fine, close, concentric lamellae with serrated upper edges, or dissolved into isolated spinulæ; these lamellae extend on the lateral sides, and, though more or less worn off, on to the upper side of the ribs. Anterior ear with 5 coarse radiating ribs and a smooth area beneath running from sinus to umbo; bounding groove of the ear serrated by a series of small tubercles. Left valve: Ribs of the same number as in the right valve; concentric lamellae produced on the ribs into small imbricating scales. Colour of both valves orange rosy. Dimensions: max. h. 32, br. 29 mm. Locality: Campbell Island: 45, 10 dead valves, the small ones having a fresh appearance showing that the species belongs to the actual fauna.

Its nearest ally seems to be *Chlamys patagonicus* King, which occurs in West Patagonia from 50° S to Tierra del Fuego and on the Eastern coast of Patagonia to 51° 30' S as well as in the Falkland Islands (Hägg 1910). The chief differences between both forms are to be found in the greater number of ribs in the latter species (about 35 on the disc and in the right anterior ear 6), together with a paler reddish-gray colour. The partition of the ribs is similar, but *Chl. patagonicus* often shows a bifurcating of the median ribs towards the inferior margin, and has, besides, an intermediate riblet in each interstitial furrow; a similar intermediate riblet is totally absent in *Chl. campbellicus.* — The fossil *Pecten triphooki,* Zittel, which has been found fossil in Campbell Island (Marshall 1909, p. 701), seems to be closely related, too.

Chlamys (Pecten) dichrous Suter.

South Island: 29, many sps., h. 36. — Stewart Island: 31, 1 sp., h. 31. — 35, 1 small sp. — Auckland Island: 37a, 3 valves, h. 12.

Chlamys (Pecten) imparvicostatus Bavay.

North Island: 11b, 1 sp., h. 7.2.

Chlamys (Pecten) radiatus Hutton.

North Island: 10, 2 sps., h. 26. — 14, 1 small sp. — 16, many valves, h. 40. — South Island: 29, 1 valve, h. 35. — Stewart Island: 32, 1 sp., h. 35.

Chlamys (Pecten) zelandiae Gray.

North Island: 1, 1 fragment. — 2, 2 sps., h. 11 (var. *gemmulatus* Suter, non Reeve)[1]). — 4, 2 sps., h. 16.5 (var.). — 11a, 4 sps., h. 27. — 11d, 1 sp., h. 25. — 16, 3 sps., h. 17. — South Island: 29, 1 sp., h. 40 (var. *gemmulatus*). — Stewart Island: 32, 3 sps., h. 71 (var. *gemmulatus*. The last mentioned specimens much exceed the size stated by Suter for the species).

Chlamys (Pecten) convexus Quoy & Gaimard.

North Island: 1, 2 sps., l. 15. — 10, 2 sps., l. 52. — 16, 1 + 3/2 sps., l. 27.

Fam. **Limidae**.

Lima bullata (Born).

North Island: 10, 1 sp., h. 10. — South Island: 29, 1 valve, h. 19.5.

Lima suteri Dall.

North Island: 16, 2 valves, h. 5. — 18, 1 valve, h. 7.

Fam. **Ostreidae.**

Ostrea angasi Sowerby.

North Island: 22, 1 sp., h. 57. — South Island: 29, 3 coherent sps., l. 58. — Stewart Island: 31, 1 sp., h. 40.

Ostrea hyotis (Linné).

North Island: 15, 1 sp., h. 61. — 27, some sps., l. 50.

Fam. **Gaimardiidae**.

(=*Modiolarcidae*.)

The characteristics of this family are in the first line the foot which has a creeping disk, and the triforic mantle with a small pedal, a ventral branchial, and a posterior anal opening. The gills

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1) Iredale (1915) points out the distinctness of Suter's variety from *P. gemmulatus* of Reeve.

have a varying structure as to the genera; they are of the eulamellibranchiate type and are fused to each other and to the mantle at the anal slit. The intestine runs directly, in a slight curve backwards from the stomach, from which it issues on the right side.

Concerning the hinge, a great variation also prevails. The teeth may be completely reduced, or they are present in a vestigial shape only, or finally, they are well-developed. The hinge seems to represent the cyrenoid type as well as the lucinoid one of Bernard; thus in *G. faba* and *trapezina* we find the latter, as well as in *Kidderia bicolor* and in *G. smithi* (which may be a *Kidderia*; cf. Hedley 1916, pl. II, figs. 17—19), and in *Neogaimardia* the former. The ligament is external or subinternal in *Gaimardia*, subinternal in *Kidderia* and distinctly internal in the new genus *Neogaimardia*.

To this family I refer the genus *Gaimardia* (=*Modiolarca;* for the change of name cf. Iredale 1915) and the closely related *Kidderia* Dall 1876, as well as the new *Neogaimardia* (type *Kellia rostellata* Tate). The interrelation of these genera which are all represented in the New Zealand fauna, is shown in the following scheme:

I. Animal with 2 gill plates on each side.

A. Gills with well-developed interlamellary septa extending nearly all along the height of the lamellae; plates folded between them; foot with mucus pore separated from byssus furrow; ventral mantle suture shorter than the branchial opening. Shell rhomboid, with anterior rostrum; hinge of the lucinoid type with indistinct teeth; ligament subinternal or external *Gaimardia* Gould 1852.

Type: *G. trapezina* (Lamarck).

B. Gills with incomplete interlamellary septa (present in the marginal part only, about 1/3 of the height), plates simple, smooth; foot with mucus pore debouching in the front end of byssus furrow; ventral mantle suture longer than both siphonal slits together. Shell elongate, rostrum indistinct *Kidderia* Dall 1876.

Type: *K. minuta* Dall.

II. Animal with 1 gill plate on each side (= the inner or anterior one of the preceding group); no interlamellary connection in the gill; foot and mantle sutures as in *Gaimardia.* Shell orbicular, with a dictinct rostrum; hinge teeth of the cyrenoid type, strong; ligament short, internal.

Neogaimardia n. gen.

Type: *Kellia rostellata* Tate.

A comparison of the hinge elements makes it evident that in this family the two chief types of Bernard are manifested. I have

Fig. 15.
Hinge of *Gaimardia acrobeles.*

Fig. 16.
Hinge of *Kidderia bicolor.*

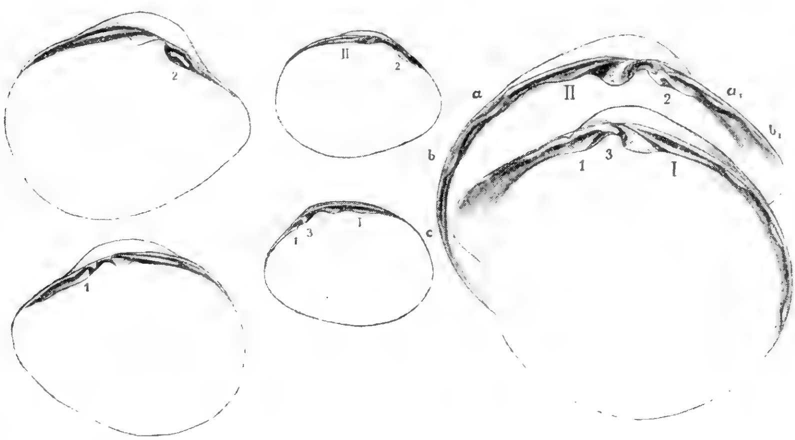

Fig. 18. Fig. 17. Fig. 19.
Three stages in the development of the shell and hinge of *Neogaimardia rostellata.*

examined the hinge in *G. faba* and *G. acrobeles* (text-fig. 15) — in the latter it is rather well developed — and in both there is only one small cardinal in the left valve being the ventral one in the hinge and thus = 2, according to Bernard's nomination; it is surrounded by two right cardinals, thus 3a and 3b, according to Bernard. An indistinct swelling of the hinge plate in front of tooth 3a represents a 5a. In the left valve a small 4a is visible in front of 2 and behind it a 4b, which may be well developed or indistinct in *G. acrobeles.*

In *Kidderia bicolor* v. Martens (from S. Georgia; text-fig. 16) the conditions are the same: teeth 2 and 3a are the largest, 4a and 3b smaller.

Bernard (1898) has stated the same type in the prodissoconch of *Modiolarca pusilla.*

Neogaimardia rostellata Tate represents a different arrangement. In a small specimen (l. 1 mm; text-fig. 17) a single tooth 2 is present in the left valve, this fits in a socket in front of tooth 3a in the right valve; a small swelling before 3 represents a tooth 1. In a somewhat larger stage (l. 1.5 mm; text-fig. 18) tooth 2 has got a slight sinus on its inner side and comprises tooth 1, and this state of affairs becomes much more obvious in the adult shell (text-fig. 19) where also tooth 2 has acquired a hook-like shape round tooth 1. 4a (a_1 in the figure) has been removed farther towards front, and so has 5a in the right valve.

The coexistence of both these types within the same family is certainly a sign of primitivity. So are also the features of the ligament which is often very indistinctly limited and may vary between external and internal position.

Concerning the structure of the gills this family exhibits a parallel to the Cyrenacea (*Cyrenidae* and *Sphaeriidae*); also in this group we find simple as well as folded gills and even a reduction of the posterior (or outer) demibranch, no doubt as a consequence of the incubatory development and its accumulative nursing of juvenile characters respectively arresting of progressive modification. Thus the single gill in *Neogaimardia* is certainly to be comprehended as a secondary apparition due to reduction, in the same way as the similar condition in the single-gilled subgenus *Neopisidium* of the freshwater mussels *Pisidium* (cf. Odhner 1923).

To *Neogaimardia* also belongs *Gaimardia tasmanica* Beddoms, according to specimens sent by the Australian Museum.

Gaimardia acrobeles Suter.

Auckland Island: 37, many shells, l. 5.6.

Kidderia campbellica n. sp.

(Pl. II, figs. 42—44, 56.)

Shell small, oblong, a little narrower at the anterior end, inflated, yellowish-gray and brown. Beaks a little produced, broadly rounded, situated a little above the front end which projects, narrowly rounded, below them. Basal margin slightly curved, posterior end broadly rounded, dorsal margin evenly convex. Sculpture faint irregular lines of growth; besides these a trace of some radial lines or rugations in the median part of the shell; a faint dorsal ridge (indistinct in old specimens) extends diagonally from the umbones to the dorso-posterior margin. Colour yellowish-gray, posterior and dorsal parts usually dark-brown, interior grayish-white, usually brownish posteriorly and dorsally. Interior surface grainy, only edges without the pallial line smooth and shining. Margins smooth, sharp. Ligament external, very long. Hinge perfectly tooth-less. Anterior adductor scar subcircular, smaller than the oblong posterior one and distinctly impressed. Dimensions: L. 6.5, h. 4.5, br. 3 8 mm. — Locality: Campbell Island, 45, numerous sps.

Externally the new species has a great resemblance to *K. bicolor* v. Martens (from S. Georgia), but that species is more elongate (with subparallel margins), and the new species differs from it and from any other species of the genus (thus also from *K. pusilla*) in being edentulous even in young stages of growth; only in one small specimen of 2.5 mm length a very indistinct right cardinal tooth was observed.

The animal has a very short pedal slit of the mantle, its length being smaller than the diameter of the anterior adductor. In *K. bicolor* this slit is twice that diameter. The pedal opening has smooth margins, then follows a long suture and, posteriorly, the large branchial slit with finely papillate margins and, above it, the anal slit with smooth margins. Between the two openings a pair of small papillae or tentacles are visible.

Many of the specimens collected contained fry in their gills, but such were observed only in the inner gill on each side, and in small number. In *K. bicolor*, on the contrary, both demibranchs at each side serve as brood-pouches and contain numerous young, as made evident by examination of specimens from S. Georgia. Also in *K. campbellica*, however, there is a free communication between the gill chambers due to the suspension of the gill axes which are free, except for their ends. By means of the anal slit the gill chambers communicate with the exterior. In their finer structure the gills, as already mentioned, are smooth, not folded. There are, however, many interlamellary connectives, though limited to the marginal parts of each demibranch. In the margin of each reflected lamella a marginal venous vessel is contained.

The front margin of each demibranch is furnished with a fine longitudinal furrow.

The foot consists of an anterior fingershaped portion and a broader posterior one, the latter containing the large byssus cavity preceded by a mucus gland which debouches in the anterior end of the byssus groove.

Both pairs of labial palps are well developed. There is a long oesophagus. The stomach chiefly consists of two portions: a large cardiac and a smaller pyloric sac, the latter evidently homologous with the crystalline coecum, though containing only ciliated epithelium and no excretion. The former portion is lined with a stomachal cuticula and is dorsally furnished with a short curved coecal appendage. Only one liver duct is present on each side of the stomach under the entrance of the oesophagus. The intestine issues from the right basal part of the pyloric sac, describes a short coil towards front and then runs with a dorsal curve through the heart to the anus.

The gonads form a pair of few-lobed bunches in the posterior half of the visceral hump. They debouch in a pair of papillae on each side of the foot retractors within the inner gill room and beneath the fundus of the pericardium.

Behind the pericard and surrounding the foot retractors lie the nephridia which begin with long pericardial tubes. These debouch dorsally in the posterior part of the outer sacs. The latter communicate medially by means of a short opening in their walls. They debouch separate from and opposite to the gonads.

Kidderia costata n. sp.

(Pl. II, figs. 45—47.)

Shell small, ovate-oblong, thin, fragile, compressed, especially below the middle, very inequilateral; umbones broad, flattened, in the foremost part of the upper side. Front margin abruptly descending, but little convex, strongly bent into the almost straight under side, hind margin produced-rounded, upper margin long, a little curved. Sculpture: 14 strong radiating costae, strongest in the left valve, of which 9 directed to the posterior margin somewhat flexed upwards with their ends, elevated, rather compressed (most so the uppermost ones), and 5 lower costae in the median part; front half of the shell without radiating sculpture; besides irregular concentric lines, in the posterior and upper parts raised as lamellae crossing the costae and lending them a subsquamose appearance. Colour white, dorsally brownish. Interior white, brownish behind and above; mantle line with a very small sinus below the posterior adductor. Anterior adductor scar small, ovate, not distinctly separated above from the retractor scar, posterior one broader, rounded ovate. Hinge-plate narrow. Hinge: left valve with a single median cardinal; shell margin depressed on both sides of it; right valve with 2 prominent stout teeth embracing the left one, and fitting into the sockets of the left valve margin; no cardinals in either valve. Ligament external, long, thin, with a strong resilium. Dimensions: L. 4, h. 2.6, crass. 2.2 mm. — Locality: Auckland Island: 41 (Masked Island), 1 empty, somewhat injured shell.

Externally this species is strikingly similar to a *Cardita calyculata;* but the hinge shows quite different characters and proves that it is referable to the genus *Kidderia.* It is similar to *K. bicolor* in the teeth and the shape of ligament and protoconch; only a slight difference is present between their left valves which is, however, easily explainable in the obliteration of the foremost tooth (4a) of the new species; even in *K. bicolor* it is not constant. A further difference is that in *K. bicolor* the retractor muscle scars are well separated from the adductorial ones. Also in *K. bicolor* a tendency to forming a small sinus of the mantle line is observable. The participating of the shell margin in forming the left cardinal sockets is no doubt a secondary apparition.

Neogaimardia rostellata (Tate).

(Pl. II, fig. 57; text-figs. 17—19.)

Mr. Hedley, who has kindly verified the identificaton of specimens sent, communicated me the following references concerning the literature about *Neogaimardia rostellata*, which is new to New Zealand:

Kellia rostellata Tate, Trans. Roy. Soc. S.A., xi, 1889, p. 63, pl. xi, fig. 14.

Kellia rostellata Wilson, Proc. Roy. Soc. Vict., ii, 1890, p. 64—67.

Kellya rostellata Tate & May, P.L.S.N.S.W., xxvi, 1901, p. 432.

Kellia rostellata Pritchard & Gatliff, Proc. Roy. Soc. Vict., xii, 1904, p. 225.

Neolepton rostellatum Hedley, P.L.S.N.S.W., xxx, 1906, p. 542, pl. xxxi, figs. 3, 4.

Neolepton rostellatum Verco, Trans. Roy. Soc. S.A., xxxi, 1907, p. 106.

Neolepton rostellatum Gatliff & Gabriel, Proc. Roy. Soc. Vict., xxi, 1908, p. 389.

Neolepton rostellatum May, Check-List Moll. Tasm., 1921, p. 19.

Neolepton rostellatum May, Illustrated Index Tasm. Shells, 1923, pl. viii, fig. 12.

Localities: North Island: 3, numerous sps., l. 2.8. — 21, masses of small sps.

The habitat in Australia of this species was communicated by Mr. Hedley thus:

Type locality: Port Phillip Heads, Victoria, 7—9 fms, on sea weed (Wilson). — Guichen Bay, alive, Lacepede Bay and Mac Donnell Bay, S. Australia (Verco), King Island, Tasmania (May).

Mr. Hedley further informs me that, according to his opinion, this form is referable to *Gaimardia*. This relationship has been corroborated by my examination of the anatomy and the hinge, but differences prevail which make necessary the creation of a new genus for the present species.

Hedley (1906, cf. above) has given a figure of this shell and its hinge. This differs, as already mentioned, from the normal type of the family in being of the cyrenoid structure with a tooth 1 in the right valve embraced by tooth 2 of the left one. Besides the characteristic hinge teeth there are some peculiar accessory marginal teeth. There are in both valves 3 posterior and 2 anterior ones, and between them small sockets for receiving the teeth of opposite valves. That these teeth are an accessory formation is evident from a comparison with a young shell: here no marginal teeth of this kind are visible. Similar teeth, though fewer in number, are to be observed also in species of *Gaimardia*, e. g. *G. acrobeles.*

The animal of *Neogaimardia rostellata* has its coalesced mantle edges pierced by three openings: a small pedal slit in the anterior sinus behind the rostrum, a long branchial one ventrally, and an anal opening behind. From *Kidderia* it differs in the mutual length of slits and sutures, and in the same respects it approaches *Gaimardia.* Between the posterior slits which have both smooth margins, like the pedal one, a pair of papillae are situated.

The gills are reduced to comprise only one demibranch on each side, viz. the inner or anterior one, the posterior or outer gill plate being entirely obliterated. The demibranch has its filaments directed in the length of the body and is smooth, not plicated; both its direct and its reflected lamella are well developed. In both lamellae there are many interfilamentary junctions, but no interlamellary ones exist at all. The upper margin of the inner lamella contains a venous blood vessel and is fused to the body at the sides of the foot; both demibranchs likewise join their inner margins behind the foot. The posterior margin of the direct lamella represents the gill axis and is fused to the mantle in its whole length. Thus a spacious chamber occupies the interior of each demibranch, communicating with the exterior only by means of the anal mantle opening; this room serves as a brood-pouch and was in many specimens filled with fry.

The foot is furnished with a broad sole and contains a large byssus gland secreting a bristle of coarse byssus rods. In front of the byssus groove is a separate pore, the mouth of a mucus gland, quite as in *Gaimardia.* The retractor muscles of the foot are very strong.

The pedal ganglia are situated far towards front. The statocysts at their upper sides contain one statolith each.

At the sides of the broad mouth 2 pairs of well developed labial palps are present. The oesophagus is of moderate length. The cardiac portion of the stomach is produced on the left side to a straight caecum; it is lined with a cuticule and receives one liver duct on each side. Downwards it passes on the left side into the pyloric sac lined with high ciliated epithelium. From the proximal portion to the right issues the intestine, which bends directly down and passes slightly curving through heart to anus.

On the under sides of the foot retractors a pair of small papillae are visible; here the genital ducts open. The sexes are separated and the gonads occupy the posterior part of the body hump. In female individuals very large eggs are seen in follicles which are formed as in *Pseudokellya* (cf. Pelseneer 1903).

The nephridia are comparatively small; they have long pericardial tubes and long communication; for the remaining part their outer sacs have smooth walls, and open opposite the genital pores, in the corner between foot retractors and visceral hump.

Fam. **Crassatellidae**.

Crassatella aurora Adams & Angas.
(Pl. II, figs. 40, 41).

North Island: 2, 1 valve, l. 21.5, h. 16.2. — 10, 3 sps., l. 15, h. 11.6, another sp.: l. 16, h. 12.5. — 11b, 1 sp., l. 18.3. This species was until now known only from the Australian continent (Lamy 1917). I give a description and figures of the New Zealand form in order to fix its characters for a comparison with the closely allied species (or varieties) *C. carnea, banksi* and *bellula*.

Shell elongate ovate-trigonal, anterior end a little shorter, rounded, posterior end rounded subtruncate, dorsal margins straight, beaks sharply pointed. Lunula and escutcheon distinct, narrow and of equal length. Colour pale fawn with 2 broken rays of brown diverging from the umbonal region to the under margin dividing the surface into 3 subequal areas. Sculpture: strong, concentric, rounded ribs over the whole shell coincident with the growth lines in the middle, more or less deflected at a diagonal line behind the posterior colour ray, and then running obliquely to the growth lines, which are somewhat raised in the hind part of the valve; concentric sculpture evanescent close at the dorsal margins. Interior light rosy, brighter towards the margins; under margin crenelate. Anterior adductor scar pear-shaped, posterior one subcircular. Hinge: left valve with a strong tooth 2 and a thinner 4b, as well as an anterior and 2 posterior thin laterals; right valve with a strong 3b, very thin 3a and 5b and 2 anterior and 1 posterior indistinct laterals.

Lamy (1917) restores Lamarck's genus *Crassatella* which had been rejected in favour of *Crassatellites* Krüger; the latter name was used by Suter.

Concerning the animal it ought to be noted that the mantle edges are, posteriorly above the ends of the gills, coalesced to form a small anal opening; for the remaing part they are quite separated. Beneath the anal foramen the mantle bears sparse and thin tentacles; in its front part, at the sides of the foot, its edges are considerably thickened, no doubt containing mucous glands. There are two pairs of gill plates at each side; the gill axes descend perfectly free without fusing to each other or to mantle. Both pairs of lamellae are well developed, here and there joining by interlamellary connections; otherwise they are entirely smooth. The foot is laterally compressed and contains a long ventral byssus groove. At the mouth two pairs of large labial palps are present.

Cyamiomactra problematica Bernard.

Stewart Island: 36a, some shells, l. 4.5 (incl. var. *truncata* Suter).

Perrierina taxodonta Bernard.

Stewart Island: 36a, many shells, l. 3.5.

Cuna delta (Tate & May).

North Island: 16, many valves, h. 2.5.

Fam. **Carditidae**.

Cardita calyculata (Linné).

North Island: 4, 3 sps., l. 10. — South Island: 29, 6 sps., l. 25. — Auckland Island: 41 (Masked Island), 1 sp., l. 21.

Venericardia purpurata (Deshayes) (=*australis* Lamarck).

North Island: 11b, many sps., l. 23.5. — South Island: 29, 1 sp., l. 35. — For the nomenclature of this species cf. Smith (1915).

Venericardia difficilis (Deshayes).

North Island: 4, 1 sp., l. 15. — 16, 3 sps. + 5 shells, l. 20. — South Island: 29, 6 valves, l. 23.

Venericardia bollonsi Suter.

North Island: 10, 3 valves, l. 6.5. — 18, 3 valves, l. 7. — 25, 1 sp., l. 6.7. — Stewart Island: 32, 1 valve, l. 3.5.

The animal has its mantle margins open except for a point behind, where a small projection from each side join each other medially; to these projections are also loosely attached the ends of the gills, which are simple, have well developed laminae, and freely depending gill axes. The foot is large, much compressed, with a digitiform prolongation in front, and with a median byssus furrow all along its keel, except in the foremost end.

Venericardia lutea (Hutton) (=*zelandica* Deshayes).

North Island: 16, many valves, l. 5. — 18, 2 sps., l. 4.

Fam. **Lucinidae**.

Loripes concinna Hutton.

North Island: 16, many sps., l. 8. — 18, 1 valve, l. 7.

Divaricella cumingi (Adams & Angas).

North Island: 4, 1 valve, l. 10. — 10, 1 valve, l. 19.5. — 16, 5 valves, l. 24. — 18, 1 small sp. — 25, 4 valves, l. 16.

Fam. **Diplodontidae**.

Diplodonta globularis (Lamarck).

Stewart Island: 33, 6 valves, l. 26. — 36a, 1 shell, l. 6.5.

Diplodonta striata Hutton.

North Island: 10, 2 valves, l. 22. — 16, 3 valves, small. — 25, many valves, l. 19. — South Island: 5 sps., l. 19.5.

Diplodonta zelandica (Gray).

North Island: 2, 1 valve, l. 20. — 12, 5 sps., l. 15. — 16, 2 valves, l. 18. — 23, 1 sp., l. 8.5. — Stewart Island: 36a, some sps., l. 15.

Fam. **Thyasiridae.**

Thyasira flexuosa (Montagu).

Auckland Island: 37a, some sps., l. 4.7. — 42, 1 sp., l. 4. — 43, 1 sp., l. 3.

Fam. **Erycinidae.**

Erycina bifurca (Webster).

Stewart Island: 36a, 1 small sp.

Erycina parva (Deshayes).

North Island: 16, 1 small sp. — 26, 7 sps., l. 3.2. — Auckland Island: 37a, some sps., l. 3.4. — In this species the mantle is entirely open, without sutures and siphons, the posterior gill is small and consists of the descending lamella only, which is directed forward. Its edge is fused to the mantle all along, and the upper half is coalesced with the direct lamella of the anterior gill. Both gills were full of fry; the posterior brood-pouch is the space between mantle and the single lamella of the posteror gill, and it extends far beyond the gill posteriorly.

Neolepton antipodum (Filhol).

North Island: 2, 2 small sps., the largest of a yellowish colour with brown fulgurations. — Auckland Island: 40, 2 small sps. — 43, numerous sps., l. 3. — Campbell Island: 45, 5 sps., l. 3.

Neolepton citrinum (Hutton).

Auckland Island: 37a, 3 sps., l. 3.

Neolepton sanguineum (Hutton).

Stewart Island: 36a, many sps., l. 3.

The genus *Neolepton* was established by Monterosato in 1875 on *Lepton sulcatulum* Jeffreys (1859) and some allied species as a subgenus of *Lepton*. It is, however, quite distinct, as will be shown by a comparison of the animals of *Lepton squamosum* (Forbes & Hanley 1853, pl. O, fig. 6) and of the present species.

Bernard (1897) includes in the synonymy of this genus *Lutetina* Munier-Chalmas & Vélain 1876.

The animal of *Neolepton sanguineum* has its mantle margins open in front and ventrally, but coalesced posteriorly to form one branchial and one anal slit both with slightly elevated and densely papillate margins which are tinged with red.

The foot has a long cylindrical sole and shortly projecting hind and front ends. There is no byssal groove.

At each side two demibranchs are present, but the external (here posterior) one is much reduced in size and consists chiefly of the reflected lamella. This is combined with the direct one by means of a few interlamellary junctions. The inner (here anterior) demibranch has both its lamellae well developed, and has no interlamellary connections. Both gills are entirely smooth and have their filaments directed from behind towards front.

Montacuta unidentata n. sp.

(Pl. II, figs. 48—51.)

Shell small, rather solid, elongate-ovate, white, finely concentrically striated. Umbones broadly rounded. Anterior end much longer than (about twice) the posterior one, frontal margin rounded, posterior one subtruncate, antero-dorsal margin straight, basal margin faintly curved. Lunula obsolete, very narrow, most distinct in the left valve. Interior white, smooth, margins simple. Hinge-line narrow, that of the right valve sharply edged but strengthened inside by means of a ridge (=inner margin of hinge plate); no lateral teeth, except a single strong cardinal-like one of a broadly triangular shape, in front of the deep, rounded trigonal ligamental pit; left valve with a short anterior and a posterior lamella fitting inside the right edge, the former gradually rising to an elongate lateral tooth. Resilium short. Adductor scars ovate, the anterior more narrow and elongate than the posterior one. Pallial line simple. Dimensions: L. 2.8, h. 2, crass. 1.4 mm. — Locality: Stewart Island: 36a, numerous valves.

Suter (1913) described a *Montacuta triquetra* from Port Pegasus, which differs essentially in its shape, being more triangularly elevated.

Montacuta tellinula n. sp.

(Pl. II, figs. 52, 53; text-figs. 20, 21.)

Shell ovate, thin, compressed, covered with a thin, light yellowish-brown cuticula; umbones small, papilliform, smooth, behind the middle. Sculpture: close concentric, somewhat irregular striae. Colour grayish-white with fine white stripes radiating over the whole shell. Interior smooth, white with the radiating stripes shining through; margins smooth, thin. Mantle line entire; adductor scars subequal, (the anterior a little longer), ovate. Hinge with one large projecting (lateral) tooth in each valve, the left one crest-like, and an indistinct knob-like posterior lateral behind the perpendicular ligament lodged in a deep hole under the umbones. Dimensions: L. 5.2, h. 4.2, crass. 1.9 mm. — Locality: North Island: 5, several sps.

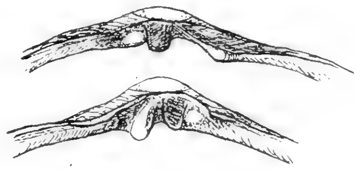

Fig. 20. Hinge of *Montacuta tellinula* n. sp.

The animal (text-fig. 21) has a long pedal slit of the mantle, behind that a long suture and then a single opening without siphons. Here in the posterior end the mantle edges are finely scalloped by very small distant papillae. There are 2 gills on each side extending far upwards to behind the ligament, the posterior (outer) one with a much reduced direct lamella; they are smooth and united in their lower ends, which are, further, fused with the mantle. The inner (anterior) gill has its reflected lamella nearly as high as the direct one and for the greater part connected with it. The foot is large, compressed, and has a well developed byssus groove. The heart lies in the up-

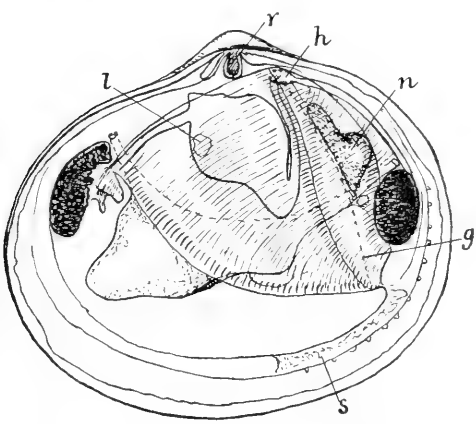

Fig. 21. Anatomy of *Montacuta tellinula* n. sp. *g* gill axis: *h* heart; *l* opening of liver duct into stomach; *n* nephridium; *r* ligament; *s* suture of mantle margins.

permost end of the pericard a little behind the ligament. The nephridia have their outer sacs dilated along the sides of the pericard.

Rochefortia reniformis Suter.

North Island: 11d, 2 sps., l. 5.2. — 17, 1 sp., l. 8. — 19, many sps., l. 6. — 23, 2 sps., l. 6. — 28, 1 sp., l. 7. — Auckland Island: 43, 1 valve, l. 5.

Fam. **Kellyidae.**

Kellya suborbicularis (Montagu).

North Island: 2, 1 sp., l. 8. — 24, 1 shell, l. 6.2. — South Island: 29, 7 sps., l. 13.

Fam. **Lasæidæ.** [1]

Lasaea minutissima (Iredale).
(*L. miliaris* Suter, non Philippi).

Stewart Island: 33, en masse, l. 3. — Auckland Island: 37, en masse, l. 3.5. — 38, many sps., l. 3.5. — Campbell Island: 44, some sps., l. 3. Oliver (1923) maintains the identity of *L. miliaris* of Suter and *Modiolarca minutissima* of Iredale as well as the specific distinctness from *L. miliaris* of Philippi.

Fam. **Galeommatidae.**

Spaniorinus zelandicus n. sp.
(Pl. II, figs. 54, 55; text-figs. 22, 23.)

Shell small, elongate-ovate, thin, a little shining, slightly gaping in front, inflated in the median part; umbones papillate, submedian; anterior half produced, rounded, posterior one a little higher, truncately rounded at the end; under margin faintly convex, almost straight in the middle. Colour white; a very thin yellowish cuticula present. Sculpture consisting of fine lines of growth only. Interior white with smooth and sharp margins; anterior adductor scar elon-

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[1] Cf. Cossmann & Peyrot 1911.

gated with acuminate upper end, posterior one a little lower situated, rounded. Hinge with a single cardinal tooth in each valve, that of the right valve hook-like, the left one broadly triangular. Ligament internal in a long oblique groove.

The animal (text-fig. 23) has thin mantle edges which are, as a very narrow brim, reflected upon the shell margin. The mantle edges are open in front and backwards to about the middle of the shell; for the greater part of this distance the edges are smooth, but above the pedal opening they are furnished with small scattered papillae. Behind the foot a long suture follows, which occupies the whole posterior end of the animal. It is pierced by a single perforation; the small and narrow anal siphon, which has only slightly raised margins. Along the posterior margins of the mantle numerous small tentacles extend as far as above the adductor. There are two gill plates on each side coalesced in their lower ends with each other and the mantle. They extend far dorsally behind the umbones. They are smooth, and both have well developed reflected lamellae. The posterior (external) gill is the narrower one, and its reflected lamella extends beyond the gill axis behind; here it is covered by a lappet of the mantle, produced by the tentacular muscles, which are unusually strongly developed at this point. The labial palps are large, triangular, and distinctly furrowed. The foot is very large, compressed, and has a byssus groove posteriorly.

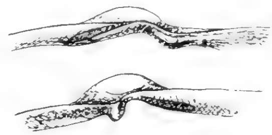

Fig. 22. Hinge of *Spaniorinus zelandicus* n. sp.

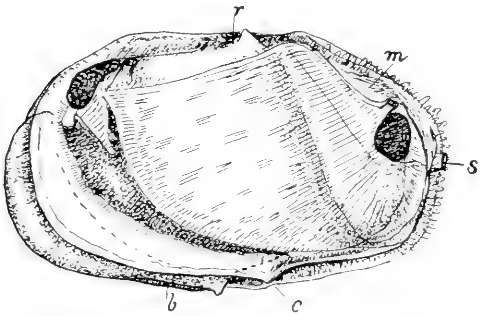

Fig. 23. Anatomy of *Spaniorinus zelandicus* n. sp. *b* byssus groove; *c* coalescing point of the mantle margins; *m* tentacular muscles; *r* ligament; *s* anal siphon.

Dimensions: L. 6, h. 3.8, crass. 2 mm.

Localities: North Island: 16, 1 right valve, l. 5. — Auckland Island: 43, 1 sp., l. 6.

This family and genus were not hitherto represented in the

New Zealand faunistical literature. *Spaniorinus* is nearly akin to *Solecardia* Conrad (=*Scintilla* Deshayes) in shape, the long postpedal suture, the small anal siphon and the papillated mantle margins. But it differs essentially in its hinge, which entirely lacks lateral teeth and often, as in the present species, also the small cardinals (3a, 4b), which are present in other species of *Spaniorinus*. According to Cossmann & Peyrot (1911), the genus has a geological range from the Eocene to the Miocene epoch.

Fam. **Unionidae**.

Diplodon menziesi (Gray).

North Island: Lake Takapuna, Auckland, at the shore, 25/12 1914, 3 sps., l. 73.

Fam. **Tellinidae**.

Tellina deltoidalis Lamarck.

North Island: 10, 1 sp., l. 20. — 17, 2 sps., l. 29. — Napier, inner harbour, muddy sand, 29/1 1915, some sps., l. 46. Iredale (1915) proposes a new name, *liliana*, for this species, which is said to be distinct from the Australian *T. deltoidalis* of Lamarck; but which are the differences?

Tellina eugonia Suter.

Off Bard Island, 35 fms, mud, 17/12 1914, 1 sp., l. 29.

Tellina huttoni Smith.

North Island: 16, 1 valve, l. 11.5. — 25, many sps., l. 17. — South Island: 29, 1 sp., l. 12.5. — Stewart Island: 32, 1 sp., l. 10.5.

Tellina disculus Deshayes.

South Island: 29, 1 sp., l. 25.

Tellina glabrella Deshayes.

Auckland Island: 42, many sps., l. 12.

Leptomya lintea (Hutton).

North Island: 10, 1 sp., l. 15. — South Island: 29, 3 sps., l. 19. — Auckland Island: 39, 5 sps., l. 14. — 41, (Masked Island), 1 sp., l. 8. — 43, 1 sp., l. 10.

Fam. **Amphidesmatidae.**

Amphidesma gaimardi (Deshayes) (=*Mesodesma subtriangulatum* Gray, by Suter).

North Island: 17, many sps., l. 39. — Hokianga, the coast, in sand, 6/1 1915, many sps., l. 37.

Amphidesma (Mesodesma) australe (Gmelin).

North Island: 12, en masse, l. 45 (var. *aucklandicum* v. Martens). — South Island: 30, 2 sps. — Stewart Island: 31, many valves, l. 57. — 33, 1 sp., l. 30. — Auckland Island: 39, en masse, l. 83 (var. *aucklandicum*). — 42, 4 valves, l. 50.

Fam. **Mactridae.**

Mactra scalpellum Reeve.

North Island: 16, many valves, l. 18.5. — 25, many sps., l. 19.

Mactra discors Gray.

North Island: 25, many valves, l. 18.5.

Spisula ordinaria (Smith).

North Island: 25, 9 sps., l. 14.

Spisula aequilateralis (Deshayes).

North Island: 5, 1 valve, l. 56.

Zenatia acinaces (Quoy & Gaimard).

North Island: 13, 1 sp., l. 57.

Fam. **Veneridae.**

Dosinia subrosea (Gray).

North Island: 11b, 1 small sp. — 13, 3 sps., l. 36.

Macrocallista multistriata (Sowerby).

North Island: 10, 2 sps., l. 18. — 16, many sps., l. 17.5. — South Island: 29, 1 sp., l. 22.5. — Stewart Island: 35, 3 sps., l. 35.

Antigona zelandica (Gray) (=*Cytherea oblonga* Hanley).

North Island: 16, 1 valve, l. 7. — South Island: 29, 3 sps., l. 63. — Stewart Island: 32, many valves, l. 18.

Chione stutchburyi Wood.

North Island: 8, 4 sps., l. 35. — 12, many sps., l. 43. — 15, 2 sps., l. 20. — 17, 1 sp., l. 12. — 25, 1 valve, l. 16.5. — Napier, inner harbour, muddy sand, low water, 29/1 1915, some sps., l. 21. — South Island: 29, 1 sp., l. 30. — Stewart Island: 31, many sps., l. 47. — Auckland Island: 37, many sps., l. 55. — 39, many sps., l. 66. — 42, many sps., l. 72.

Chione spissa (Deshayes) (=*crassa* Quoy & Gaimard).

Auckland Island: 37a, 1 sp., l. 17. — 43, many sps., l. 35. 43, north arm of Carnley Harbour, 35 fms, mud, 30/11 1914, 1 sp., l. 30.

Chione mesodesma (Quoy & Gaimard).

North Island: 5, 1 valve, l. 23. — 11a, some valves, l. 23. — 11b, 6 sps., l. 16. — 16, many sps., l. 21. — 14, 1 sp., l. 20. 22, 2 old valves. — South Island: 29, many sps., l. 26. — Stewart Island: 36a, some small sps.

Paphia intermedia (Quoy & Gaimard).

South Island: 29, 2 sps., l. 42. — 30, 5 sps., l. 14. — Stewart Island: 31, 3 sps., l. 41. — Auckland Island: 37a, 3 valves, l. 35. — 39, 5 sps., l. 62. — 40, many sps., l. 58. — 41 (Masked Island), 4 sps., l. 44. — 41 (Figure 8 Island), 1 sp., l. 29. — 42, 2 sps., l. 63. — Campbell Island: 44, 1 sp., l. 50.

Protothaca crassicosta (Deshayes) (=*Paphia costata* Quoy & Gaimard).

North Island: 15, 3 valves, l. 30. — 23, 5 sps., l. 16. — South Island: 30, 2 sps., l. 21.

Venerupis reflexa Gray.

North Island: 23, 1 sp., l. 18. — 26, 5 sps., l. 27. — 28, 9 sps., l. 25.

Venerupis siliqua Deshayes.

North Island: 28, 5 sps., l. 23. — South Island: 29, 2 sps., l. 32.

Fam. **Cardiidae.**

Cardium (Protocardia) pulchellum Gray.

North Island: 7, 1 sp., l. 15. — 10, 8 sps., l. 17.5. — 16, many sps., l. 18. — 25, 1 sp., l. 16. — 3, some valves, l. 20. — South Island: 29, 4 sps., l. 22.5. — Stewart Island: 33, 1 valve, l. 18. — Campbell Island: 1 sp., l. 22.

Fam. **Garidae.**

Gari (Psammobia) lineolata (Gray).

North Island: 16, 1 valve, l. 23. — 25, many sps., l. 36. — Stewart Island: 36a, 3 valves, l. 82.

Gari (Psammobia) stangeri (Gray).

North Island: 8, 1 sp., l. 64. — South Island: 29, many valves, l. 56, + 1 sp., l. 20.

Gari (Psammobia) zelandica (Deshayes).

North Island: 10, 1 shell, l. 13.5. — 11b, 2 sps., l. 25. — Stewart Island: 35, 1 valve, l. 30.

Soletellina nitida (Gray).

North Island: 16, 1 valve, l. 45.

Fam. **Corbulidae.**

Corbula zelandica Quoy & Gaimard.

North Island: 10, many sps., l. 13. — 11b, 3 sps., l. 14. — 16, 5 sps., l. 11.5. — 17, 1 sp., l. 12. — 22, 1 old valve. — 23, 2 sps., l. 13. — South Island: 29, many sps., l. 14. — Auckland Island: 41 (Masked Island), 5 sps., l. 12.

Fam. **Saxicavidae.**

Saxicava artica (Linné).

North Island: 4, 2 sps., l. 10.5. — 9, some sps., l. 19. — 10, 2 sps., l. 7. — 14, 1 sp., l. 6. — 16, many sps., l. 9. — 17, 4 sps., l. 12. — 18, 1 valve, l. 8.5. — 28, many sps., l. 12. — off Bare Island, 35 fms, clayish mud, 17/12 1911, 1 sp., l. 10.5. — South Island: 29, 6 sps., l. 21. — Stewart Island: 35, 1 sp., l. 11. — Auckland Island: 41 (Masked Island), 1 sp., l. 13. — 43, 4 sps., l. 9. — Campbell Island: 45, many sps., l. 5.5.

Fam. **Pholadidae.**

Pholadidea spathulata (Sowerby).

North Island: 11d, 1 sp., l. 50.

Pholadidea tridens (Gray).

North Island: 17, 1 sp., l. 22.

Barnea similis (Gray).

North Island: 28, numerous sps., l. 80.

Fam. **Thraciidae.**

Thracia transenna Suter.

North Island: 19, 1 sp., l. 16.

Thracia vitrea (Hutton).

North Island: 25, 1 valve, l. 22. — Auckland Island: 43, 2 sps., l. 6.5. — 42, 1 sp., l. 8.5.

Fam. **Periplomidae.**

Cochlodesma angasi (Crosse & Fischer).

Stewart Island: 33, 1 valve, l. 57.

Fam. **Myochamidae.**

Myodora antipodum Smith.

North Island: 16, many valves, l. 6.

Myodora novae-zealandiae Smith.

North Island: 16, many valves, l. 5.5.

Myodora pandoriformis (Stutchbury).

North Island: 4, 1 valve, l. 9.5.

Myodora striata (Quoy & Gaimard).

North Island: 25, 1 valve, l. 18. — South Island: 29, 4 sps., l. 34.

Fam. **Cleidothaeridae.**

Cleidothaerus (Chamostrea) albidus (Lamarck).

North Island: 24, 2 sps., h. 60.

Fam. **Verticordiidae.**

Verticordia setosa Hedley.

North Island: 16, 3 valves, l. 4.5.

Fam. **Cuspidariidae.**

Cuspidaria fairchildi Suter.

North Island: 18, 1 shell, l. 11.

Cuspidaria trailli (Hutton).

North Island: 16, 1 sp., l. 21, + 1 valve.

Addenda.

Bouvieria ornata (Cheeseman), p. 51.

Suter refers this species to *Berthella* evidently on account of its smooth-edged jaw-elements. Like *Berthella,* too, it has a relatively small shell. But the radula characters undoubtedly place it in *Bouvieria.* Externally it differs from *B. aurantiaca* and all Berthellas in the position of anus somewhat in front of the posterior end of the gill mesenterium.

Bergh (1902) certainly had another species at hand, when he described a specimen from Rarotonga, designated as *Pleurobranchus ornatus* Cheeseman, since it differed in serrated jaw-elements.

Marinula parva (Swainson), p. 55, var. *striata* n.

The present specimens differ from the typical *M. parva* (from Tasmania) in being regularly striated spirally, at least in their upper whorls. This character being exceptional within the genus, the form in question deserves to be recognized as a separate variety *striata* (text-fig. 24).

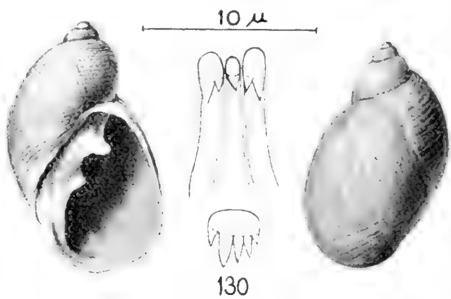

Fig. 24. *Marinula parva* Swainson, var. *striata* n. Auckland Isl., × 6, with teeth from its radula (median, two laterals, one marginal). × 2300.

Suter (1913) gives some particulars of the radula of *M. parva.* They may be completed by the following facts concerning the present form: Length and breadth of radula, 0.95 and 0.36 mm resp.; series of teeth 138; teeth in one series 270. Median tooth with a small simple cusp; laterals 1—109 with an entocone; 110—114 with an additional ectocone; subsequent (marginal) teeth, by addition of ectocones with 4 denticles, and outermost ones with 5. All teeth extremely small: laterals little more than 1 μ in breadth (text-fig. 24).

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Explanation of the Plates.

Plate I.

Fig. 1. Lepidopleurus inquinatus Reeve, half of a median valve. Campbell Island. × 10.
Fig. 2. The same, Stewart Island. × 10.
Fig. 3. Gibbula mortenseni n. sp. × 5.5.
Fig. 4. Calliostoma onustum n. sp. × 6.
Figs. 5—8. Rissoa achatina n. sp., different colour variations. × 8.5.
Fig. 9. The same, operculum. × 20.
Figs. 10—11. Rissoa semen n. sp. × 20.
Fig. 12. Rissoa erosa n. sp. × 20.
Fig. 13. The same, operculum. × 20.
Fig. 14. Rissoa cylindrella n. sp. × 20.
Fig. 15. Cerithium invaricosum n. sp. × 3.
Fig. 16. Cerithiopsis dirempta n. sp. × 15.
Fig. 17. Cerithiopsis trizonalis n. sp. × 15.
Fig. 18. Seila dissimilis Suter. × 12.
Fig. 19. Caecum suteri n. sp. × 20.
Fig. 20. Lamellaria verrucosa n. sp. Nat. size.
Fig. 21. The same, from below. Nat. size.
Fig. 22. The same, shell, somewhat enlarged.
Fig. 23. Turbonilla campbellica n. sp. × 6.
Fig. 24. Mitra mortenseni n. sp. × 3.
Fig. 25. Prosipho chariessa Suter. × 10.
Fig. 26. Trophon mortenseni n. sp. × 4.
Fig. 27. The same, operculum. × 10.
Fig 28. Marginella coma n. sp. × 6.
Fig. 29. Heterocithara mediocris n. sp. × 10.
Fig. 30. Runcinella zelandica n. sp., from the right. × 25.
Fig. 31. The same, anterior end from below. × 25.
Fig. 32. The same, from above. × 25.
Fig. 33. Alloiodoris lanuginata Abraham, from above. × 1.5.
Fig. 34. The same, from below. × 1.5.
Fig. 35. Cuthona zelandica n. sp. × 4.5.

Plate II.

Figs. 36—38. Chlamys campbellicus n. sp. × 1.5.
Fig. 39. The same, sculpture. × 9.

Fig. 40. Crassatella aurora Adams & Angas, from exterior. × 2.5.
Fig. 41. The same, from interior, another valve. × 2.5.
Fig. 42. Kidderia campbellica n. sp., left valve, from exterior. × 4.
Fig. 43. The same, right valve from interior. × 4.
Fig. 44. The same, dorsal view. × 4.
Fig. 45. Kidderia costata n. sp., left valve from exterior. × 10.
Fig. 46. The same, right valve from interior. × 10.
Fig. 47. The same, hinge of left valve.
Figs. 48—51. Montacuta unidentata n. sp. × 10.
Figs. 52—53. Montacuta tellinula n. sp. × 6.
Figs. 54—55. Spaniorinus zelandicus n. sp. × 5.
Fig. 56. Anatomy of Kidderia campbellica n. sp.
Fig. 57. Anatomy of Neogaimardia rostellata Tate.
Fig. 58. Fossarus ovatus n. sp. × 12.
Fig. 59. Fossarus conicus n. sp. × 12.
Fig. 60. Fossarus productus n. sp. × 12.
Figs. 61—62. Fossarus hyalinus n. sp. × 12.

a opening of liver duct into stomach; *b* byssus gland; *c* cerebral ganglion; *e* embryo in the gill; *f* pedal ganglion; *g* gonad; *l* liver; *L* ligament; *m* pedal gland; *n* nephridium; *p* pericard; *r* margin of reflected lamella of the inner gill; s_{1} pedal slit; s_{11} branchial slit; s_{111} anal slit; *t* tentacle; *v* visceral ganglion.

24—5—1924.

Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XX.

Echinoderms of New Zealand and the Auckland-Campbell Islands.

II. Ophiuroidea.

By

Dr. **Th. Mortensen.**

(With Pls. III—IV.)

The first Ophiuroid known from New Zealand was *Pectinura maculata*, described by Verrill[1]) in 1869 under the name of *Ophiarachna maculata*. In Hutton's "Catalogue of the Echinodermata of New Zealand" (1872) in all 5 species are mentioned, viz.

Ophiothrix coerulea n. sp.
Ophionereis fasciata n. sp.
Ophiactis nigrescens n. sp.
Ophiura maculata Verrill
Ophiura cylindrica n. sp.

To this list Hutton adds in 1878[2]) one more new species, *Amphiura parva*. In 1877 E. A. Smith[3]) added another Ophiurid to the New Zealand fauna, viz. *Ophiopteris antipodum*, representing a new generic type.

Not counting a few deep-sea forms, dredged by the "Challenger" and the "Gazelle" off New Zealand, all additions to the New Zea-

1) A. E. Verrill. On new and imperfectly known Echinoderms and Corals. Proc. Boston Soc. Nat. Hist. Vol. XII. p. 388.

2) F. W. Hutton. Notes on some New Zealand Echinodermata, with descriptions of new species. Trans. N. Z. Inst. XI, p. 305.

3) E. A. Smith. Description of a new form of Ophiuridae from New Zealand. Ann. Mag. Nat. Hist. 4. Ser. XIX. p 305.

land Ophiuroid fauna for the next nearly 30 years are due solely to the efforts of H. Farquhar, who in a series of papers, published mainly in the Transactions of the N. Z. Institute, describes several species new to science from New Zealand waters, corrects former identifications of New Zealand species, records species hitherto not found in New Zealand waters or rejects species wrongly included in the New Zealand fauna.

In 1894 he describes *Amphiura rosea* n. sp. from Wellington Harbour. In 1895 *Ophiomyxa australis* Ltk. is recorded from New Zealand, and Hutton's *Ophionereis fasciata* is declared identical with the Australian *Ophionereis Schayeri* M. & Tr., while *Ophiothrix coerulea* Hutton is rejected from the New Zealand fauna, being from Fiji. In 1897[1]) Farquhar describes the new species *Amphiura pusilla,* and *Amphiura elegans* (= *Amphipholis squamata*) is recorded from New Zealand. His next paper, 1898,[2]) contains only the data up to that time, giving no new additions to the New Zealand Ophiuroid fauna. Next follow the descriptions of these new species: *Ophioplocus Huttoni* (1899), *Ophiocreas constrictus* (1900), *Amphiura aster* (1901), *Ophiactis nomentis* (1907), *Ophiocoma bollonsi* (1908) and finally *Amphiura arenaria* (1913).

In 1907 Koehler described in his "Revision de la collection des Ophiures du Muséum d'histoire naturelle de Paris"[3]) an Ophiurid, *Amphiura præfecta,* from Campbell Island and another, *Amphiura basilica,* from East Cape, New Zealand, both of them brought home by M. Filhol, from the Transit of Venus-Expedition in 1874, but which had remained undescribed till then. — The Trawling Expedition of the New Zealand Government, 1907, brought to light two more Ophiurids new to science, viz. *Astrotoma Waitei* and *Amphiura noræ,* described by Benham in 1909;[4]) no other forms were added by this expedition to the New Zealand Ophiuroid fauna.

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1) H. Farquhar. A contribution to the history of New Zealand Echinoderms. Journ. Linn. Soc. London. Zoology. XXVI. p. 186—198.

2) H. Farquhar. On the Echinoderm Fauna of New Zealand. Proc. Linn. Soc. N. S. Wales. 1898.

3) Bull. sc. de la France et de la Belgique. XLI.

4) Scientific Results of the New Zealand Government Trawling Expedition 1907. Echinoderma, by W. B. Benham. Rec. Canterbury Mus. Vol. I. No. 2. 1909.

The same holds good of the Expedition to the Subantarctic Islands in 1907, which found only one species of Ophiurids, in Carnley Harbour, Auckland Islands. In his report on the Echinoderms of this expedition Benham[1]) lists this species as *Amphiura squamata*, proving at the same time Hutton's *Amphiura parva* to be only a synonym of this species.

A few more additions to the Ophiuroid fauna of New Zealand are found in H. L. Clark's "Catalogue of Recent Ophiurans" 1905,[2]) viz. *Ophiocormus notabilis* and *Ophiozonoida picta*, both collected by Farquhar; further the New Zealand *Ophiomyxa* is described as a new species, *O. brevirima*. — Lastly F. Jeffrey Bell in 1917 in his Report on the Echinoderms of the British Antarctic ("Terra Nova") Expedition adds four new Ophiuroids to the New Zealand Fauna, viz. *Ophiothrix* sp., *Astroporpa Wilsoni*, *Astroschema elegans* and *Astrotoma benhami*, all dredged off the North of New Zealand, the three latter being new to science.

In the present paper 9 new species and 3 new varieties are described, namely:

Ophiocreas longipes
Gorgonocephalus chilensis, var. *novæ-zelandiæ*
Ophiacantha vilis
Amphiura spinipes
„ *alba*
„ *hinemoæ*
„ *amokuræ*
„ *annulifera*
„ *eugeniæ*, var. *latisquama*
Ophionephthys stewartensis
Ophiactis profundi, var. *novæ-zelandiæ*
Pectinura gracilis

Two more species, *Astroschema* sp. and *Amphiura* sp. are probably new, but are too young to be identified with certainty.

The following 5 species are recorded as new to the New Zealand fauna:

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1) The Subantarctic Islands of New Zealand. 1909. Art. XIII. W. B. Benham. The Echinoderms, other than Holothurians, of the Subantarctic Islands of New Zealand.

2) Mem. Mus. Comp. Zool. Harvard College. Vol. XXV. 1915.

Ophiothrix oliveri Benham
„ *aristulata* Lyman
Ophiactis hirta Lyman
Amphiura magellanica Ljungman
Amphiocnida pilosa (Lyman)

Further it is proved that Hutton's *Ophionereis fasciata* is a valid species, not identical with the Australian *Ophionereis Schayeri*, while, on the other hand, *Ophiactis nomentis* Farquhar is identical with the Australian *Ophiactis resiliens* Lyman. Also Farquhar's *Amphiura arenaria* is shown to be identic with his *Amphiura aster*. Finally Hutton's *Ophiactis nigrescens* is rejected from the New Zealand fauna, the examination of the type having led to the result that it is a specimen of *Ophiocoma schoenleini* M. & Tr. from the Fiji Islands.

The following is then a corrected list of the New Zealand Ophiuroids, not including those from the Kermadec Islands and from the Deep-sea off New Zealand.

1. **Ophiocreas constrictum** Farquhar
2. „ **longipes** n. sp.
3. **Astrotoma Waitei** Benham
4. „ **Benhami** F. Jeffr. Bell
5. **Astroporpa Wilsoni** F. Jeffr. Bell
6. **Astroceras elegans** (F. Jeffr. Bell) (= *Astroschema elegans* F. Jeffr. Bell)
7. **Astroschema** sp.
8. **Gorgonocephalus chilensis**, var. **novæ-zelandiæ**, n. var.
9. **Ophiomyxa brevirima** H. L. Clark (**non** = *Ophiomyxa australis* Ltk.)
10. **Ophiacantha vilis** n. sp.
11. **Ophiothrix aristulata** Lyman
12. „ **Oliveri** Benham
    („ *coerulea* Hutton not New Zealand)
13. **Ophiocormus notabilis** H. L. Clark
14. **Ophiocoma Bollonsi** Farquhar
15. **Ophiopteris antipodum** E. A. Smith
16. **Ophiactis resiliens** Lyman (= *Ophiactis nomentis* Farquhar)
17. „ **hirta** Lyman

18. **Ophiactis profundi**, var. **novæ zelandiæ** n. var.
(*Ophiactis nigrescens* Hutton not New Zealand, = *Ophiocoma schoenleini* M. & Tr.)
19. **Amphiura magellanica** Ljungman
20. „ **spinipes** n. sp.
21. „ **præfecta** Koehler
22. „ **aster** Farquhar (= *Amphiura arenaria* Farquhar)
23. „ **noræ** Benham
24. „ **rosea** Farquhar
25. „ **eugeniæ**, var. **latisquama** n. var.
26. „ **amokuræ** n. sp.
27. „ **alba** n. sp.
28. „ **hinemoæ** n. sp.
29. „ **annulifera** n. sp.
30. „ **pusilla** Farquhar
31. „ sp.
32. **Amphiocnida pilosa** (Lyman)
33. **Amphioplus basilicus** (Koehler)
34. **Ophionephthys stewartensis** n. sp.
35. **Amphipholis squamata** (D. Ch.) (= *Amphiura parva* Hutton)
36. **Ophionereis fasciata** Hutton (**non** = *Ophionereis Schayeri* M. & Tr.)
37. **Ophiozonoida picta** H. L. Clark
38. **Ophioplocus Huttoni** Farquhar
39. **Pectinura cylindrica** (Hutton)
40. „ **gracilis** n. sp.
41. „ **maculata** (Verrill)

As the number of species of Ophiurids recorded in the "Index Faunæ Novæ Zelandiæ" (1904) is 36, the present list, numbering 41 species, would appear to represent a small progress only in our knowledge of the New Zealand Ophiurid fauna. An analysis of the list of the „Index" will, however, give a somewhat different impression. Out of the list of the „Index" no less than 22 species are Deep-sea forms, and one is known from the Kermadec Islands only. These species might well be added to the present list; when omitted here it is not because they are not regarded as belonging rightly to the New Zealand fauna, but only because it is out of the scope of this work to treat the Deep-sea forms. Accordingly, only the remaining 13 species of the „Index" are to be compared with those of the present list, and, moreover, one of these 13 species, *Amphiura parva* is a synonym of *Amph. elegans* (= *Amphipholis squamata*). Thus the number of Ophiurids known from the New Zealand seas has been raised from 12 to 41 in the course of the last twenty years. Rather a noticeable increase!

That the list is still far from complete is indubitable. We may especially feel confident that many more forms will be found in the sea to the North of New Zealand, which appears to be an eminently rich and interesting faunistic area. Also the Cook Strait, which has yielded the first *Gorgonocephalus* and the first *Ophiacantha* to the New Zealand fauna, as well as the rare *Ophiactis hirta*, will, no doubt, afford lots of interesting forms, when once a thorough survey of its bottom fauna will be made. Even the purely littoral fauna may well be expected to yield new forms, seeing that such interesting species as *Ophiozonoida picta*, *Ophiocormus notabilis* and *Amphiura annulifera* have been found there within the last few years.

From the Auckland- and Campbell Islands were hitherto known only two species of Ophiurids, viz. *Amphiura præfecta* Koehler, brought home from the Transit of Venus-Expedition by Filhol, and *Amphipholis squamata*, the only species collected by the Expedition to the Subantarctic Islands in 1907. Besides these two species I have found there *Ophiomyxa brevirima*, *Amphiura magellanica*, *Amph. amokuræ* and *Amphioplus basilicus*. I do not think that those 6 species are all that are to be found there; especially I have no doubt that dredgings in the sea off these islands will result in adding a fair number of Ophiurids — and other Echinoderms — to their fauna.

A very noticeable feature in the New Zealand Ophiuroid fauna is the large percentage of Amphiurids, 17 out of 41 — and almost equally noticeable is the total absence of any *Ophiura*-species (sensu lat.), a group otherwise of worldwide occurrence. It is hardly conceivable that it should really be totally absent from New Zealand waters, and considering the fact that only quite recently the first *Ophiothrix* and the first *Ophiacantha* have been found in those seas it may not seem too fanciful to expect that also the *Ophiura*-group will ultimately prove to be represented there.

None of the new species described in this paper are of exceptional morphological interest. A noteworthy discovery is the viviparity of *Ophiomyxa brevirima* and of *Amphiura annulifera*, the latter being also hermaphroditic. Very interesting is also the find of a parasitic Copepod of the genus *Cancerilla* on *Amphipholis squamata*; while the Ophiurid cannot be distinguished from the specimens living in the European seas (and, apparently, all over the world), the parasite is specifically quite distinct from the *Cancerilla tubulata* infesting specimens in the European seas — (according to kind information from Mr. K. Stephensen, who is preparing a report on the Crustaceans collected at the Auckland-Campbell Islands).

The material upon which the present report is based was collected mainly by the author himself during his visit to New Zealand and the Auckland-Campbell Islands in 1914—15. Further Mr. W. R. B. Oliver, the Dominion Museum, Wellington, has done me the favour partly of presenting me with material from his own collection and partly of sending me some Ophiurids from the collections of the Wellington Museum, among which the types of "*Ophiactis nigrescens*" Hutton, *Pectinura cylindrica* (Hutton), *Astrotoma Waitei* Benham, cotypes of *Amphiura arenaria* Farquhar, *Ophiothrix oliveri* Benham, and some material from the Cook Strait, collected by Mr. Hazelwood, comprising *Gorgonocephalus chilensis*, var. *novæ-zelandiæ*, *Ophiacantha vilis* and *Ophiactis hirta*, the two former new to science, the latter new to the New Zealand fauna. Also to Professor W. B. Benham, Otago, I am greatly indebted for important material, comprising the type of Hutton's *Amphiura parva*, a cotype of *Ophiothrix oliveri* Benham, Var. and a specimen of *Ophiocreas constrictum* Farquhar from the type-locality. I beg herewith to tender my cordial thanks to the two said gentlemen. Finally, I beg to express my great indebtedness to the Authorities of the British Museum, London, for leaving me for study the Ophiurids from New Zealand seas, collected by the "Terra Nova" Expedition, allowing these specimens to be sent to Copenhagen. I had an opportunity of a rather cursory examination of these species during my visit to the British Museum in 1920, and of seeing that the identifications due to Bell are as phantastic as might be expected from the knowledge of the other later contributions to science from the hand of this remarkable author. His *Pectinura* sp. is *Ophiozonoida picta*, his *Ophiomyxa brevirima* is *Ophiocreas constrictum* Farquhar, while his *Ophiocreas constrictum* is the new species described here as *Ophiocreas longipes* n. sp.; alone his *Ophiothrix* sp. is correctly identified as to the genus. Fortunately, Bell did not care to trouble himself with the three other species in the collection but sent them to Professor Benham for identification. Thus it happened that the three species *Astroporpa Wilsoni*, *Astroschema elegans* and *Astrotoma benhami* are correctly identified, thanks to Prof. Benham (apart from *Astroschema elegans*, which should rather be referred to the genus *Astroceras*); but the descriptions supplied by Bell are very insufficient, and likewise Bell did not take the trouble of having figures made of these three new species, while he gives several figures of the old and well known species *Cycethra verrucosa* and *Ophiosteira antarctica*, in order to show their supposed great variability. Through the courtesy of the Authorities of the British Museum I have been able to supply the necessary figures of these species and to give complete descriptions of them.

Upon the whole, I have made a point of giving, so far as possible, accurate and detailed figures of all the species, those new to science as well as those not hitherto figured, and of supplying necessary corrections to such figures as were previously published. I have confined myself to giving ink-drawn textfigures (excepting the Euryalids), as, in my opinion, photographs of such forms, where the exact outlines of the various plates are of supreme importance for the identification, are altogether too often more or less useless, and rather tantalizing for the student who tries, often in vain, to make out on those figures the characters mentioned (or perhaps not mentioned) in the descriptions. Instances of this are found also in the literature concerning the New Zealand Ophiurids.

May I hope to have facilitated through these efforts the correct identification of New Zealand Ophiurids, and to have given local investigators some stimulus to a further study of this highly interesting fauna, a study which cannot fail to bring many interesting new facts to light, not only additions to this fauna but also increased knowledge of the biology of the forms already known to occur in those seas.

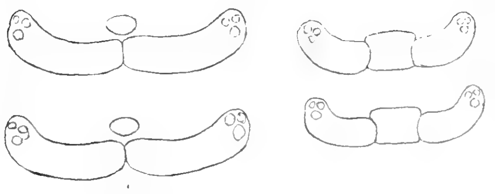
1. *Ophiocreas constrictum* Farquhar.

Pl. IV. Figs. 4—5.

Ophiocreas constrictus. H. Farquhar. 1900. On a new species of Ophiuroidea. Trans N. Z. Inst. XXXII. p. 405.
— *constrictum* H. Lyman Clark. 1905. Cat. Rec. Ophiurans, p. 178.
— *phanerum* — — 1916. Biological Results ... "Endeavour". Report on the Sea-Lilies .... p. 79. Pl. XXXIII. 1—2.
Ophiomyxa brevirima. F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova") Exp. 1910. Echinoderma. Zool. IV. p. 7.
Non: *Ophiocreas constrictus.* F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova") Exp. 1910. Echinoderma. p. 7. = *Ophiocreas longipes* n. sp.

Having had a specimen of this species from the type locality, Dusky Sound, kindly sent me for examination by Professor Benham, I must say that I do not see how this species could be distinguished from the Australian form described by H. L. Clark as *Ophiocreas phanerum.* According to the descriptions it would appear that *O. constrictum* differs from *O. phanerum* in the character of the skin, which is stated to be covered with minute papillæ and small pores in the former, while in the latter it is perfectly smooth. I cannot, however, ascribe much importance to this character. In one of two specimens of the Australian form at hand I find in places similar small papillæ, though not quite so distinct as in the New Zealand specimen. As regards the pores, I do not think them anything but artefacts, due either to preservation or to some sort of damage done to the type specimen by the dredging. In the specimen at hand I can hardly see any indication of pores, and what is seen is certainly due to some damage. As no other differences are found, I do not see any reason for distinguishing the Australian from the New Zealand form.

To the descriptions given by Farquhar and Clark I may add that the lateral plates do not meet in the ventral midline, but are separated by very well developed ventral plates (Fig. 1.2). This fact has a rather important bearing on the systematic position of this species. As pointed out by Matsumoto[1]) a main character of the *Astrochematinæ* is the joining of the lateral plates in the ventral midline of the arm, in contradistinction to the *Trichasterinæ*, in which the lateral plates are separated by the ventral plates. According to this character the present species is no *Ophiocreas* at all, but should be included in the subfamily *Trichasterinæ*, representing a new genus, the nearest ally of which would appear to be *Astroceras*. But then it differs from the *Trichasterinæ* in the lateral plates not projecting ventrally like hanging rods, which is also a character of the *Trichasterinæ*. Regarding the anatomical characters pointed out by Matsumoto as distinguishing the two said subfamilies, I have no material for examining them in the present species. The matter is rather puzzling, and as it would hardly be possible to reach a definite solution of the systematic problems raised by this form without going into a very detailed study of the whole family *Trichasteridæ*, for which I have neither material nor time, I shall provisionally leave the present species within the genus *Ophiocreas*, in spite of the marked difference in the lateral and ventral plates.



1. 2.

Fig. 1. The ventral plates and lateral plates of two consecutive armjoints of *Ophiocreas longipes* (1) and *Ophiocreas constrictum* (2). The small round spots on the outer end of the lateral plates indicate the grooves for the insertion of the armspines. $^{8}/_{1}$.

Also *Ophiocreas adhærens* Studer has the sideplates separated by well developed ventral plates. This species, apparently, is closely related to *O. constrictum*; I should, indeed, not be surprised at all, if it ultimately turned out to be identical with that species. From the description given by Studer[2]) this would appear rather im-

[1]) H. Matsumoto. A new classification of the Ophiuroidea; with descriptions of new genera and species. Proc. Acad. Nat. Sc. Philad. Vol. LXVII. 1915 p. 51.

[2]) Th. Studer. Verzeichniss d. während d. Reise S. M. S. „Gazelle“ um die Erde 1874—76 gesammelten Asteriden und Euryaliden. Abh. d. Kgl. Preuss. Akad. d. Wiss. Berlin, a. d. Jahre 1884.

probable, it is true, some very definite characters being assigned to his *O. adhærens*, viz. large, conspicuous mouthshields, the presence of six granules, in two series, above the second tubefoot and of a hook inside the two tentacle scales, from about the middle of the arm; finally the tentacle scales are stated to begin only at the fourth pair of tubefeet. Having had one of Studer's cotypes from the Berlin Museum for examination, I must state that — in this specimen, at least (and it corresponds very well with the figures given by Studer, so that there would not seem to be any reason for thinking that it might be a different species confounded with the true *adhærens*) — there are no grains at the second tubefoot, no hook inside the tentacle scales in any part of the arm, and the tentacle scales begin at the third pair of tubefeet (not counting the oral tubefeet). (In Studer's figure 11.b. they are even represented as beginning at the second pair!). Finally, the mouth shields are not at all large and conspicuous, on the contrary, quite small and inconspicuous, situated in the very outermost corner between the large adoral shields. What has been taken by Studer to be the oral shields are, in fact, the adoral shields (Comp. his fig. 11.b., Pl. IV). The only noteworthy difference which I find to exist between this specimen and the young specimen of *O. constrictum* from off the North of New Zealand (see below), which is of nearly the same size, is the somewhat greater length of the bursal slits in *O. adhærens*. The very distinctly jointed appearance of the arms and the prominence of the radial shields in *O. adhærens* would appear to be due to the specimen having been half dry. In any case, *O. adhærens* and *O. constrictum* must be very nearly related: whether they are really different species or identical, is a question which can only be settled on a close study of a much larger material than at present available.

The young specimen figured in Pl. IV, figs. 4—5, is the one which Bell (Op. cit.) identified as *Ophiomyxa brevirima* (evidently only because it agrees with the name in its short genital slits; the resemblance to an *Ophiomyxa* would be hard to find). It agrees, upon the whole, so well with *Ophiocreas constrictum* that I hardly have any doubt of its being a young specimen of this species. (It measures 8 mm diameter of disk, ca. 100 mm length of arms). Only the colour is different, light-brown, while *O. constrictum* is deep red-purple. But as H. L. Clark states the young specimens of his "*Ophiocreas phanerum*" to be "somewhat lighter", I do not think this colour difference sufficient for regarding this specimen as representing a separate species. At any rate, until more material shall be available, it may be regarded as identical with *O. constrictum*. — It was taken East of North Cape, in a depth of 70 fathoms.

O. constrictum must then be expected to occur in the seas all round New Zealand as well as in the East Australian waters.

2. *Ophiocreas longipes* n. sp.

Pl. III.

Ophiocreas constrictus Farqh. F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova") Exp. 1910. Echinoderma. Zool. IV.1. p. 7.

Diameter of disk 25 mm. Arms of unequal length, the longest ca. 600 mm, the shortest ca. 400 mm. Width of arm near disk 6,5 mm, height 7 mm. Disk and arms covered with a rather thin, completely smooth skin, which forms some longitudinal folds on the arms. Radial ribs narrow, meeting in the centre of the disk. Mouthangles with 2—3 rounded grains adjoining the teeth; the number of these latter could not be ascertained, the mouth being tightly closed. Genital slits 5—6 mm long, deeply sunk, nearly parallel. Tentacle pores small, the first pair without papillæ; the following 4—7 pairs carry one papilla, beyond these there are two papillæ to each pore. One of the arms shows a somewhat abnormal arrangement of the tentacles on the second and third joint, and a corresponding abnormal arrangement of the papillæ. The inner papilla (or armspine) gradually becomes elongated and clubshaped, its length not exceeding 3,5 mm. The outer papilla is about $^1/_2$—$^2/_3$ that length, not clubshaped. The lateral plates join in the ventral midline, a very small, oval ventral plate generally lying in front of them (Fig. 1.1); in some joints it may, however, be lacking. (The shape of the lateral and ventral plates discernible only on dissolving the skin e. g. by means of hypochlorite of sodium).

The single specimen was taken 25 miles off Three Kings Isl., in a depth of 300 fathoms.

This species is, evidently, closely related to *Ophiocreas sibogæ* Koehler, from which it is distinguished through the grains on the sides of the mouth-edges and through the arms being considerably longer. Further the papillæ, or armspines, afford a characteristic difference (Fig. 2). In *O. sibogæ* the outer spine is almost as long as the inner one, the latter being provided with some larger, straight thorns on the adradial side in its outer part; in *O. longipes* the outer spine is, at most, two thirds the length of the inner one, which latter is provided in its outer part, on the adradial side, with a great number of strong, curved thorns. To this thorny part of the inner spine is attached a gland which is much larger in *longipes* than in *sibogæ;* the more or less distinct, claviform shape of this spine is mainly due to the different development of this gland, which appears to be of very common occurrence in Euryalids, and the secretary function of which has no doubt some important bearing on the biology of these forms.

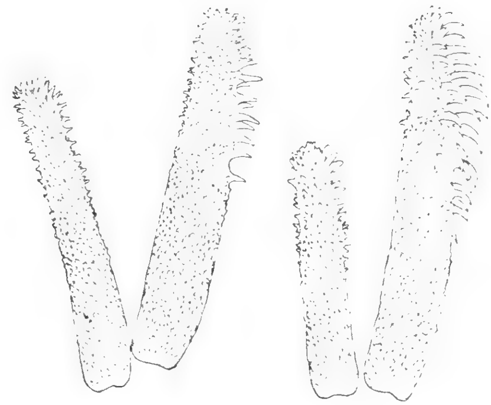


Fig. 2. Armspines (papillæ), from about the middle of the arm, of *Ophiocreas sibogæ* (a) and *Ophiocreas longipes* (b). $^{12}/_{1}$.

The greater length of the arms in *O. longipes* might seem to be no real difference from *O. sibogæ*, since H. L. Clark in his report on the „Endeavour" Echinoderms (p. 80) records among his specimens of the latter species from the Bass Strait and the Great Australian Bight (80—300 fms) one of the same size and arm-length as the New Zealand specimen here made the type of *O. longipes.* Most probably, however, Clark's specimens are in reality not *O. sibogæ*, but *O. longipes.* Clark, himself, expresses some doubt as to the correctness of identifying the Australian specimens with *O. sibogæ*; I would therefore think it probable that they do really belong to the New Zealand species. At least, the statements resting on these specimens cannot afford the proof of the identity of the New Zealand species with *O. sibogæ,* and, for the present, the only safe course seems to me to be that of regarding the New Zealand form as a distinct species.

That this species is not identical with *Ophiocreas constrictum* Farquhar, to which it was referred by Bell, is very easily seen. The fact alone that the tentacle papillæ appear from the second joint (in *O. constrictum* from the third joint) is sufficient to prove these forms to be quite distinct, this character being of special importance within this genus.

3. *Astrotoma Waitei* Benham.

Pl. IV. Fig. 2.

Astrotoma Waitei. W. B. Benham. 1909. Scientif. Res. N.Z. Governm. Trawling Exp. 1907. Echinoderma. Rec. Canterb. Mus. I.$_2$. p. 19. Pl. IX. 1—6.

Two specimens of this species having been lent me for examination, by Mr. Oliver and Prof. Benham, I take the opportunity of giving a photographic figure of it, which may not be superfluous, as the drawings by Prof. Benham (Op. cit.) cannot, of course, give all the details so exactly as does a photo.

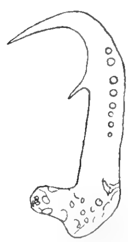


Fig. 3. Hook from arm of *Astrotoma Waitei.* $^{105}/_{1}$.

To the very careful description given by Benham I would only add that the rounded "scales", stated to cover the upper surface of the disk, are more appropriately designated as grains. The segmented appearance of the dorsal side of the arms is very differently developed in the two specimens examined by me — in one the depressions are very distinct, in the other, the one photographed, they are so narrow as to be hardly distinguishable. — The hooks are provided with one small tooth below the long, pointed endtooth. (Fig. 3).

When Benham speaks — here and in other Ophiurid-descriptions — of the "adradial" plates, the meaning is, of course, the radial shields.

4. *Astrotoma Benhami* Bell.

Pl. IV. Figs. 6—7.

Astrotoma Benhami. F. Jeffr. Bell. 1917. Brit. Antarctic „Terra Nova" Exped. 1910. Echinoderma. Zoology. IV.$_1$. p. 8.

Bell states that there is only a single specimen of this species. In fact there are 9 specimens, ranging in size from 10 to 14 mm diameter of disk. One specimen has the arms well extended; they reach a length of ca. 60 mm; as the point is broken the true length is somewhat greater, probably some 80 mm total.

To the very deficient description not accompanied by figures, given by Bell, I shall add the following remarks, also supplying the necessary figures.

The tubercles, which cover the disk completely, leaving no distinct traces of the radial shields, are rounded, perfectly smooth, smaller in the middle of the disk, increasing in size towards the base of the arms; rarely they continue a little way out on the dorsal surface of the arms. The interradial spaces on the oral side generally carry a few similar, but somewhat smaller tubercles; otherwise they are covered with fine grains. Also the underside of the arms and the oral frame are covered by rounded grains, generally slightly larger than those of the interradial spaces. Along the edge of the mouthframe there is mostly a series of larger tubercles, forming something like a fence, separating the slightly sunken interradial space from the mouth frame. This transverse series of tubercles has much the appearance of being a continuation of the series of armspines. The genital slits are fairly large, some 2 mm long. The mouth edges carry each a cluster of spines or papillæ, which outwards gradually pass into the common granulation of the underside. This is perhaps what is meant by the statement of Bell that „the papillæ are encircled by well-marked granules which become spiniform towards the periphery", a statement which does not appear very intelligible. The covering of the dorsal side of the arms is that typical of *Astrotoma* s. str.; it may only be pointed out that the double rings of hooks are complete from the base of the arm, at most the 1—3 proximal rings being interrupted in the dorsal midline. There are generally three short, thick, smooth armspines, slightly rough at the point. Now and then there may be only two spines on some consecutive joints. Towards the end of the arm the spines gradually assume the character of hooks.

This species appears to be most nearly related to *A. Murrayi* Lym. — No specimens are known besides those taken by the "Terra Nova".

From the other species of *Astrotoma* known from New Zealand waters, *A. Waitei* Benham, it is very easily distinguished through its much coarser granulation of the disk, through the number of armspines (8 in *A. Waitei*), as also through the rings of hooklets, which are divided in many small parts in *A. Waitei*.

5. *Astroporpa Wilsoni* Bell.

Pl. VI. Figs. 8–9.

Astroporpa Wilsoni. F. Jeffrey Bell, 1917. British Antarctic ("Terra Nova") Expedition 1910. Echinoderma. Zoology. IV.1. p. 7.

This species is very closely related to the Australian species. *A. australiensis*, described by H. L. Clark[1]). Only two characters, so far as I can see, distinguish it from the latter species, viz.: the grains covering the interradial spaces on the oral side are conical, slightly pointed in *A. Wilsoni*, perfectly smooth (or nearly so) in *A. australiensis*; the colour of the brown rings alternating with the white rings on the arms and the disk are pale brown in *A. Wilsoni*, dark brown, and accordingly much more conspicuous, in *australiensis*. Also the mouth papillæ are perhaps slightly shorter in the New Zealand- than in the Australian form. These differences are certainly rather small, but, if they prove constant, they may well justify regarding the two forms as distinct species. At least, it would not be correct to unite them into one species on the basis of the material available at present (the two specimens of the New Zealand form collected by the "Terra Nova" and a few specimens of *A. australiensis*, collected by the author in 1914 in the Australian seas).

Bell's statement that there is „a total absence of ornamentation from the plates, both of the arms and disc" seems rather peculiar, since there are, upon the whole, no plates to be discerned either on the disc or the arms, only a general covering of grains of various character, as clearly set forth by Clark. Also the statement that „the armspines are numerous, very delicate, with minutely roughened surfaces" is somewhat remarkable; their number amounts to 4—6 (only very exceptionally 7), which would

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1) Scientific Results of the Trawling Expedition of H. M. C. S. "Thetis". Echinodermata. Mem. Austral. Mus. IV. 1909. p. 547. Pl. LIV.2.

not seem to be an insuperable number to count, and they are short, thick, flattened, ending in 2—4 distinct points, which could not easily be gathered from the description quoted. — Otherwise, I would refer to the description given by Clark of his *A. australiensis,* which — apart from the differences pointed out above — suits *A. Wilsoni* as well.

No other specimens known than those taken by the "Terra Nova". East of North Cape, 70 fathoms. Besides the two specimens on which Bell's description was based, there is also a young specimen, 4 mm diameter of disk, lying together with the specimens of *Ophiothrix aristulata*, as mentioned by Bell under his *Ophiothrix sp.* Its arms are so strongly coiled up that it is impossible to measure their length. The specimen shows the interesting feature of the 6 primary disk plates being distinct; they are, however, very small, and only through their darker colour to be distinguished from the grains. There is no trace of the radial shields. There are only two of the grain-covered transverse bars on the disk at the base of each arm, while in the grown specimens there are 4—5 of these bars on the disk. The genital slits have appeared, but are situated off the first armjoint (armspines), while in the adult specimens they lie between the third and fourth joint. A very considerable displacement must accordingly take place during growth.

6. *Astroceras elegans* (Bell).

Pl. VI. Fig. 3.

Astroschema elegans. F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova" Exped. Echinoderma. Zoology. IV.$_1$. p. 7.

To the rather deficient description of this species given by Bell I may add the following remarks.

With "the five pairs of rows of prominent plates, which might at a superficial view be taken for radial shields" are evidently meant the white tubercles, which cover the radial shields; they are generally arranged in a very distinct series along each radial shield in the younger specimens, while in the larger specimens the arrangement becomes more irregular. Also the number of these tubercles is rather variable. The white tubercles continue a various distance on the arms, sometimes only on a few of the inner joints, sometimes forming regular rings nearly to the end of the arm. In any case the arms have a very distinct annulated appearance, rings of white and brown skin alternating very regularly to the very tip of the arm. — Sometimes the tubercles on the arms are distinctly oblong. How Bell came to the statement that "the spines of the lower surface (of the arms) are set in a single row on either side of the median furrow" I do not understand. At the merest glance it is seen that there are two armspines, not one. Farther out on the arm the inner armspine becomes somewhat elongated, very distinctly clubshaped and distinctly thorny in the thickened end. The outer armspine remains short and thin and often has the appearance of a small sidebranch on the larger, clubshaped spine; both are placed on the top of the somewhat prominent side plates; these latter are separated from each other by the well developed ventral plates. The tentacles are sheathed, more or less distinctly, till about the middle of the arm. The ventral surface is covered by a perfectly smooth skin. The "five prominent spines" which, according to Bell, "guard" the mouth, can be nothing but the mouth edges. There is a vertical series of about 10 broad triangular teeth and some small grains on the sides of the mouth edges.

The "Terra Nova" secured 7 specimens (E. of North Cape, 70 fms), ranging in size from 8 to 12 mm diameter of disk. A small specimen, taken off Three Kings Isl., in 60 fathoms, was given me by Captain Bollons.

That this beautiful Ophiurid is no *Astroschema* is evident enough and that it cannot be referred to the genus *Ophiocreas* is likewise clear — if we do not want to extend the limits of the latter genus beyond the usual conception, which would not be in any way desirable. It seems beyond doubt that this species is the nearest related to *Astroceras compar* Koehler from the Malay Archipelago, and if this latter is justly referred to the genus *Astroceras*, the present species must also be included in that genus. From the figure of the oral side of *A. pergamena*, the type of that genus, given in the "Challenger" Ophiuroidea Pl. XXXIV.1 it might well appear that the genital slits are quite different from those of the present species, being represented there as long, narrow, horizontal slits, while here they are short, wide, and vertical, as characteristic of the *Trichasteridae*. It is, however, certain that the said figure is incorrect. In the diagnosis Lyman correctly states that the genital slits are vertical, as also I find them in specimens which I have collected myself in the Japanese seas. — In any case, it seems to me that the present species must be referred to the genus *Astroceras,* if it is not made the type of a separate genus, which latter course I would not think desirable at the present state of our knowledge.

7. *Astroschema* sp.

On a piece of a Gorgonid from off Three Kings Isl., 60 fms., collected by Captain Bollons, I found two small specimens, 1—1,5 mm diameter of disk, which, evidently, belong to a species of *Astroschema.* It is hardly possible to identify the species — very probably they belong to some undescribed species. In any case these young specimens are interesting as they prove that also a species of *Astroschema* proper occurs in the sea here off the North end of New Zealand. In the younger of the two specimens the 6 primary plates and the radial shields are still distinct, not yet obscured by the covering of the grains. In the larger specimen only the central plate is still discernible. The genital slits have already made their appearance, even in the smaller specimen.

8. *Gorgonocephalus chilensis* (Phil.), var. *novæ=zelandiæ* n. var.

Pl. IV. Fig. 1.

Cook Strait, 100 fms. 1 specimen, collected by Mr. Hazelwood, 1921.

I do not see any characters by which this specimen, which measures 50 mm diameter of disk, could be distinguished from *G. chilensis* (Phil.). Only the short stumps of the disk are sparser than appears to be the rule in *chilensis,* and for this reason I think it correct, at least for the present, to regard the New Zealand form as a separate variety of this species. If it should be ultimately shown, when more material is at hand, that the disk covering varies so as to be sometimes closer and more like what is usual in *chilensis,* I should not hesitate in simply uniting them. As the species is known to be distributed from South America to Kerguelen and Heard Island, it would not be very surprising if it turned out to occur also in the New Zealand seas.

The small conical tubercles of the dorsal side are rather numerous on the ribs, few and very sparse in the interspaces; similar tubercles also occur on two of the arms at their base, mainly on the sides. On the oral side a very few tubercles are found in the interbrachial spaces. The underside of the arms is covered by very fine granules, seen distinctly only when dried. When these grains are removed (by means of hypochlorite of sodium) irregular small plates are seen to fill the spaces between the lateral plates, which join in the ventral midline.

9. *Ophiomyxa brevirima* H. L. Clark.

Figs. 4—5.

Ophiomyxa australis Ltk. H. Farquhar. 1895. Notes on New Zealand Echinoderms. Trans. N. Z. Inst. XXVII. p. 199.

— — H. Farquhar. 1898. On the Echinoderm Fauna of N. Z. Proc. Linn. Soc. N. S. Wales. p. 309.

— — W. B. Benham. 1909. Scientific Results of the N. Z. Governm. Exped. 1907. Echinoderma. Rec Canterb. Mus. I.$_2$. p. 19.

— *brevirima*. H. L. Clark. 1915. Catalogue Rec. Ophiurans; p. 169. Pl. I.$_{3-4}$.

Non: *Ophiomyxa australis*. Lütken. 1869. Add. ad hist. Ophiuridarum. III. p. 45.

— — *brevirima*. F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova") Exp. 1910. Echinoderma. Zool. IV$_1$. p. 7. (= *Ophiocreas constrictum* Farquhar).

Masked Island, Carnley Harbour, Auckland Isl. 3/XII.1914 4 specimens.
Figure 8 Island, Carnley Harbour, Auckland Isl. 2/XII.1914. 12 specimens, found in the base of a *Macrocystis*, cast on shore.
Paterson Inlet, Stewart Isl., 5—15 fms. 17/XI.1914. 5 specimens.
Queen Charlotte Sound, 3—10 fms. 20/I.1915. 3 specimens.
Colville Channel, 35 fms. 21/XII.1914. 1 young specimen.
10 M. N.W. of Cape Maria v. Diemen; 50 fms. 5/I.1915. 2 young specimens.
Three Kings Isl., 65 fms. 5/I.1915. 1 young specimen.

The identification of the young specimens from the three latter localities is not beyond doubt; especially that from Three Kings Isl. recalls to some degree *Ophiomyxa australis*. It is, therefore, not improbable that more than one species of *Ophiomyxa* will ultimately be found to occur in the New Zealand seas.

It is the merit of H. Lyman Clark to have pointed out that the *Ophiomyxa* of New Zealand seas is not identical with that of

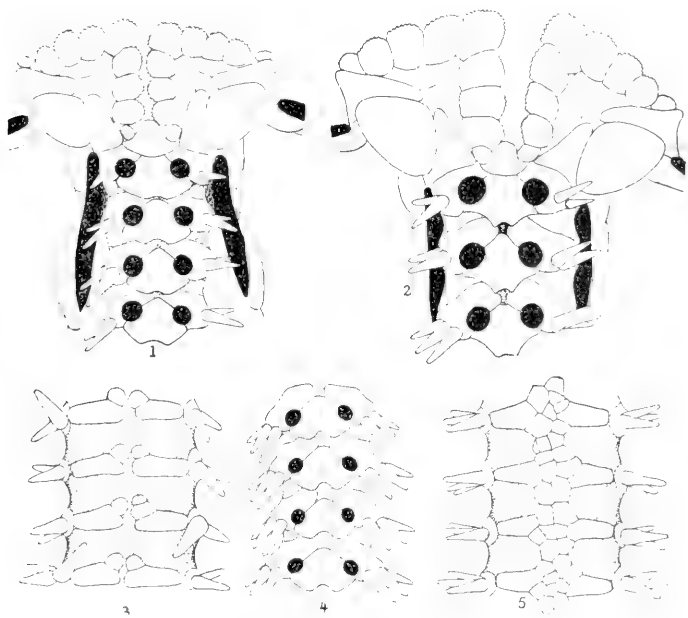


Fig. 4. *Ophiomyxa brevirima* (1, 3, 4) and *O. australis* (2, 5). All the figures 6/1. — 1. Part of ventral side of *O. brevirima*; — 2. same part of *O. australis*. — 3. Part of dorsal side. — 4. part of ventral side of arm of *O. brevirima*. — 5. Part of dorsal side of arm of *O. australis*.

the Australian seas, *Ophiomyxa australis* Ltk., as was stated by Mr. Farquhar. However, the characters pointed out by H. L. Clark as distinguishing the New Zealand species from *O. australis* do not all hold good. The genital slits, as well as the radial shields, do not appear to me to offer any reliable differences. The number and arrangement of the armspines: alternating 3 and four in *brevirima*, 5—6, not alternating in *australis*, is a much better and fairly constant character. But there are some other not less important differences. Thus the shape of the dorsal and ventral plates is rather different in the two species. (Cf. Fig. 4). (The thick skin obscuring the plates must be removed in order to make the outline of these plates distinct; this may be done by applying hypochlorite of sodium to some part of the arm, the treatment being discontinued before the plates are becoming isolated). In

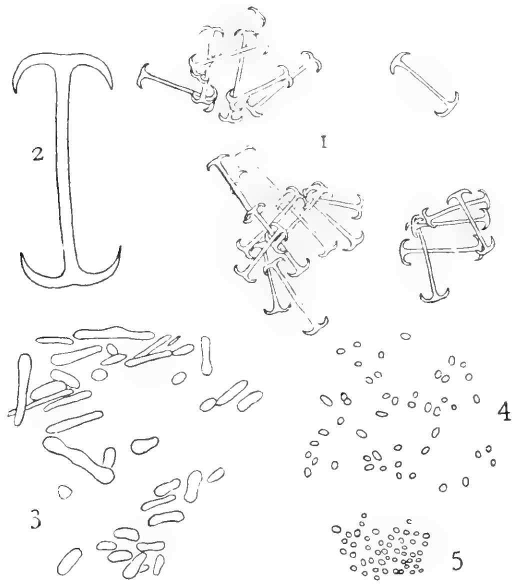
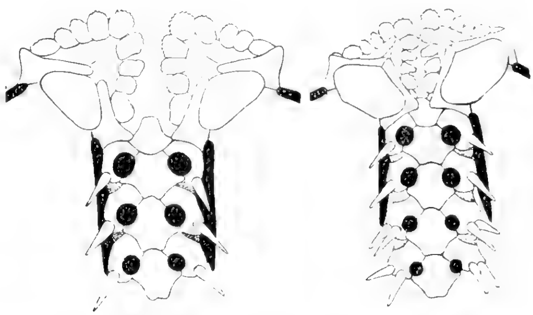


Fig. 5. **1.** Spicules from an ovary of *Ophiomyxa australis*, in a natural group. 130/1. — 2. One of these spicules more enlarged. 365/1. — 3. Spicules from the bursal wall of *O. australis* in a natural group. 130/1. — 4. Spicules from the bursal wall of *O. brevirima*, natural group. 130/1. — 5. Spicules from the skin of white-ringed variety of *O. brevirima*. 270/1.

both species there is on the dorsal side of each armjoint a pair of large plates, looking like a continuation of the side arm plates, which, however, they are not; these plates do not join in the dorsal midline, but are separated here in *O. australis* through a continuous mosaik of small polygonal plates (Fig. 4.5), in *O. brevirima* through only some few (2—3) such small plates, which do not form a continuous mosaik. (Fig. 4.3). Also the shape of the ventral plates is different, the outer edges being much more pointed in *australis* than in *brevirima* (Fig. 4.1—2).

There are, however, still other differences. In *O. australis* the eggs are rather small, ca. 0,25 mm, and the ovarial membrane is studded with those remarkable double anchors characteristic of *Ophiomyxa* (Fig. 5.1–2); the bursal wall is full of small bone-shaped calcareous bodies (Fig. 5.3). In *O. brevirima* these latter bodies are much smaller (Fig. 5.4), the double anchors much fewer in number, and the eggs much larger, 0,5–6 mm. The latter fact indicates that probably a considerable biological difference exists between the two species. Nothing is known about the development of *O. australis*, but the relatively small size of the eggs lends support to the suggestion that it is not viviparous, whereas *O. brevirima* is viviparous. In one specimen from Lyttelton harbour I find one fairly large young one in each of two bursæ. Another specimen, from Cook Strait, collected by Mr. W. R B. Oliver (as was also the specimen from Lyttelton) likewise contains young ones in its bursæ; but here conditions are quite different. All the bursæ are here completely filled up with embryos, most of them in nearly the same stage of development, with 2—3 armjoints developed, only very few being in a younger stage. They lie so closely packed that they are partly quite irregularly compressed. I have counted no less than 120 embryos in one bursa. They are of a bright orange colour, on account of the content of yolk in the eggs. — The difference between the two said specimens, one having the bursæ quite filled with embryos, the other having only one in each bursa, is so remarkable that the suggestion lies at hand that they may represent two different species, the more so as the two specimens are quite different in colour, one being of a uniform grayish-brown, the other (the one with the many embryos) greenish with white bands on the arms and irregular white spots on the disk. This white colour is due to closely packed heaps of exceedingly minute, lenticular calcareous grains (Fig. 5.5). (Such grains are also found in the skin of the not banded or spotted specimens, only much less numerous, scattered, not in dense heaps). I am, however, unable to find any other difference. Accordingly, it would appear that we have to do with only one species, and the difference in regard to the embryos contained in the bursæ may then perhaps be due to one of them having discharged its brood, with the exception only of a few of them, which have remained in the bursæ a little longer, and perhaps therefore grown a little larger. This is, of course, nothing but a suggestion. Observations on a larger material, and especially on living specimens, will be needed to settle the question how the difference described is to be explained.

The discovery that *O. brevirima* is viviparous naturally led to the suggestion that it might then perhaps prove to be identical with the *Ophiomyxa vivipara* Studer of the Magellanic region. This it is, however, not. There is a conspicuous difference in the shape of the ventral plates (see fig. 6) as also in the dorsal plates; the two large lateral plates are not found in *O. vivipara*, the whole



a. b.

Fig. 6. Part of ventral side of *Ophiomyxa vivipara*; a. of a specimen from the Cape region, b. of a specimen from Patagonia. 6/1.

dorsal side of the arm being occupied by one large, thin and delicate fenestrated plate. It should be pointed out that *O. brevirima* has separate sexes, as is also the case with *O. vivipara*.

I would still add that probably the specimens from the Cape region referred to *Ophiomyxa vivipara* do not really belong to that species, but represent a separate species, as is also suggested by H. L. Clark in his "Echinoderm Fauna of South Africa".[1]) I shall not, however, enter on a discussion of this question here.

10. *Ophiacantha vilis* n. sp.

Figs. 7. a–d.

Some specimens from Cooks Strait, 200 fathoms (collected by Mr. Hazelwood, 1920) were sent me by Mr. W. R. B. Oliver. They are all in a rather poor state of preservation.

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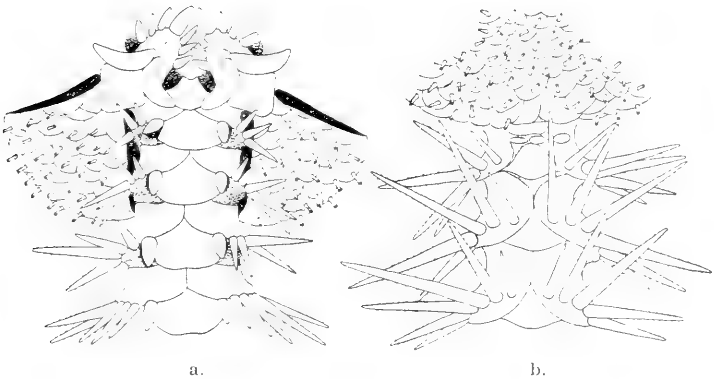
[1]) Annals of the S. African Museum. XIII. 1923; p. 313.

Disk covered with a uniform coat of small spines or stumps generally ending in four short, diverging points. The scales of the disk are generally discernible, though with some difficulty (on the figure they are rather too distinct and the coat of spines not



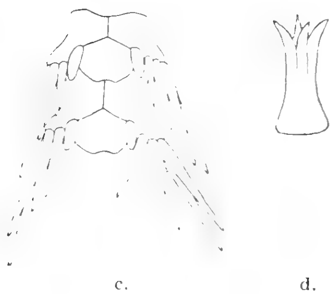


Fig. 7. *Ophiacantha vilis.* a. Part of ventral side, b. of dorsal side; c. two armjoints, ventral side, from the middle of the arm. d. spine from the disk. a--c. 14/1. d. 100/1.

dense enough). The radial shields not distinct, only just the outer end may be visible. On the underside of the disk the scaling is more distinct, the spine-covering less dense. — The oral papillæ are three to each side, the outer one generally scarcely widened; the infradental papilla is fairly large; rarely one may find in one of the mouth angles the outer papilla represented by two much narrower ones, there being thus four papillæ here. The mouth shields are about equally long and broad, with a somewhat produced outer lobe; the adoral shields crescent-shaped, meeting broadly within, but not produced outwards so as to separate the mouth shield from the first side armplate. The ventral plates are broader than long; the two inner ones are in contact, the second one having the inner edge truncated; the third almost reaches the second, but from the fourth they are widely separated. The inner ones have a convex outer edge, from the fourth the outer edge has a reentering curve, which gradually becomes more marked farther out. In the outer part of the arm the ventral plates are about regularly heptagonal. There is a single, rather large, smooth tentacle scale. The dorsal plates are very small, triangular, with a slightly arched outer edge, widely separated throughout the whole length of the arm. The side armplates are rather prominent, carrying 7—8 long, slender, very finely serrate armspines; farther out there are only 6 spines. On the proximal joints the spines may almost join in the dorsal middle line.

None of the specimens exceed a size of 4 mm diameter of disk. The arms are broken, but apparently they are only ca. 4—5 times so long as the diameter of disk. The colour appears to be that usual in Ophiacantha's, a light yellowish-brown.

This species, the first *Ophiacantha* recorded from the New Zealand seas, is very closely related to *Ophiacantha pentagona* Koehler. a species widely distributed over the Indo-Pacific Ocean. It differs from that species in the shape of the stumps covering the disk, these being provided with much longer thorns in *O. pentagona* (cf. Pl. IV. Fig. 29 of Koehler's Report on the "Investigator" Ophiuroidea and Pl. 93.5 of the Philippine Ophiurans);[1] also the tentacle scale appears to be distinctly smaller in *O. pentagona*; the shape of the buccal shield is slightly different, and there are only 5—6 armspines in *O. pentagona*.

Also to another species it bears a very close resemblance — I rather think still closer than to *O. pentagona* —, viz. to *O. adiaphora* H. L. Clark, from the North Pacific, the main difference from that species being found in the shape of the mouth shield. A character which might look rather essential is the shortness of the genital slits in *O. adiaphora*, where they appear not to reach beyond the first armjoint, while in *O. vilis* they reach almost to the edge of the disc. I cannot, however, ascribe any greater signific-

[1]) R. Koehler. Ophiurans of the Philippine seas and adjacent waters. Bull. N. S. Nat. Mus. 100. 1922.

ance to this apparent difference. In some of the New Zealand specimens the genital slit appears to be no longer than in *O. adiaphora*, while in others it appears to reach to the edge of the disc. The bad preservation of the specimens in hand makes it impossible to make out exactly how the genital slits really are in this species — in some places they even have the appearance of being divided into two parts, as in *Ophioderma*.

I think it quite possible that both *O. adiaphora* and *O. vilis* will ultimately prove to be the same species as *O. pentagona* (also Clark points out the close resemblance of his species to *O. pentagona*). But for the present it seems to me more safe to regard the New Zealand form as a separate species, especially so long as *O. pentagona* or *O. adiaphora* have not been found in the Australian seas.

11. *Ophiothrix aristulata* Lyman.

Ophiothrix aristulata. Th. Lyman. 1882. Challenger Ophiuroidea, p. 223, Pl. XXI. Figs. 9—12.
— — R. Koehler. 1904. "Siboga" Ophiuroidea. I. p. 151.
— — H. Lym. Clark. 1915. Catalogue Recent Oph. p. 269.
— — — 1916. Report on the Sea-Lilies, Starfishes, Brittle Stars and Sea-Urchins. . . . "Endeavour". Biol. Res. Fishing Experiments by the "Endeavour". IV.1. p. 89.
— sp. F Jeffr. Bell. 1917. Echinoderma. British Antarctic ("Terra Nova") Expedition 1910. Zoology IV.1. p 6.
— *aristulata.* R. Koehler. 1922. Ophiurans of the Philippine seas and adjacent waters Bull. U. S. Nat. Mus. 100. Vol 5, p. 205. Pl. 35. 1—3. Pl. 97.1. a—f.
— — H. L. Clark. The Echinoderm Fauna of S. Africa. Ann. S. Afr. Museum. XIII. p. 336.

The two specimens of *Ophiothrix* sp. from off Cape Maria van Diemen, mentioned by Bell (Op. cit.), which I have had the opportunity of examining, undoubtedly belong to this characteristic species. They agree in all essential features with the description and figures given by Lyman. The keel on the dorsal midline of the arms is rather indistinct, more so in the larger specimen (diameter of disk 7 mm) than in the smaller one (6 mm). The only noteworthy difference from the type is that the spines on the ventral side and near the edge on the dorsal side of the disk are short trifid stumps, not long, serrated spines as in the middle of the disk. Evidently this feature is not of sufficient value for separating these New Zealand specimens from the typical form, not even as a variety.

The species being widely distributed in the Indian and Australian seas, as far South as Tasmania, its occurrence in New Zealand seas (off North Cape and Cape Maria van Diemen) is not surprising at all.

From *Ophiothrix Oliveri* Benham, the other species found in New Zealand waters, it is very easily distinguished through its naked radial shields and the long spines covering the disk scales, *O. oliveri* having the disk with the radial shields completely covered with small, trifid stumps. Also the shape of the dorsal plates is quite different in the two species.

12. *Ophiothrix oliveri* Benham.

Fig. 8.

Ophiothrix oliveri. Benham. Stellerids and Echinids from the Kermadec Islands. Trans. N. Z. Inst. Vol. XLIII. 1910. p. 154.

— — — H. L. Clark. Catalogue Rec. Ophiurans. 1915. p. 276.

Off Little Barrier Isl., 30 fms ; shells, 2 specimens.

Three Kings Isl., 65 fms.; hard bottom. 1 specimen.

Fig. 8. *Ophiothrix oliveri* Benham. 1. Part of ventral side: 2. dorsal aspect of three armjoints, from the middle of the arm. 7/1.

Judging from the description and figures of this species given by Benham it would seem that the specimens in hand could not be simply identified with the Kermadec-species; especially the shape of the ventral plates in Benham's Fig. 14 differs rather conspicuously from that of the New Zealand specimens, as shown in Fig. 8.1. The direct comparison with one of the cotypes of *O. oliveri*, which I have received through the kindness of Mr. W. R. B. Oliver, shows, however, that the difference in the shape of the ventral plates is only apparent, due to the rather crude character of the said figure in Benham's paper. I find the ventral plates in the cotype, from the Kermadec Islands, to be quite like those of my New Zealand specimens, as represented in Fig. 8.1.

There are a few other points to which attention should be called, indicating apparent differences between the New Zealand specimens and the typical form from the Kermadecs. Benham states the dental papillæ to be arranged in four horizontal rows of 4 in each row, making thus 4 vertical rows. In the cotype in hand the papillæ form only three vertical rows; only at the upper (outer) edge there are four small papillæ. This discrepancy, evidently, is due to the fact that the type specimen was much larger, 14 mm diameter of disk, the cotype measuring only 7 mm. Otherwise Benham's figure does not correspond to the description, as it shows 7 and 5 papillæ in a horizontal row. The New Zealand specimens agree with the cotype in having the papillæ in three vertical columns; only in the largest specimen, 8 mm diameter of disk, the upper papillæ are fairly distinctly arranged in four columns. — The small oval plate, seen along the genital slits in Benham's figure, I do not find in any of the specimens in hand; on the other hand, Benham does not show the large genital plate bordering the outer extremity of the genital slits. The raised median prominence in the distal margin of the dorsal plates I do not find either in the cotype or in the New Zealand specimens, or, at most, only very indistinctly indicated. This can thus hardly be a constant feature. Upon the whole, I do not see any character by which it might be possible to distinguish the New Zealand specimens from those from the Kermadecs, not even as a variety.

The variety of this species mentioned by Benham (Op. cit. p. 156) does not appear to me to deserve this designation. Prof. Benham having kindly sent me one of the specimens I must say that on comparing it with the cotype and with the New Zealand specimens I do not see any reason for distinguishing it as a separate variety. The fact that the radial shields are more distinct than in the type is due simply to its bad state of preservation, the spines normally covering the radial shields having dropped off.

13. *Ophiocormus notabilis* H. L. Clark.

Ophiocormus notabilis. H. L. Clark. 1915. Catalogue of Recent Ophiurans. p. 219. Pl. $3._{11-12}$.

Not having seen any specimens of this Ophiurid, known only through H. L. Clark's description of the unique specimen found by Mr. Farquhar under a stone near low water mark off Wellington, I can only offer a few critical remarks to the said description.

H. L. Clark includes this form among the Ophiacanthidæ, as an extreme development from an *Ophioconis*-like ancestor, though recognizing the uncertainty of its real relationships, stating that "it is quite possible that its true position is in the Ophiodermatidæ". — Judging from the figures given by Clark one cannot help thinking the latter suggestion by far the more probable; in fact, were it not for the grains covering the base of the arms, I would suggest it to be a young *Pectinura*. But, as justly said by Clark, "much more abundant material is necessary before the matter can be satisfactorily determined." I would only point out this case as exemplifying in quite a special degree the insufficiency of photographic figures. I defy anybody to find in the figures, given by Clark, the details of the armplates or the mouth structure. We gather from these figures that it is an Ophiurid with very short, robust arms, with short, appressed armspines, the disk being covered with grains. But this is not satisfactory in an up to date work on Ophiurids.

14. *Ophiocoma Bollonsi* Farquhar.

Fig. 9.

Ophiocoma Bollonsi. Farquhar 1908. Description of a new Ophiurid. Trans. N. Z. Inst. XL. p. 108.
— — H. L. Clark. 1915. Catalogue Rec. Ophiurans. p. 293.
— — — 1921. The Echinoderm Fauna of Torres Strait: its composition and its origin. Publ. Carnegie Inst. 214. p. 132.

Of this species, hitherto known only from the single specimen on which Farquhar based his description, I have been fortunate enough to find three specimens in the following localities:

Wellington Harbour, 5—10 fms; hard bottom.

2 Miles E. of North Cape, 55 fms; hard bottom.

Three Kings Isl., 65 fms; hard bottom.

Further I have received through Mr. W. R. B. Oliver a few specimens from the Cooks Strait, 120 fms., collected by Mr. Hazelwood.

To the very careful description of this species given by Farquhar I have but little to add. On the other hand, it may be of importance to give a pair of figures of the species, Farquhar not having published any.

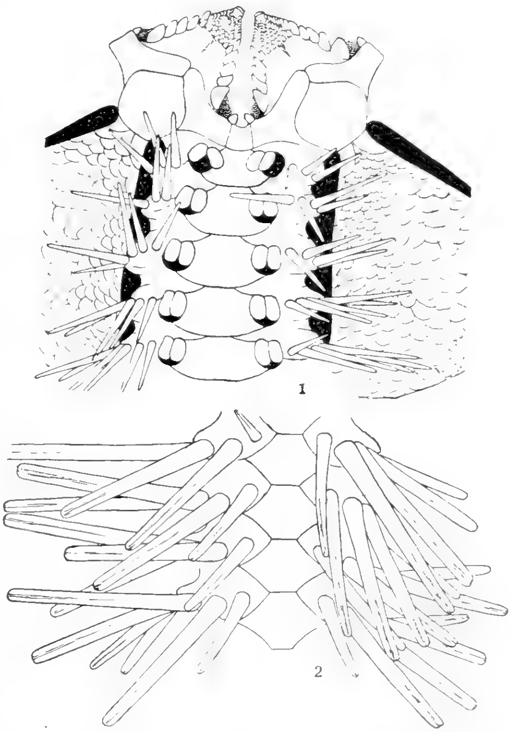


Fig. 9. *Ophiocoma bollonsi* Farquhar. — 1. Part of oral side; — 2. armjoints, from the dorsal side. 6/1.

The tooth-papillæ, which are rather exceptionally numerous for an *Ophiocoma*, are arranged above in 6 irregular transverse series; inwards in the mouth they gradually decrease in numbers, only the lateral series on each side continuing until they meet the teeth, which are squarish, provided with an enamel cap, as usually in *Ophicoma*. There are 7 tooth papillæ in the vertical row of the outer series, and below these papillæ (or above them, if we place the animal in its natural position) 2—4 teeth. The mouth is thus very deep. The outer series of the tooth papillæ are longer than the inner ones, the chewing surface of each jaw thus being concave. — The side mouth shields may be excluded from the adoral edge of the genital slit (Fig. 9.1). Regarding the shape of the ventral and dorsal plates I may content myself with referring to the figures. The spines may be in the number of 8 in the inner part of the arm in the larger specimens, increasing in length from the ventral side upwards, the uppermost one being again smaller, sometimes quite small. They are very slender, smooth (— I do not find them "granular", as Farquhar states them to be —), flattened dorsoventrally and with a slight furrow along the upper side. They are not widened at the point.

The tubefeet are strongly papillated, as usual in *Ophiocoma*. The very small size of the eggs indicates that the larva must be a typical Ophiopluteus.

Some of the armspines are clubshaped through the skin being much thickened in the outer part. That this is due to an infesting parasitic organism may well be concluded from the fact that the occurrence of such swollen spines is without any order whatever. What sort of organism I have been unable to ascertain. In sections of such spines the skin is seen to have a peculiar radiate structure; but no trace could be found of a foreign organism to the action of which this peculiar structure might be due.

As pointed out by Clark (Op. cit.) this species is most nearly related to *Ophiocoma canaliculata* Ltk., with which it has in common a. o. the peculiar character of the canaliculate spines.

15. *Ophiopteris antipodum* E. A. Smith.

Fig. 10

Ophiopteris antipodum. E. A. Smith. 1877. Description of a new form of Ophiuridæ from New Zealand. Ann. Mag. Nat. Hist. 4. Ser. XIX. p. 305. Pl. XV.

— — Th. Lyman 1882. "Challenger" Ophiuroidea; p. 168, 176.

— — H. Farquhar. 1897. Contribution to the Hist. N. Z. Echinoderms. Journ. Linn. Soc. Zool. XXVI. p. 192.

— — — 1898. Echinoderm Fauna of New Zealand. Proc Linn. Soc. N. S. Wales, p. 308.

— — H L. Clark. 1915. Catalogue Recent Ophiurans p. 294.

While no specimens of this species were collected by myself during the investigations in New Zealand Seas, I had the pleasure of receiving two fine, dried specimens from Mr. W. R. B. Oliver, who had found them under stones at low water mark at Rangitoto Isl. in Auckland Harbour. The species having hitherto been recorded only from Cook's Strait (Wellington, Nelson), this new locality is of considerable interest, showing that the species must be more widely distributed along the New Zealand coasts, probably all round the North Island.

The very careful description given by E. A. Smith does not leave much to be desired; only his figure of the mouth-structure is insufficient, being drawn in too small a scale for showing the shape of the mouthparts exactly and sufficiently detailed. I give, therefore, a figure here to illustrate these parts (Fig. 10).


Fig. 10. Part of oral side of *Ophiopteris antipodum.* E. A. Sm. 6/1.

As pointed out by E. A. Smith, the mouth structure has a considerable resemblance to that of *Ophiothrix*, differing from it only in the presence of mouth-papillæ. These, however, are quite different from those of other Ophiocomids in lying along the edge of the mouth frame, covering one another, not placed side by side along the mouth frame and at a right angle therewith as usually in Ophiocomids; in fact, there is no distinct limit between the mouth papillæ and the tooth papillæ, the former passing quite gradually into the outer series of the tooth papillæ. It is also important to notice that the teeth are not capped with enamel as is the case in most Ophiocomids. Further the peculiar shape of the adoral shields recalls *Ophiothrix* much more than the Ophiocomids. In fact, these characters are important enough to make it doubtful, whether this genus really belongs the Ophiocomidæ. On the other hand, the characters of the arms and disk decidedly recall the Ophiocomidæ. — In short, this genus would appear to be intermediate between the Ophiothrichidae and the Ophiocomidæ. A study of its anatomy and, especially, its larval development would probably decide the question of its true relationship, the larvæ of *Ophiocoma* and *Ophiothrix* being both very characteristic.

16. *Ophiactis resiliens* Lyman.

Figs. 11.1—4.

Ophinctis resiliens. Lyman. 1882. Challenger Ophiuroidea, p. 115. Pl. XX. Figs. 7—9.

— *nomentis.* Farquhar. 1907. Notes on New Zealand Echinoderms, with descript. of a new species. Trans. N. Z. Inst. XXXIX. p. 125.

— — Benham. 1909. Scientific Results N. Z. G. Trawling Exped. Rec. Canterbury Mus. I. Nr. 2. p. 23.

— *resiliens.* H. L. Clark. 1909. Scientif. Results of the Trawling Expedition of H. M. C. S. "Thetis". Mem. Austral. Mus. IV. p. 539.

— — — 1915. Catalogue Recent Ophiurans. p. 265.

— *nomentis* — — — p. 264. Pl. 11. figs. 1—2.

— *resiliens* — 1916. Report on the Sea-Lilies, Starfishes, Brittle Stars etc. Biol. Res. Fishing Exper. F. I. S. "Endeavour". IV.1. p. 87.

— — — 1918. Brittle-Stars, new and old Bull. M. C. Zool. LXII. p. 312.

— *nomentis* — 1918. Ibid. p. 312.

Off White Island, (37° 40' S. 177° 1' E.), 55 fms; sandy mud. 19/XII 14. 1 specimen.

Slipper Island, under stones at low water. 20/XII.14. 2 specimens

Colville Channel, 35 fms; sandy mud. 21/XII.14. 1 specimen.

Little Barrier Isl, 30 fms; shells. 29/XII 14. 1 specimen.

Moku Hinau Isl., Hauraki Gulf; 5 fms; gravel. 30/XII.14. 1 specimen.

10 M. N.W. of Cape Maria v. Diemen; 50 fms; hard bottom. 5/I.15. 4 specimens.

Off New Plymouth; 8 fms; hard bottom. 12/I.15. 3 specimens.

Cook Strait, 120 fms. 13/VIII.1920. (Coll. by Mr. Hazelwood; received from Mr. W. R. B. Oliver).

In his paper "Brittle-Stars, old and new" (p. 312) H. L. Clark states regarding *Ophiactis nomentis* Farquhar that it is very near *O. resiliens* Lyman "though apparently larger, but if the differences in the oral shields and adoral plates prove to be constant, the two forms may well be kept apart". A very careful comparison of the two forms has led me to the result that they are decidedly identical, and the name *Ophiactis nomentis* thus becomes a synonym of *O. resiliens.*

The differences between the Australian and the New Zealand forms pointed out by H. L. Clark (Op. cit. p. 301) are these: in *O. resiliens* the oral shields are much wider than long; adoral plates with no distally projecting angle separating oral shields from side arm-plates; in *O. nomentis* the oral shields are about as long as wide; adoral plates with a distally projecting angle separating oral

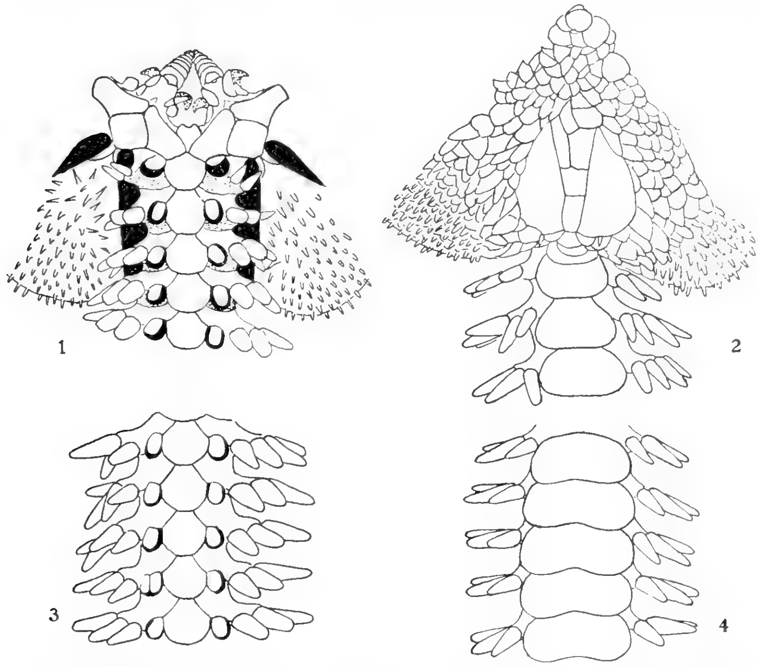


Fig. 11. *Ophiactis resiliens* Lyman. — 1. Part of oral side; 2. of dorsal side; 3. arm-joints from middle of arm, oral side; 4. same, dorsal side. $^{10}/_{1}$.

shields from side arm-plates. Regarding the latter character, the distally projecting angle of the adoral shields, it is seen from the figure given here, drawn from a specimen from Slipper Island, that it may be wanting just as well in the New Zealand as in the Australian form; of two specimens of the Australian form sent me by H. L. Clark one has the distally projecting angle of the adoral shields very distinctly developed. This character thus is decidedly of no value as a distinguishing feature. The difference in the shape of the oral shields thus remaining the only character to distinguish the two forms is decidedly too insignificant and inconstant to serve as base for keeping the two forms as separate species. The only thing which makes me hesitate a little in declaring *O. nomentis* identical with *O. resiliens* is the fact that Farquhar in his description of *O. nomentis* says: "one rounded leaflike mouth-papilla on each side of the base of the mouth-angle". As a matter of fact, my specimens, which otherwise agree very well with Farquhar's description, have two mouth-papillæ, as has *O. resiliens*. In the rather poor photographic figure given by H. L. Clark (Cat. Rec. Oph. Pl. 11.2) of a cotype of *O. nomentis* the mouth-papillæ are not distinctly discernible; but since Clark in his key to the species of *Ophiactis* (Brittle-Stars, old and new, p. 301) places *O. nomentis* in the group with 2 mouth-papillæ, the conclusion seems inevitable that Farquhar's statement is a mistake, and that the type of *O. nomentis* really had 2 mouth-papillæ.[1]) — It thus seems to me an unavoidable conclusion that *O. nomentis* is identical with the Australian species, *O. resiliens* Lym.

It may be pointed out that the concave outer edge of the dorsal plates in Fig. 11.4 is no constant feature, and cannot be used as a feature to distinguish the New Zealand from the Australian form.

The breaking up of the dorsal plates in several small irregular plates not rarely occurring in Australian specimens I have not observed in any of my New Zealand specimens; but Farquhar has observed it in his specimens.

The eggs are very small and numerous, which fact indicates almost certainly that this species has a typical Ophiopluteus-larva.

17. *Ophiactis hirta* Lyman.

Figs. 12, a—c.

Ophiactis hirta. Th. Lyman. 1882. Challenger Ophiuroidea, p. 118. Pl. XX, Figs. 4—6.
— — H. L. Clark. 1915. Catalogue Recent Ophiurans. p. 266.
— — — 1918. Brittle-Stars, new and old. Bull. Mus. C. Zool. Vol. LXII. p 310.

[1]) In one of the specimens from Cook Strait, received through Mr. W. R. B. Oliver, I find in some of the mouthangles only one outer mouth papilla, in others two. This specimen is, upon the whole, somewhat abnormal. Another of these specimens has only 4 arms.

Among a number of *Ophiactis profundi* from Cook Strait, 120 fms (collected 13/VIII.1920 by Mr. Hazelwood), sent me by Mr. W. R. B. Oliver, I found one small specimen of an *Ophiactis*, which I do not hesitate in referring to *Ophiactis hirta* Lyman, in spite of its differing from that species in a few minor characters.

This specimen is a small one, measuring only 2,5 mm in diameter of the disk. It has only 6 arms, while the type specimen has 7 arms. That this could be a valid specific difference hardly anybody, who is familiar with the characters of Ophiurans, would

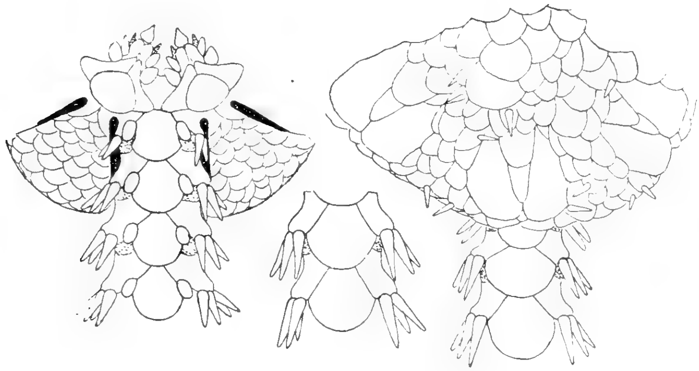


Fig. 12. *Ophiactis hirta* Lyman. — a. Part of oral side, b. of dorsal side; c. two arm-joints from middle of arm, dorsal side. $^{20}/_{1}$.

venture to maintain (— quite differently if we have to do with forms normally having 5 arms; comp. sub. *O. profundi*). The only other noteworthy differences to be observed between this specimen and the type, as figured by Lyman, are in the shape of the dorsal plates, which are more elongate in the New Zealand specimen than in the type, and in the oral papillæ being sligtly broader in the former than in the type. — I do not think that these small differences would justify us in distinguishing the New Zealand form even as a variety of the typical *O. hirta*. — The figures given here will serve to make clear the small differences from the type, and also to facilitate distinguishing this species from the other 6-armed *Ophiactis* occurring in New Zealand seas.

It should be emphasized that in the specimen in hand all the arms are equally developed, which may indicate that this species does not propagate through autotomy.

The species *Ophiactis hirta* being until now known with certainty only from off the coast of N. S. Wales through the single specimen collected by the "Challenger", it is very satisfactory that it has now been demonstrated to occur also in the Cook Strait. The statement of its occurrence in the Atlantic (Koehler. Echinodermes. Res. Campagnes Scientif. Monaco. Fasc. XXXIV. 1909. p. 171) probably refers to a specimen of *Ophiactis nidarosiensis* Mrtsn. (Comp. Th. Mortensen. Notes on some Scandinav. Echinoderms. Vid. Medd. Dansk Naturh. Foren. Bd. 72. 1920. p. 62). That this latter species is closely related to *O. hirta* seems beyond doubt; there is, however, a very marked difference in the shape of the mouth shields, and also the shape of the ventral plates is somewhat different. These characters, added to the fact that *O. nidarosiensis* is selfdividing, while *O. hirta*, according to the scanty evidence at hand, is not so, and to the fact of one being known with certainty only from the Scandinavian seas, the other only from the Australian-New Zealand seas, necessitate, at least for the present, that we regard these two forms as separate species.

18. *Ophiactis profundi* Ltk. & Mrtsn., var. *Novae-Zelandiae* n. var.

Figs. 13.1—4.

Ophiactis profundi. Lütken & Mortensen. 1899. "Albatross" Ophiuroidea. Mem. Mus. C. Zool. XXXIII. p 140. Pl. VI. figs. 4—6.
— — H. L. Clark. 1915. Catalogue Recent Ophiurans. p. 264.
— — R. Koehler. 1922. Ophiurans of the Philippine seas and adjacent Waters. Bull. U. S. Nat. Mus. 100. p. 192. Pl. 63. fig. 8.

Hen & Chicken Isl., 50 fms 30/XII.1914. 1 specimen.
2 miles E. of North Cape. 55 fms. 2/I.1915. 2 specimens.
Cook Str. 120 fms. 13/VIII.1920. Several specimens. (Collected by Mr. Hazelwood).

These specimens are undoubtedly closely related to *Ophiactis profundi* Ltk. & Mrtsn. There are, however, some slight differences which make me hesitate in simply identifying them with that species.

The size appears to be, upon the whole, smaller than in the type, which has a diameter of disk of 6 mm. The New Zealand specimens, which are most of them in various stages of reproduction after division through autotomy, do not exceed a size of ca. 4 mm diameter of disk. Three of the specimens which have, appearently, finished dividing, since they have all 6 arms equally developed, and which would thus appear to have reached full size, measure only 3—4 mm diameter of disk. The mouth shields are generally broader than in the type; they are, however, subject to some variation. The difference in the shape of the infradental papilla, which is represented here as trifid, while in the type it is simply triangular, pointed, is of no value as a distinguishing feature, being altogether too inconstant; even in one and the same specimen we may find both shapes represented. For the rest it is hard to point out any noteworthy differences between the typical form and the New Zealand specimens, excepting the fact that the latter have 4 armspines, while the typical form has only three.

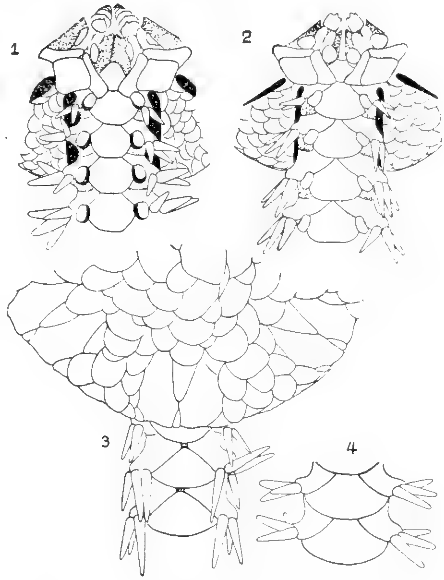


Fig. 13. *Ophiactis profundi*, var. *Novæ-Zealandiæ*. 1—2. Part of oral side of two different specimens; 3. part of dorsal side; 4. two armjoints, from middle of arm; dorsal side. $^{15}/_{1}$. The two figures 1 and 4 are from an aberrant specimen, from off the North Cape (cf. p. 131).

The characters here pointed out, viz. the smaller size, the different shape of the mouth shield and the different number of armspines, would seem to necessitate distinguishing the New Zealand specimens as a separate variety, the more so as the typical form was found in the Gulf of Panama and at Galapagos, in depths of 550—900 fms.

The weight to be attached to the wide separation of the localities is, however, considerably lessened through the fact that Koehler recently has recorded *O. profundi* from the vicinity of the Philippines. If Koehler is right in uniting the Japanese form *Ophiactis pteropoma* H. L. Clark with *O. profundi*, — as seems very probable — this would indicate that the species is probably distributed all over the Pacific, and the occurrence of a variety of it in New Zealands seas would thus be very well in accordance with zoogeographical facts.

In his paper "Brittle-Stars, new and old" (Bull. Mus. C. Zool. LXII. 1918. p. 301) H. L. Clark has maintained that the species *Ophiactis plana* Lyman, *flexuosa* Lyman, *perplexa* Koehler, *profundi* Ltk. & Mrtsn. and *brachygenys* H. L. Clark are really all one and the same species, which is thus distributed all over the Atlantic and Indo-Pacific Oceans and has a bathymetrical range of 26—1048 fms. I cannot agree with Clark in this view. It is beyond doubt that they are all closely related, as every writer on these forms has well recognized. But the unusually great horizontal and bathymetrical distribution, which a species comprising all these forms would have, must make us look very carefully into the matter, before we accept their identity. One of the objections raised by Lütken & myself (Op. cit. p. 141) against the identity of *O. profundi* with *O. flexuosa*, at least, is still as valid as ever, viz. that *O. flexuosa* has only five arms, while *O. profundi* has constantly six arms; "there is no sufficient evidence that in any species the young has six arms, the adult only five" — and Clark has given no new evidence whatever as to this point. Concerning *O. plana* Lyman, from the Atlantic, the figures given by Clark in his "Catalogue of Recent Ophiurans" would seem to show that the ventral plates of this species are different in shape from those of the New Zealand form; for the rest these figures are not sufficiently distinct for allowing a detailed comparison. The fact that this species has 6 arms, otherwise, does not, a priori, make it improbable that it might be identical with *O. profundi*, but the available material does not seem to me to justify declaring them to be identical. As for *O. brachygenys* this form has five arms and is thus certainly not identical with *O. plana* or *O. profundi*, and the same holds good with regard to *O. perplexa*, which is otherwise distinguished by the spines occurring on the edge of the disk.

Thus, while agreeing that *O. plana* and *profundi* may possibly prove to be identical I must maintain that sufficient proof of their identity has not yet been given, and for the present the only safe course is to keep them separate. Also the New Zealand form ought to be kept separate for the present, the differences pointed out above pointing more in the direction of its being a separate species than of its being simply identical with *O. profundi*.

One of the two specimens from off North Cape differs in the dorsal plates being in contact in the larger part of the arms, thus having a truncated inner angle, and also in the ventral plates being more broadly in contact than is otherwise the case, and, upon the whole, somewhat different in shape from those of the other specimens (Fig. 13.1 and 4). I do not think, however, that this can be regarded as more than an individual variation, especially since the said features are more conspicuous on one arm than on the others. But attention must be called to this form, which may possibly ultimately turn out to be another, distinct species. The two specimens from off North Cape have a few narrow, dark bands on the arms.

"*Ophiactis nigrescens*" Hutton.

Through the kindness of Mr. W. R. B. Oliver I have received a specimen of an Ophiurid from the Dominion Museum, Wellington, which is, according to a handwritten label by Mr. Farquhar, the type specimen of Hutton's "*Ophiocoma nigrescens*". Since Hutton did not describe any "*Ophiocoma nigrescens*", but only an "*Ophiactis nigrescens*", it would seem probable that this is the type specimen of the latter, to the description of which it corresponds fairly well. It is a very poor specimen of *Ophiocoma schoenleini* M. & Tr. — That it is not from the New Zealand seas is evident; most probably the specimens have come from Fiji, as had also the "*Ophiothrix coerulea*" of Hutton.

Herewith the "*Ophiactis nigrescens*", which has for so long a time puzzled the echinologists, may well disappear both from the list of Ophiurids and from the New Zealand fauna.

19. *Amphiura magellanica* Ljungman.

Figs. 14.$_{1-3}$; 15.a.

Amphiura magellanica. Ljungman. 1866. Ophiuroidea viventia huc usque cognita. Öfvers. kgl. Vet. Ak. Förh. p. 320.
— — (?) Th. Lyman. 1875. Zool. Res. Hassler Exped. II. Ophiuridæ and Astrophytidæ. Ill. Cat Mus Comp. Zool. VIII. p. 19
— — — 1882. "Challenger" Ophiuroidea, p. 143.
— — H. Ludwig. 1899. Hamburger Magalh. Sammelreise. Ophiuroidea. p. 10.
— — — 1905. Asterien u. Oph. d. schwed. Exped. Z. w. Zool. Bd. 82 p. 75.
— — R. Koehler. 1909. Asteroidea, Ophiuroidea & Echinoidea. Scottish National Antarct. Exp. Vol. V. Part. XIII. p. 271. Pl. XI. fig 104.
— — — 1914. Ophiurans of the U. S. Nat. Museum. Bull. U. S. Nat. Mus. 84. p. 65.
— — H. Lym. Clark. 1915. Catalogue Rec. Ophiurans. p 228.
— — Th. Mortensen. 1920. On hermaphroditism in viviparous Ophiurids. Acta Zoologica. I. p. 12.

Masked Island, Carnley Harbour. Auckland Isl. 3/XII.1914. Several specimens, on the rocks, among calcareous algæ (*Melobesia antarctica*).

Figure 8 Isl., Carnley Harbour, Auckland Isl. 2/XII.14. 4 specimens, under stones, at low water.

Port Ross, Auckland Isl., 10 fms. Sand. 25/XI.14. 1 specimen

Carnley Harbour, Auckland Isl., ca. 45 fms; sandy mud. 6/XII.1914. 1 specimen.

Perseverance Harbour, Campbell Isl. Ca. 20 fms, sandy mud. 10/XII.1914. 3 specimens.

Wellington Harbour, 5—10 fms, hard bottom. 16/II.1915. 2 specimens.

Queen Charlotte Sound, 3—10 fms, hard bottom. 20/I.1915. 2 specimens.

The finding of this interesting viviparous and hermaphroditic Ophiurid in New Zealand seas is rather surprising; not from a zoogeographical point of view — it is one of the forms which might be expected to have got a circumantarctic distribution through being carried by floating algæ —, but as it occurs in a place like

Wellington Harbour, we may well wonder that it has been overlooked hitherto. It is also surprising that it was not found by the Expedition to the sub-antarctic Islands of New Zealand, as it is fairly common at least in Carnley Harbour, occurring there on the rocky shores among the beautiful *Melobesia antarctica* which covers the vertical rock wall to a great extent; also under stones at low water mark it may be found.

Although mentioned fairly often in literature, the only figure of it ever published is that given by Koehler in his Report on

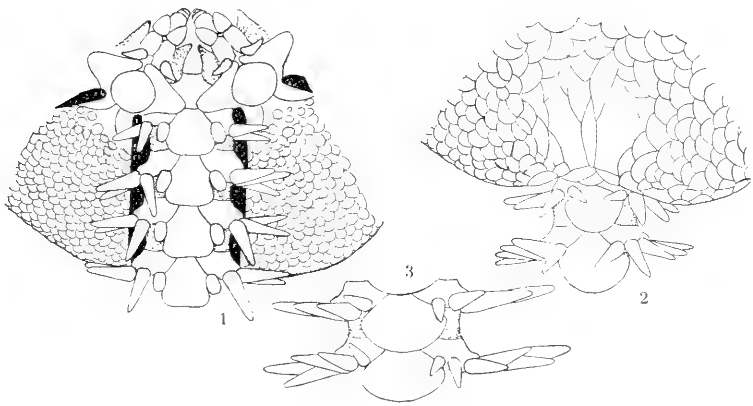


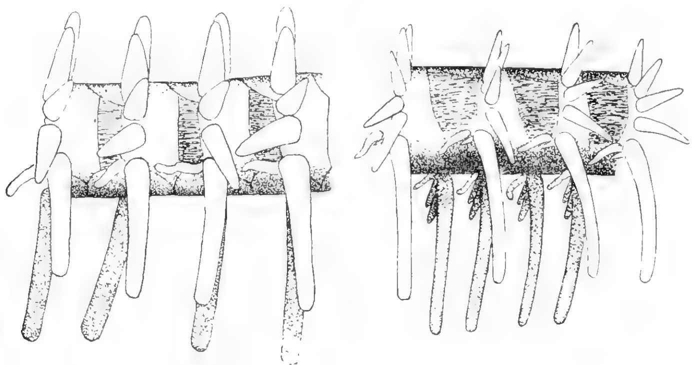
Fig. 14. *Amphiura magellanica* Ljungm. — 1. Part of oral side; — 2. of dorsal side; 3. two armjoints from middle of arm, dorsal side. 12/1.

the "Scotia" Echinoderms. It is therefore evidently not superfluous to give some figures here to illustrate the characters of this species. Also for comparison with the following species such figures are rather needed.

The largest specimens measure 6 mm diameter of disk, with an armlength of ca. 25 mm. Although fairly robust looking, it is exceedingly brittle, which may be due to the narrowness of the side armplates, leaving a rather large membraneous space between each two successive plates. The radial shields are scarcely $^1/_3$ of the disk radius. The primary plates hardly to be discerned in the larger specimens, while in the younger ones they are quite distinct. The disk generally swollen and bulging out between the arms. The tubefeet are somewhat papillose. In larger specimens there may be

7 spines on the basal armjoints; in the middle of the arm there are only 5 spines. The long, downwards directed ventral spines (Fig. 15.a), may perhaps have relation to the biology of the species: mainly living among algæ, not burrowing in sand or mud, as is otherwise the rule among Amphiurids.

Amph. magellanica was hitherto known to occur only in the Magellan region and at the Gough Island in the S. Atlantic. It is then of considerable zoogeographical interest to have proved it to occur also in the New Zealand region. The greatest depth at which



a. b.

Fig. 15. Four armjoints from middle of arm, in side view, showing the elongated downward pointing lower spine. — a. *Amphiura magellanica;* b. *Amph. spinipes.* 20/1.

it has been found is 75 fms (Gough Isl.). It appears to be mainly littoral.

After this had been written I received from Prof. Benham a specimen of this species dredged in Otago Harbour, 2 fms, and also one from Foveaux Strait. This proves, as might be concluded from its occurrence at the Cook Strait coast, that this species occurs along the coasts of the South Island of New Zealand. Whether it extends farther North than the Cook Strait remains to be seen.

20. *Amphiura spinipes* n. sp.

Figs. 15.b; 16.a—c.

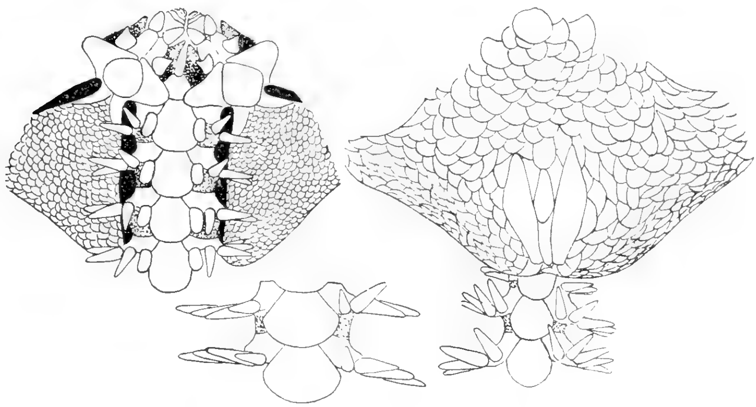
Little Barrier Isl., 30 fms, shells. 29/XII.14. 7 specimens.

Colville Channel, 35 fms; sandy mud. 21/XII.14. 8 specimens.

10 M. N.W. of Cape Maria van Diemen, 50 fms; hard bottom. 5/I.15. Several specimens.

Three Kings Isl. 65 fms; hard bottom. 5/I.15. 5 specimens.

As appears from a comparison of the figures of this species with those of *A. magellanica*, it is really difficult to indicate reliable distinguishing features in the characters of the plates or spines. The oral shields have the same rounded shape in both forms; the ventral plates are more rounded at the outer edge in *spinipes*, more straight or even slightly concave in *magellanica* — but, although it may appear distinct enough in the figures, the difference is really very slight. The single tentacle scale quite alike in both



a. c. b.

Fig. 16. *Amphiura spinipes* Mrtsn. — a. Part of oral side; b. of dorsal side; c. two armjoints from middle of arm, dorsal side. $^{18}/_{1}$.

species. The dorsal plates in the interior part of the arm are somewhat narrower and more elongated in *spinipes* than in *magellanica*; those further out on the arm very nearly of the same shape in both species. The radial shields are narrower and more elongated than in *magellanica*, ca. $^1/_2$ the disk radius, and the scales covering the disk on both sides are distinctly finer in *spinipes* than in *magellanica*. The armspines are as in *magellanica*, 6 (more rarely 7) at the armbase, 5 farther out, and the ventral is very much elongated, somewhat curved, and directed straight downwards. The tube feet are not papillose.

Upon the whole, these two forms agree so closely that one might be more inclined to think the form, here distinguished as *Amph. spinipes*, merely to represent a more slender variety of *magellanica*. That it is, however, really a distinct species is proved beyond any doubt by the fact that it is not viviparous and not hermaphroditic, as is *magellanica.* Also the eggs are distinctly smaller, only ca. 0,1 mm, those of *magellanica* ca. 0,2 mm, and probably it has then typical pelagic larvæ.

The species is, upon the whole, smaller and more delicate than *magellanica*; the largest specimen measures 5 mm diameter of disk; the arms are ca. 4—5 times the length of the diameter of disk. The long ventral armspines give the arms a very peculiar appearance, looking more like feet than like spines, and the suggestion lies at hand that they do really act as such (the species-name *spinipes* is meant to refer to this); they are gradually increasing in length from the base of the arm to the 8th—10th joint, remaining very long on some 20—25 joints, and then again gradually diminishing in length towards the point of the arm. It can hardly be doubted that this Amphiurid lives among shells a. o. hard objects on the bottom, not burying itself in the sand or mud, as do most other Amphiurids. Its long spines would, evidently, be very unfit for digging, but very useful for crawling among hard objects, in the same way as does *Amph. magellanica*, the armspines of which are exactly similar, only somewhat more robust.

Three specimens from North Channel, Kawaii, Hauraki Gulf, 10 fms (29/XII.14) I must hesitate in simply referring to this species. They are, in fact, more like *A. magellanica*, but not being viviparous nor hermaphroditic they cannot belong to that species. They are somewhat more robust than *A. spinipes*, and the ventral spines not so long as they generally are in that species. Also the eggs are somewhat larger. — I shall prefer to leave undecided at present, whether they should be regarded as a variety of *A. spinipes* or as representing, perhaps, a separate species. But it may be useful to call attention to the possible existence in New Zealand seas of still another species of the group of *Amphiura*'s with elongate ventral spines.

21. *Amphiura præfecta* Koehler.

Figs. 17.a—c.

Amphiura præfecta. R. Koehler. 1907. Revision de la collection des Ophiures du Muséum d'hist. Nat. Paris. Bull. sci. Fr. & Belgique. XLI. p. 302.

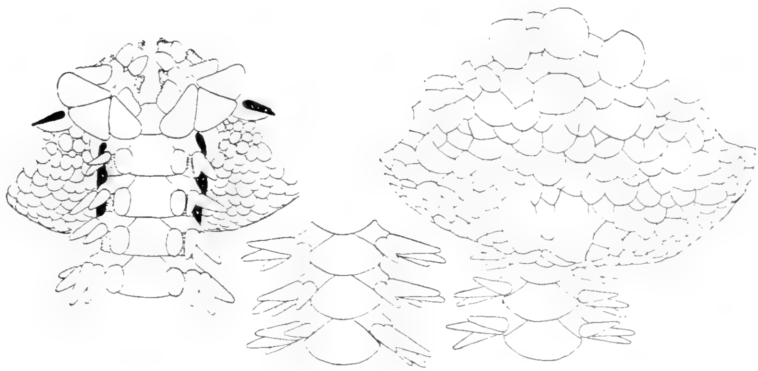
— — H. L. Clark. 1915. Catalogue Rec. Ophiurans; p. 235.

Masked Island, Carnley Harbour; Auckland Isl. Among *Melobesia antarctica* on rock wall. 3/XII.14. 10 specimens.

Perseverance Harbour, Campbell Isl., ca. 20 fms. Sandy mud. 10/XII.14. 3 specimens.

Only a few remarks need be added to the careful description given by Koehler, the figures otherwise supplying the necessary information.

The largest specimen measures 4 mm diameter of disk; the arms are ca. 4 times the diameter of the disk. The outer oral papilla is very broad, not pointed, but may be serrated along its free



a. c. b.

Fig. 17. *Amphiura præfecta* Koehler. — a. Part of oral side; b. of dorsal side; c. three armjoints from middle of arm, dorsal side. $^{18}/_{1}$.

edge. The oral shields are generally triangular, but the outer edge is sometimes more convex than shown in the figure. The radial shields may be contiguous in the outer part. The primary plates in younger specimens join completely, with no small plates between them, thus forming a very conspicuous rosette.

The species, although apparently not viviparous, shows some unusual features in the arrangement of its genital organs. There is, in both sexes, only one gonad to each bursa, situated at the interradial side; the eggs are large and yolky and do not all ripen at the same time, as is the rule in non-viviparous forms, but one after another, as is the case in viviparous forms. This is so remarkable and exceptional that one cannot help suggesting that it may, however, ultimately prove to be viviparous; the fact that the eggs ripen one after another, and consequently must be laid one after another, is not in favour of assuming that some sort of care of the brood exists, the rule in other Echinoderms which protect their brood being that the eggs are laid simultaneously.

The species was first found at Campbell Island by Filhol, the single specimen secured by him remaining undescribed until Koehler undertook a revision of the Ophiuroid-Collection of the Paris Museum (1907). Through the present author's researches it has now been shown to occur also at the Auckland Islands. The fact that it has not been found in other localities would seem to indicate that it is endemic to the subantarctic region of New Zealand.

22. *Amphiura aster* Farquhar.

Figs. 18—19.

Amphiura aster. Farquhar. 1901. Description of a new Ophiurid. Trans. N. Z. Inst. XXXIII.

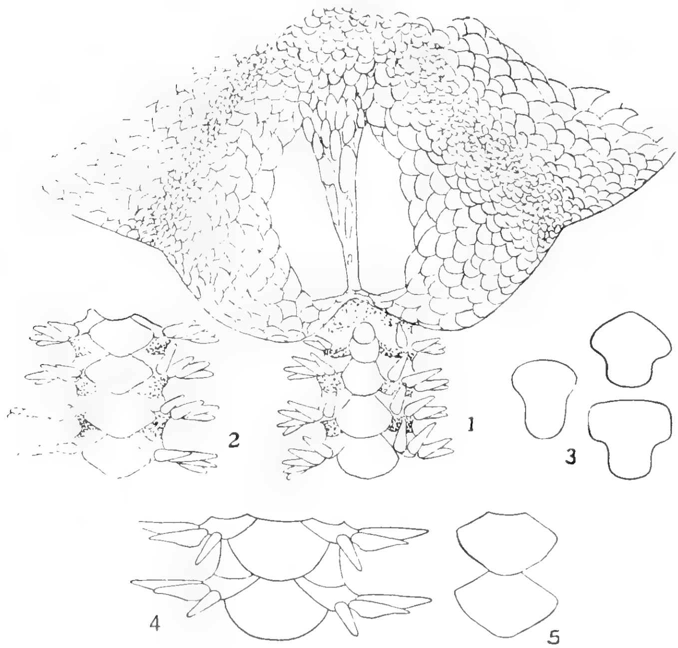


Fig. 18. *Amphiura aster* Farquhar. — 1. Part of dorsal side; 2. four armjoints from middle of arm, dorsal side; 3. various forms of mouthshields; 4. two armjoints, from another specimen, dorsal side; 5. two dorsal plates from yet another specimen. $^{12}/_{1}$.

?*Amphiura aster.* Koehler. 1907. Revision de la collect. des Ophiures du Mus. d'Hist. nat. Paris. Bull. sc. Fr. et Belgique XLI. p. 299. Pl. XI, 15—16.
— *arenaria* Farquhar. 1913. On two new Echinoderms. Trans. N. Z. Ins. XLV. 214. Pl. IV.
— — H. Lym. Clark. 1915. Catalogue Rec. Oph. p. 224.
— *aster* — Ibidem. p. 224.

No specimens were collected by the author, but a few specimens of *A. arenaria* from Plimmerton were sent to me by Mr. Farquhar in 1912, and a pair of specimens of *A. aster* (unfortunately in a very poor state of preservation) from Timaru, the type locality of this species, were presented to me by Mr. W. R. B. Oliver. Also a pair of specimens of *arenaria* (again from Plimmerton) were sent me from the Dominion Museum, Wellington.

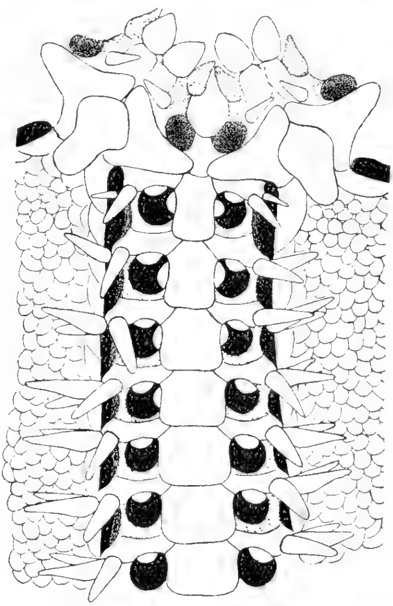


Fig. 19. *Amphiura aster* Farquhar. Part of oral side. 13/1.

On studying these specimens I find that they all belong to one and the same species, and there can be no doubt, accordingly, that *Amph. arenaria* is a synonym only of *A. aster.* Farquhar has also himself called attention to the close relation between *arenaria* and *aster*, but thinks the differences in the scaling of the disk and the shape of the mouth parts sufficient for separating them as two different species. As regards the scaling of the disk there is, however, so considerable a variation that it is quite out of question to find a reliable distinguishing character herein. The same I find to hold good for the shape of the mouth parts. Especially, I find the oral shields exceedingly variable in form, as shown in figures 18,3 and 19. No other differences existing between the two forms, I do not hesitate in declaring them identical.

Regarding the characters of this species I would point out the fact, already observed by Farquhar, that two tentacle scales are found only on a few of the proximal joints; farther out generally only one scale remains, sometimes placed on the side plate (as in fig. 19), sometimes in the corner between the side plate and the ventral plate, as usual in species where only one scale is found. The ventral plates gradually change in form, from narrow, elongate, about twice as long as wide, in the inner part of the arm, to rectangular, almost twice as wide as long, farther out (Fig. 19). The dorsal plates are, generally, more or less fanshaped, but upon the whole rather variable in shape; the proximal ones are rudimentary or, partly, absent, as pointed out by Farquhar. (Fig. $18._{1-2}$, $_{4-5}$). Some of the armspines show the characteristic feature of having a widened, slightly serrate distal edge in the basal part (fig. $18._{4}$); this feature is especially distinct on the second spine from below, and, apparently, does not occur on the lowermost or the uppermost one. The lowermost spine is slightly curved.

The figures of *Amph. aster* given by Koehler (Op. cit.) offer so conspicuous differences from the characters to be observed in this species that they must either be very diagrammatic or represent another species.

The eggs are fairly large, ca. $0,_{15}$—$0,_{18}$ mm, which may perhaps indicate that this species has not a typical *Ophiopluteus*-larva.

23. *Amphiura noræ* Benham.

Amphiura noræ. W. B. Benham. 1909. Sci. Res. N. Z. Governm. Trawling Exp. 1907. Echinodermata, p. 22. Pl. $X._{1-3}$.

This species, — besides *Ophiocormus notabilis* the only New Zealand Ophiurid not examined by the present author, — is very well distinguished from the other New Zealand *Amphiura*'s through its two tentacle scales and the nearly naked underside of the disk.

I have no remarks to offer to the careful description and figures given by Benham.

24. *Amphiura rosea* Farquhar.

Fig. $20._{1-7}$.

Amphiura rosea. Farquhar. 1894. Description of a new species of Ophiuridæ. Trans. N. Z. Inst. XXVI. p. 110. Pl. IX.

— — Farquhar. 1898. On the Echinoderm Fauna of New Zealand. Proc. Linn. Soc. N. S. Wales. p. 308.

Amphiura rosea. H. Lyman Clark. 1915. Catalogue Recent Ophiurans; p. 231.
— *parva* Hutton. H. Lyman Clark. Ibidem, p. 230. Pl. V, figs. 10—11.

Wellington Harbour, c. 5 fms; mud. 16/II.15. 3 specimens.
Queen Charlotte Sound, 3—10 fms; mud. 19—20/I.15. 2 specimens.
Off Bare Island, 35 fms; mud, clay. 17/XII.14. 1 specimen.
Off Tiri-Tiri, Auckland, 15 fms; mud. 28/XII.14. Numerous specimens.

To the very careful description of this species given by Farquhar only a few remarks need to be added. Reference must

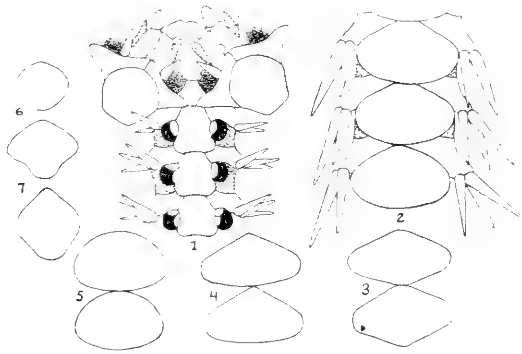


Fig. 20. *Amphiura rosea* Farquhar. — 1. Part of mouth and oral side of arm; 2. three armjoints from middle part of arm, dorsal side; 3—5. various shapes of dorsal plates; 6—7. various shapes of mouthshields. All figures $^{12}/_{1}$.

also be made to his careful figures; only a few details it is desirable to figure here.

The oral shields are stated by Farquhar to be circular, usually with a slight peak within. I have found a considerable variability in regard to the shape of the oral shields, the nearly circular form being met with more rarely. The usual form I find to be that with a slight restriction near the outer edge (Fig. $20,_{1}$). The adoral shields sometimes join completely proximally to the oral shield; they may prolong outwards so as to reach the genital slit, but equally often they have no such prolongation (Fig. $20._{1}$). The outer mouthpapillæ I have sometimes found to be bifid. The arms, which are very long and slender, ca. 15 times the diameter of disk, are somewhat flattened and slightly increasing in width, thus being somewhat more slender close to the disk than farther out, and then very gradually tapering towards the end. The dorsal plates may vary rather considerably in shape (Fig. 20.2—5). As remarked by Farquhar there is not rarely only one tentacle scale at some of the proximal pores.

The numerous specimens from off Tiri-Tiri have nearly all of them lost their original reddish colour on being preserved in alcohol; only a few of them have remained much darker than the rest.

The eggs are small, ca. 0,07—0,08 mm, which fact tends to indicate that this species will prove to have a typical Ophiopluteus-larva.

The species having hitherto been recorded only from Wellington Harbour and Foveaux Strait (H. Lym. Clark, op. cit.), it is of interest to find it so widely distributed in the New Zealand seas, in some places even occurring in great numbers.

The species mentioned and figured by H. L. Clark in his Catalogue of the Recent Oph. (loc. cit.) under the name of *Amphiura parva* Hutton is not that species (which latter has been shown by Benham to be *Amphipholis squamata*) but *Amphiura rosea* Farqu. I can state this, having had, through the kindness of my friend H. L. Clark, one of his specimens for examination.

Farquhar thinks this species nearly related to *Amph. bellis* Lyman from the Japanese seas. I am inclined to think it more nearly related to *Amphiura Eugeniæ* Ljungm. from the South American seas (the Fuegian region) and from off Kerguelen. I do not think, however, that it is identical with the latter species. Especially the shape of the oral shields, although very variable in *A. eugeniæ*, as shown by Koehler[1]) seems to afford a distinct distinguishing character, being upon the whole more elongate and spearshaped in *A. eugeniæ*, shorter and more rounded in *A. rosea*.

25. *Amphiura eugeniæ* Ljungm. var. *latisquama* n. var.

Fig. 21.a—c.

Among the Ophiurids from New Zealand, brought home by the author, there is a single specimen of an *Amphiura*, in a very poor state of preservation (dried), labelled only New Zealand. I am not quite sure how I have got it, but it is presumably one of the Echinoderms presented to me by Mr. W. R. B. Oliver, and therefore probably was found in the neighbourhood of Auckland.

[1]) See under the following species.

The specimen shows a very close resemblance to *Amphiura eugeniæ* Ljungman. In view of the great variations shown by Koehler[1]) to occur in this species, especially as regards the shape of the oral shields, I do not think the small differences from the typ-

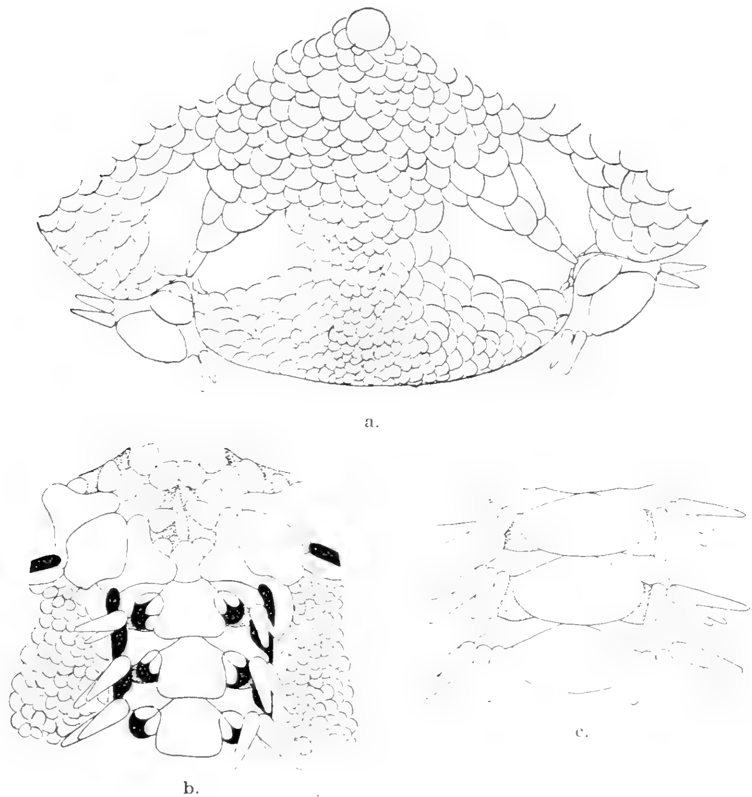


Fig. 21. *Amphiura eugeniæ*, var. *latisquama*. — a. Part of dorsal side; b. of ventral side; c. three armjoints, from middle part of arm, dorsal side. a. $^{10}/_{1}$; b.—c $^{18}/_{1}$.

ical form (from Kerguelen) to be observed in this specimen sufficient for maintaining it as a separate species. It seems to me preferable — until more and better material enables us to form a better judgment of the value of these differences — to designate it as a variety only of *Amphiuræ eugeniæ*; thus the undeniable close relation to the said species is emphasized.

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1) R. Koehler. Échinodermes (Astéries, Ophiures et Échinides) recueillis par M. Rallier du Baty, aux îles de Kerguelen, en 1913—1914. Ann. de l'Inst. Océanogr. VII. 1917. p. 63. Pl. VIII, figs. 1—9.

The New Zealand specimen (Figs. 21.a.—c.) differs from the Kerguelen form in the character of the ventral plates, which are somewhat shorter and wider than generally in the typical *A. eugeniæ*; also the characteristic form of the proximal ventral plate, shown in the figure, affords a character distinguishing it from *A. eugeniæ*. The shape of the oral and adoral shields is almost exactly similar to that of *A. eugeniæ* seen in Pl. VIII, fig. 8 of Koehler's work. The outer mouth papilla appears to be generally more scale-like in *A. eugeniæ* than in the New Zealand form, but in Koehler's Pl. VIII, fig. 9 the shape of this papilla is very much like that of the New Zealand form. A noteworthy feature of the New Zealand form is the presence of a small papilla outside the normal outer papilla; such papilla is not observed in any of Koehler's figures of *A. eugeniæ*, and not mentioned in the text either.[1]) If this papilla proves to be a constant feature in the New Zealand form I would be inclined to ascribe some importance to it. — The radial shields are very small, widely divergent; they do, however, not differ much from those in Pl. VIII, fig. 5 of Koehler's work, less so than those of another specimen of *A. eugeniæ* represented in Fig. 1 on the same plate in Koehler's work. The shape of the dorsal plates may perhaps prove slightly different in the two forms, but I cannot ascribe much importance to a small difference herein. — The tentacle scales are regularly two in the whole of the arm fragment preserved; some of the proximal pores have three scales, as has also been observed in *A. eugeniæ* by Koehler.

I may take the opportunity here of pointing out that also *Amphiura mortenseni* Koehler appears to be very closely related to *A. eugeniæ* and perhaps cannot be maintained as a distinct species. At least, a comparison between the figures of *A. eugeniæ*, given by Koehler in the work on the Echinoderms of Kerguelen quoted above, and those of *A. mortenseni*, given by Koehler in his report on the Ophiuroids of the Australian Antarctic Expedition, Pl. 80, figs. 5—8 conveys the impression that these two species are so closely related as to be hardly distinguishable from each other.

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[1]) In one of some specimens of *A. eugeniæ*, kindly sent me by Prof. Koehler, I find a trace of this small outer papilla at one side of one of the mouth corners.

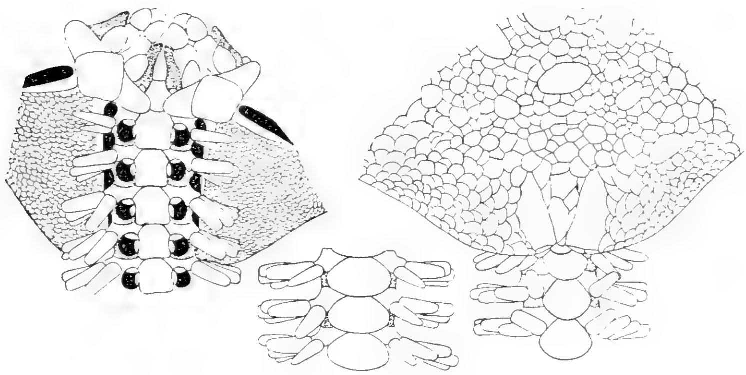
26. *Amphiura amokuræ* n. sp.

Figs. 22.a—c.

Perseverance Harbour, Campbell Island; under stones, at low water. 8/XII.1914. 2 specimens.

North Cape, New Zealand; under stones, at low water. 3/I.1915. 1 specimen.

Diameter of disk 5 mm, length of arms 4—5 times the diameter of the disk. The scales of the aboral side of the disk rather coarse, somewhat irregular, round the radial shields more regular, imbricating; the primary plates are distinct. The radial shields are



a. c. b.

Fig. 22. *Amphiura amokuræ* Mrtsn. — a. Part of oral side; b. of dorsal side; c. three armjoints from middle of arm, dorsal side. 13/1.

small, only ca. $^1/_3$ of the disk radius; they are diverging, completely separated by several irregular scales. The oral side of the disk has a complete covering of very fine scales. The oral papillæ are large, oval, not spiniform; sometimes a very small papilla is found distally to the large papilla. The oral shields are almost rhomboidal, with only a small outer lobe. The adoral shields do not meet within and, as a rule, do not reach the genital slits. The ventral plates are about equally wide and long, with their lateral and distal edges slightly concave and the outer corners rounded. Two small tentacle scales. The dorsal plates are in the proximal part of the arm somewhat elongate, fanshaped, about as long as wide, farther out more oval, nearly twice as broad as long. The armspines are short, outstanding, distinctly flattened; there are six, sometimes seven, in the proximal part of the arm, the number gradually decreasing towards the point of the arm.

The eggs are rather small, only c. 0,1 mm.

The specimen from North Cape differs from those from Campbell Island in having much finer scales on the aboral side of the disk, the central plate alone remaining distinct; also the radial shields are a little smaller and narrower. As I do not find any other characters by which to distinguish it from the typical form, I do not hesitate in referring it to the same species. If the differences noted in the scaling and the radial shields prove constant, it may well be distinguished as a separate variety — but the material available does not allow judging of the constancy of this feature.

The species shows a considerable resemblance to *Amphiura incana* Lyman, from Cape of Good Hope. ("Challenger" Ophiuroidea, p. 128, Pl. XXXIII, figs. 5—7). The broad outer oral papilla of *A. incana* and the different configuration of the oral and adoral shields would appear, however, to afford good distinguishing characters, to which must be added the difference in the shape of the ventral plates which are — judging from the figure given by Lyman — distinctly broader in *incana* than in *amokuræ*, and the number of the spines, eight in *incana*, six (seven) in *amokuræ*. These differences would seem to put the specific distinctness of the two forms beyond all doubt.

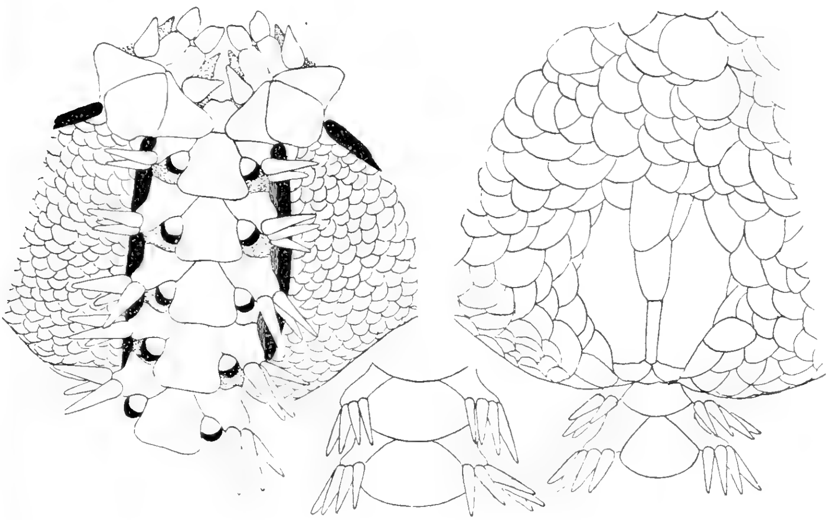
After this was written I received from Professor Benham two specimens of this species, dredged in Otago harbour, 2 fms; VI. 1923. They agree very well with type specimens from Campbell Isl., only the arms are somewhat longer, ca. 7 times the diameter of the disk. Also a young specimen from Lyall Bay and one from Timaru, collected by Mr. W. R. B. Oliver in 1907, prove to belong to this species. — It is very satisfactory thus to have demonstrated the occurrence of the species at the coast of the South Island of New Zealand. This fact, together with the above statement of its occurrence at North Cape, leaves no doubt that it will prove to occur all along the New Zealand coasts.

27. *Amphiura alba* n. sp.

Figs. 23, a—c.

Colville Channel, 35 fms; sandy mud. 21/XII.14. 4 specimens.

Diameter of disk 4 mm; length of arms 4—5 times the diameter of the disk. The scales of the disk on the aboral side fairly large, those on the oral side much finer, but forming a complete covering. The primary plates not very distinct; the radial shields rather broad, not quite as long as half the disk radius; they are diverging and may be separated by a narrow wedge of scales or join in their outer part. The outer oral papilla broad, but pointed, thus evidently of the spiniform type. The oral shields are about spear-shaped, somewhat longer than broad. Adoral plates just meeting within, sometimes excluded from the genital slit. The ventral plates are distinctly broader in their outer part, the outer edge being slightly concave. One small triangular tentacle scale. The dorsal plates are broadly contiguous, with the aboral edge slightly convex; they are distinctly broader than long. The basal armjoints carry 6 short slender spines; farther out the number diminishes, as usual, to 5—4, and 3 at the end of the arm. They do not



a. c. b.

Fig. 23. *Amphiura alba* Mrtsn. — a. Part of oral side, b. of dorsal side; c. two armjoints from middle of arm, dorsal side. $^{20}/_{1}$.

stand out at a right angle to the arm, as is the case in the preceding species. The two ventral spines are slightly longer than the others.

The colour is white, somewhat shining, especially in the oral region. The eggs are very small and numerous; it may thus be inferred that it has typical pelagic larvæ.

This species appears to be nearly related to *Amph. angularis* Lym. occurring at Kerguelen (cf. Koehler. Échinodermes, recueillis par M. R. du Baty, aux îles de Kerguelen, en 1913—14. Ann. Inst. Océanogr. VII. 1917. p. 67. Pl. VIII, figs. 13—15). In fact, it is only the different number of armspines (4—3 in *angularis*, 6—5 in *alba*) and the different character of the dorsal plates (broadly in contact in *alba*, scarcely so in *angularis*) which appear to form distinguishing characters. This is, however, sufficient for showing that they cannot simply be regarded as identical. Also to *Amph. constricta* it bears a considerable resemblance; but the fact that this latter species is viviparous at once proves that these two forms are not identical.

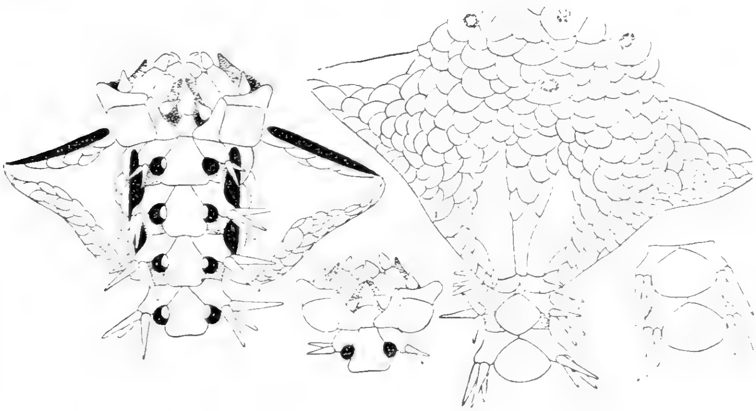
28. *Amphiura hinemoæ* n. sp.

Figs. 24. a—d.

Off White Island (37° 40' S. 177° 1' E.), 55 fms; sandy mud. 19/XII.14. 2 specimens.

Disk covered by numerous rather fine scales, among which the six primary plates are distinct, through their somewhat larger size and through having a whitish spot in the middle, surrounded by a darker ring, due to a special structure of this part of the plate. The radial shields are narrow and elongate, equalling half the radius of the disk in length; they are separated throughout their length. The underside of the disk is naked, the limit between the naked part and the scales along the border being quite sharp; a few larger scales are found along the genital slits. The outer mouth papilla is somewhat leafshaped, not simply spiniform. The oral shields are, in the larger specimen, rhomboidal, in the smaller specimen almost triangular, with outer edge rounded. Adoral plates rather narrow, meeting within. The ventral plates are somewhat elongate, with outer edge slightly concave and the outer corners rounded. The first fully formed ventral plate is distinctly broader in the distal than in the proximal part; outside the disk they are in contact merely with the point. Only one small tentacle scale. The dorsal plates are transverse oval with an obtuse point inwards, not in mutual contact. Three subequal armspines, about as long as an armjoint. Colour of the dried specimens white.

The larger specimen, measuring 4 mm diameter of disk, has all five arms broken; in the smaller specimen, 3 mm diameter of disk, the arms are about 5—6 times the diameter of disk.



a. b. c. d.

Fig. 24 *Amphiura hinemoæ* Mrtsn. — a. Part of oral side; — b. part of mouth and proximal armjoint of smaller specimen; — c. part of dorsal side; — d. two armjoints from middle of arm, dorsal side. 16/1.

The eggs are not large, 0,15 mm. Apparently they do not all ripen at the same time, which might well indicate that the species has not typical pelagic larvæ. However, the material in hand is rather too insufficient for giving this conclusion a reasonably firm base.

Among the small group of Amphiuras with one tentacle scale, three spines and naked underside of the disk *A. seminuda* Ltk. & Mrtsn. and *A. carchara* H. L. Clark, both from the North Pacific, are evidently nearly related to the present species. From the former (known only from the mouth of the Gulf of California) it is distinguished through the different shape of the outer mouthpapilla (spiniform in *seminuda*), through the different shape of the radial shields (broadly joining in *seminuda*) and through the primary plates, which are not visible in the latter species. In *A. carchara* the outer mouthpapilla is also long and spiniform and there would appear to be some differences between *A. hinemoæ* and *carchara* also in the scaling of the disk (primary plates not seen in the latter) and in the shape of the dorsal plates. — These differences are not very important, it is true, but by the great geographical distance it would be quite unjustifiable to regard the New Zealand form simply as identical with the North Pacific form, since there are distinct differences. Especially, I should think the shape of the outer mouthpapilla a valuable character.

29. *Amphiura annulifera* n. sp.

Figs. 25. a—c.

Plimmerton, under stones, at low water. 15/I.1915. 2 specimens.

Diameter of disk, 3 mm, length of arms ca. 3 times the diameter of the disk. The scales in the middle of the aboral side of the disk rather coarse. The central plate distinct, but the other primary plates indistinguishable; towards the edge of the disk the scales are conspicuously smaller than in the middle. The scales on the oral side of the disk very fine. The radial shields are small, separated, divergent, equalling only $^1/_3$ of the disk radius. The outer oral papilla fairly large, not spiniform. The oral shields are triangular, with slightly rounded sides; adoral shields meeting within and adjoining the inner border of the genital slit with their outer edge. The ventral plates are elongate, somewhat longer than broad, with the sides almost straight and the outer edge slightly concave, outer corners rounded; the proximal end truncate. One small, but distinct tentacle scale; pores small. The dorsal plates are fan-shaped, with the proximal end truncate, somewhat wider than long. 4 short, cylindrical spines, of almost equal length. Genital slits narrow.

The two specimens show a characteristic coloration, viz. a brownish ring round the mouth, across the mouth angles, proximal to the outer oral papilla; the species name refers to this feature. Otherwise they have no coloration.

This small species is viviparous, two fairly large young ones being found in the one specimen, which was sacrificed for anatomical study. It disclosed the very important and interesting feature of being hermaphroditic, as the author has shown nearly all viviparous Ophiurids to be.[1]) It was found to have one testis at the adradial side and one ovary at the interradial side of each genital slit. The eggs are fairly large, ca. 0,3 mm, full of yolk.

The two specimens were found together with, and under the same conditions as *Amphipholis squamata*, and may well be supposed to be of not rare occurrence in such localities as those, where the latter species is found.

This species appears to be nearly related to the Australian *Amphiura constricta* Lym., from which it differs, however, besides

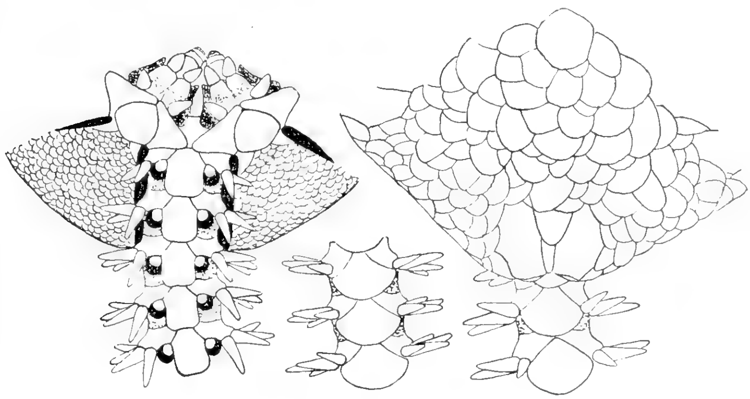


Fig. 25. *Amphiura annulifera* Mrtsn. a. Part of oral side, b. of dorsal side; c. three armjoints from middle part of arm, dorsal side. $^{22}/_{1}$.

in some minor details (tentacle scales larger, more elongate, dorsal armplates somewhat shorter and broader, radial shields somewhat more elongate in *A. constricta*) in the anatomical relations of the genital organs, *A. constricta* having both ovary and testis on the same, interradial side of the genital slit.

Also to the antarctic *Amphiura algida* Koehler the present species shows a considerable resemblance, but still differs so much from it in various minor points that their specific identity is out of question. It is unknown whether *A. algida* is also viviparous.

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[1]) Th. Mortensen. On hermaphroditism in viviparous Ophiurids. Acta Zoologica. I. 1920.

30. *Amphiura pusilla* Farquhar.

Figs. 26.1—2.

Amphiura pusilla. H. Farquhar. 1897. A contribution to the history of N. Z. Echinoderms. Journ. Linn. Soc. Zool. XXVI. p. 191. Pl. XIV. figs. 1—3.

— — H. L. Clark. 1915. Catalogue Rec. Ophiurans. p. 235.

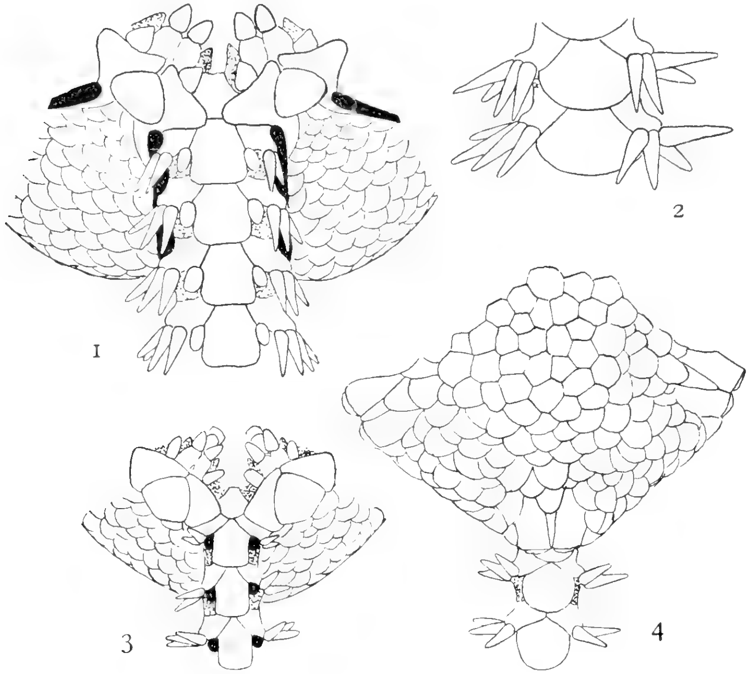


Fig. 26. 1—2. *Amphiura pusilla* Farquhar. 30/1. 3—4. *Amphiura* sp. 26/1. 1. and 3. part of oral side; 2. and 4. part of dorsal side.

Island Bay, Wellington. 22/I.1915. 1 specimen.
Wellington Harbour, 5—10 fms. Hard bottom. 16/II.1915. 1 specimen.
Otago Harbour. VII.1923. 1 specimen (received from Professor Benham).

All three specimens are in a poor condition. Still they are sufficient to enable me to give a little additional information about this species. They are all small, the largest scarcely 3 mm diameter of disk. Arms all broken.

The figure of the ventral side of this species given by Farquhar is not quite satisfactory, the shape of the mouthshields as well as of the ventral plates not being very well represented. In my three specimens I find these plates to have the shape given in Fig. 26.1. Also the mouth parts are not quite satisfactorily represented in the said figure in Farquhar's paper. Farquhar's statement that the first tentacle scale is long and spiniform probably refers to the inner mouth papilla; the tentacle scales proper are all rounded, leaf-like, as shown also in Farquhar's figure.

I can give no information as regards the propagation of this species. It would especially be very interesting to know whether it is viviparous or not — but the solution of this question requires much better material than that at present available. — The species was hitherto found only at Wellington. As pointed out by Farquhar this species is very closely related to *Amph. constricta* Lyman. In fact, I am rather inclined to think that they are really the same species. But until we know whether *A. pusilla* is also viviparous and hermaphroditic like *A. constricta* we must keep them as separate species.

31. *Amphiura* sp.

Figs. 26.3—4.

A single small specimen of an *Amphiura*, dredged in a depth of 50 fathoms, 10 M. N.W. of Cape Maria van Diemen, on hard bottom (5/I.1915) very probably represents a hitherto unknown species. It is, however, too young for stating this definitely; but it is so characteristic, especially through the arrangement of the scales on the dorsal side of the disk that it will probably be perfectly recognizable, and I have therefore thought it worth while describing and figuring it.

Diameter of disk 2 mm, length of arms ca. 10 mm. The scales in the middle of the aboral side of the disk uniform, polygonal, arranged like a regular mosaic. Towards the edge of the disk the scales gradually become overlapping. No central or other primary plates to be distinguished. Radial shields small, $^1/_3$ the length of the disk radius, separated, divergent. The oral side of the disk covered with fairly large, overlapping scales. Genital slits not yet distinct. The oral shields are triangular with rounded sides; adoral plates meeting within. Outer oral papilla fairly broad and long, apparently not spiniform. The ventral plates are elongate, with nearly straight sides, outer edge rounded. Tentacle scales not yet developed, only at one pore a single triangular scale is found, which would seem to indicate that this species belongs to the group of *Amphiura*'s with one tentacle scale only. The proximal dorsal plates somewhat elongate, farther out they are shorter, more rounded, separated from one another. Three short, cylindric, subequal arm-spines.

The characteristic scaling of the dorsal side of the disk recalls *Amphioplus basilicus*; also the ventral plates and the oral parts bear a considerable resemblance to that species, as seen on a comparison with fig. 28. The lacking of the tentacle scales evidently is due to the specimen being too young for yet having them developed and, therefore, might not be sufficient reason for not simply referring this specimen to *Amphioplus basilicus*. But the single outer oral papilla is so important a character, scarcely to be accounted for by the young age of the specimen alone, that it is out of question to identify the specimen with that species. (The youngest specimen of *A. basilicus* in hand, scarcely 2 mm diameter of disk, already has the mouth papillæ typically developed). Also the arms are very much shorter in *A. basilicus* of a corresponding size, only ca. 3 mm against ca. 10 mm in the present specimen. Upon the whole, it is out of question that these two forms could be more nearly related, in spite of the conspicuous resemblances pointed out above.

32. *Amphiocnida pilosa* (Lyman).

Figs. 27.1—10.

Ophiocnida pilosa. Lyman. 1882. Challenger Ophiuroidea, p. 153. Pl. XIX.7—9.

— — H. L. Clark. 1909. Sci. Res. Trawling Exped. "Thetis" Mem. Austral. Mus. IV. p. 541.

Amphiocnida — A. E. Verrill. 1899. Revision of certain families and genera of West Indian Ophiurans. Tr. Conn. Acad. X. p. 318.

— — H. L. Clark. 1915. Cat. Recent Ophiurans, p. 237.

Colville Channel; 35 fms; sandy mud. 21/XII.14. 8 specimens.

Several minor points of difference existing between the specimens from New Zealand and the type of this species (from Bass Strait) as described and figured by Lyman (Op. cit.), tend to make the referring of the New Zealand form to this species somewhat uncertain. However, the very great variability exhibited by the specimens according to size, and the fact that they cannot be distinguished with certainty from specimens from the N. S. Wales

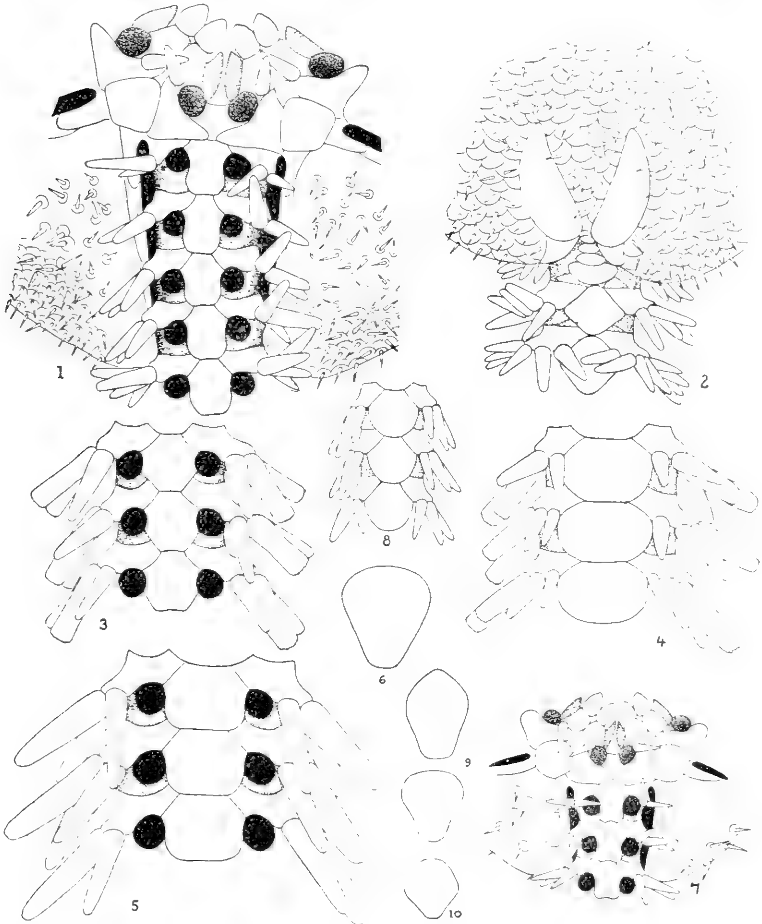


Fig. 27. *Amphiocnida pilosa* Lyman. — 1. Part of oral side: 2. of dorsal side; 3 and 4. three armjoints from middle of arm, showing shape of ventral and dorsal plates. Same specimen as 1—2 (7 mm). 5. three armjoints of a larger specimen (11 mm) showing different shape of ventral plates; 6. mouthshield of same specimen; 7. part of oral side of a small specimen (4 mm); 8. three armjoints from same specimen, dorsal side; 9—10. different shapes of mouthshield from specimens from off the N. S. Wales coast. All figures $^{13}/_{1}$.

Seas would seem to make it unjustified to maintain the New Zealand form as a separate species. Whether the N. S. Wales specimens really belong to the species described from the Bass Strait is another question; but here, again, I am inclined to think so, in spite of the differences which can be pointed out. The fact that H. L. Clark, who had a cotype of Lyman's *Ophiocnida pilosa* for comparison with his specimens, does not hesitate in declaring them identical, makes me the more confident that both the New Zealand and the N. S. Wales form really belong to this species.

As appears from the figures given here, the specimens differ so considerably according to age that, if they had not been taken all together in the same haul, one would hardly think of regarding them as belonging to one and the same species. It is mainly the shape of the ventral plates which differs so conspicuously. In a specimen of 4 mm diameter of disk (Fig. 27.7) they are narrow, elongate, distinctly longer than broad, the basal part being somewhat broader than the outer part. In a specimen of 7 mm diameter of disk they have mainly the same character in the proximal part of the arm, but farther out they get a very characteristic polygonal shape, narrowing in their outer part (Fig. 27.1, 3); finally in the largest specimen, 11 mm diameter of disk, they are almost regularly rectangular, distinctly broader than long (Fig. 27.5). The same transformation of the ventral plates according to age is to be observed in the N. S. Wales specimens. The difference in the shape of the dorsal plates in smaller and larger specimens, as shown by figs. 27.8 and 4, though no less striking, is not so surprising. It may be pointed out that generally the first complete dorsal plate is rhomboidal.

The armspines are in the larger specimens 7—9 in the proximal part of the arm; in the smaller specimens there are only five, as in the type. They are more or less distinctly flattened, sometimes slightly widened and dentate at the point (Fig. 27.3—4), but this is no constant feature. Generally the lowermost one is the longest, and sometimes also the upper one or two are somewhat longer than the middle ones; but, again, this is not constantly so. The radial shields are generally contiguous in the outer part, but sometimes they are wholly separate (Fig. 27.2). The mouth shields are very variable in shape, as is also the case in the specimens from off the N. S. Wales coast (Fig. 27.1, 6, 9—10); the form of mouth shields seen in Fig. 27.1 I have, however, not observed in any of the specimens from off the N. S. Wales coast.

It is rather perplexing to find in this species so great a variation in the shape of the plates which otherwise generally afford distinguishing characters of the highest value. But we have got to agree that there is such great variation here — otherwise we should have to designate each specimen as a separate species.

The scaling of the ventral surface of the disk is, upon the whole, more sparse in the New Zealand than in the Australian form; also the spines on the disk are generally not so coarse in the former as in the latter form — but it appears to be not constant enough to justify maintaining the New Zealand form as a distinct variety.

Evidently the arms are very long. In the largest of the New Zealand specimens the longest arm is ca. 7 times the diameter of the disk, and quite a considerable length has been lost. In one of the Australian specimens the arms must have been a good deal more than 15 times the diameter of the disk.

The eggs are not very numerous and fairly large, 0,25 mm. This indicates that this species has probably not a typical Ophiopluteus-larva.

On the largest of the New Zealand specimens a number of specimens of a small *Loxosoma* are found attached to various places on the ventral side of the disk and arms. Also in one of the Australian specimens (37^0 05' S. 150^0 15' E. 30—50 fms) the same *Loxosoma* is found.

33. *Amphioplus basilicus* (Koehler).

Figs. 28. a—c.

Amphiura basilica. Koehler. 1907. Revision de la Collection des Ophiures du Mus. d'hist. nat. Paris. Bull. sci Fr. & Belgique XLI, p. 307. Pl. XI. 17—18.

Amphioplus basilicus. H. Lym. Clark. 1915. Catalogue Rec. Oph. p. 257.

Carnley Harbour, Auckland Isl. 29/XI.14. 4 specimens.

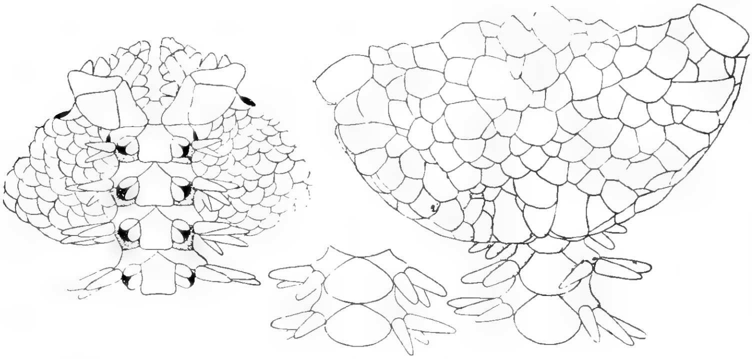
Masked Isl., Carnley Harbour; Auckland Isl. 3/XII.14. 6 specimens.

Perseverance Harbour, Campbell Isl.; under stones, at low water. 9/XII.14. 18 specimens.

These specimens agree so perfectly with the description given by Koehler of the species *Amphiura basilica*, founded on three specimens from off East Cape, New Zealand (Filhol), that the identification therewith is beyond doubt.

A few remarks should be added to the description given by Koehler and also a pair of figures may not be superfluous, those given by Koehler being slightly diagrammatic.

The largest of the specimens in hand measures 4 mm diameter of disk, the arms being scarcely three times so long as the diameter of disk. As stated by Koehler, the primary plates are not distinct. It is a noteworthy fact that also in the very young specimens they are indistinct. There are some larger plates in the centre, it is true, but they are not regularly arranged in the shape



a. c. b.

Fig. 28. *Amphioplus basilicus* Koehler. — a. Part of oral side; b. of dorsal side; c. two armjoints from middle of arm, dorsal side. $^{13}/_{1}$.

of a rosette consisting of one central plate and five radially placed plates, as it is usually seen in very young Ophiurids.

A very interesting feature is offered by the genital slits, which are very short, not reaching beyond the first armjoint. This is in contradiction with Koehler's figure, in which they are represented as large slits, reaching to the edge of the disk. In the text Koehler only says that the genital slits are narrow, without giving any statement about their length. In view of the otherwise perfect agreement of my specimens with Koehler's description of this species I could not but suppose the said figure to be erroneous in this regard and therefore asked Professor L. Joubin at the Muséum d'hist. naturelle, Paris, to lend me one of Koehler's specimens for reexamination, which he very kindly did. My suggestion proved to be perfectly justified; the genital slits were found to be quite narrow and small as in my own specimens.

Thinking that perhaps also the closely related *Amphioplus textilis* Koehler from the Magellan region might have similar short genital slits, in spite of the figure (Koehler. Op. cit. Pl. XII, fig. 35) representing them as reaching to the edge of the disk, I asked Prof. Joubin to lend me also a specimen of this species for examination. My suggestion proved to be correct, the genital slits of this species also are quite short, as in *A. basilicus*, not reaching beyond the first armjoint. — This interesting feature might perhaps justify establishing a separate genus for these two species. I shall, however, for the present, not take up a definite position as to this point.

There is only one pair of genital organs in each interradial space; the ovaries are fairly large, containing a number of reddish 0,3 mm large eggs This considerable size of the eggs shows almost with certainty that the development is direct, not through a typical Ophiopluteus-larva.

Some very young specimens, with only three armjoints developed, I have no doubt in referring to this species with which they agree especially in the noteworthy feature that there is no regular rosette of primary disk plates. They were found to gether with the adult specimens under stones, Campbell Island, 9/XII.14.

The species appears to be rather common in the littoral region at the subantarctic islands and evidently will prove to occur also at the New Zealand shores. (There is no information about the depth in which Filhol's specimens were taken.)

34. *Ophionephthys stewartensis* n. sp.

Figs. 29.1—3.

Halfmoon Bay, Stewart Island; 5—7 fms; sand. 19/XI.14. 1 specimen.

Although the single specimen in hand is in a very poor state of preservation, having lost the disk, I do not hesitate in describing it as a new species, the oral and arm structures affording sufficient characters for distinguishing it not only from all other Amphiurids of the New Zealand region, but upon the whole from any other species of Amphiurids known till now.

There is a series of three papillae to each side of the mouth-edge, and a very small one in the outer corner, close to the first ventral plate. The oral shields are elongate, rounded, with slightly reentering sides and a straight outer edge. Adoral shields almost meeting within. The ventral plates are very characteristic, elongate, a little broader within than without; the proximal one with a concave inner edge. Farther out they are almost octogonal, with a slight concavity in the outer edge. The dorsal plates are transverse oval, about twice as broad as long. Two very small tentacle scales (they are not distinct at all the pores, but this, evidently, is due to the bad state of preservation). Five or four simple spines, about as long as a joint, the middle ones slightly shorter. Whether they are naturally appressed, as in Fig. 29.3, may well be doubted. — The fact that the disk is lost, indicates that it is naked as in related species. The arms are all broken, but convey the impression of being long and slender.

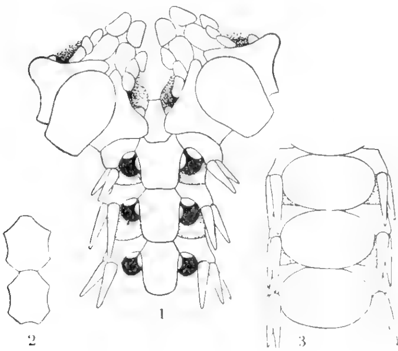


Fig. 29. *Ophionephthys stewartensis* Mrtsn. 1. Part of mouth and proximal armjoints; 2. two ventral plates from middle of arm; 3. three armjoints from middle of arm, dorsal side. 13/1.

This species agrees so perfectly in its oral structure and in the shape of the ventral plates with *Ophionephthys limicola*, that I do not hesitate in referring it to the same genus.

Quite recently H. Lyman Clark[1]) has reestablished the genus *Ophionephthys*, which was regarded by Matsumoto as a synonym only of *Amphiura*. Clark comprises as belonging to *Ophionephthys* the group of species of Amphiurids with nearly naked disk, calcareous scales occurring only around the radial shields and rarely near the disk margin interradially, with numerous arm-spines, 5-10 on basal joints and with oral papillae as in *Amphiura*. In regard to the oral papillæ, however, the type-species, *O. limicola* Ltk. (from the West Indies) does not agree with the other species, and Clark, in fact, is in doubt, whether it was not better to restrict the genus so as to include the latter species alone; since otherwise the oral papillæ afford the main distinguishing characters of the genera

[1]) H. Lyman Clark. Brittle-Stars, new and old. Bull. Mus. Comp. Zool. LXII. 1918, p. 278.

within the *Amphiuridae*, it certainly does seem very inappropriate to unite, in this genus alone, species which, after the character of their oral structures, should otherwise be referred partly to *Amphioplus*, partly to *Amphiura* s. str.

The discovery of this new species, so closely agreeing with the type of the genus *Ophionephthys* in the important characters of the mouth parts, decidedly lends support to a restriction of the genus *Ophionephthys* to those species agreeing with the type, *O. limicola*, in regard to the oral characters. Besides the new species here described I would refer to this genus also the species described by H. Lym. Clark (Catalogue Rec. Oph. p. 253) under the name of *Amphioplus cyrtacanthus* (from the Philippines). The genus would thus also get a less remarkable geographical distribution. The other species referred by Clark to *Ophionephthys* I cannot, accordingly, regard as really belonging to that genus.

35. *Amphipholis squamata* (Delle Chiaje).

Amphiura parva. Hutton. 1878. Notes on some New Zealand Echinodermata, with descr. of new species. Trans. N.Z. Inst. IX. p 305.

— *elegans*. Farquhar. 1897. Contr. to the history of New Zealand Echinoderms. Journ. Linn. Soc. Zool. XXVI. p. 191.

— — Farquhar. 1898. Echinoderm Fauna of New Zealand. Proc. Linn. Soc. N.S W. p. 308.

— — Farquhar. 1907. Notes on N. Z. Echinoderms, with descr. of new species. Tr. N. Z. Inst. XXXIX. p. 125.

— *squamata*. H. L. Clark. 1909. Sci. Res. Trawling Exp. H. M. C. S. "Thetis". Mem. Austral. Mus. IV. p. 541.

— — Benham. 1909. The Subantarctic Islands of New Zealand. Echinoderms. p 303.

— — Benham. 1911. Stellerids and Echinids from the Kermadec Isl. Tr. N. Z. Inst. XLIII. p. 152.

— — H. L. Clark 1915. Catalogue Rec. Oph. p. 242.

Non: *Amphiura parva*. H. L. Clark. 1915. Catalogue Rec. Oph. p 230. Pl. 5, figs. 10—11 (=*Amph. rosea* Farquh.).

Wellington Harbour, 5—10 fms. 16/II.15. 3 specimens.
Island Bay, Wellington; under stones, at low water. 22/I.15. 12 specimens.
Mahia Peninsula; under stones, at low water. 18/XII.14. 3 specimens.
Ponui Isl., Auckland; under stones, at low water. 24/XII.14. 2 specimens.
North Channel, Kawaii Isl., Hauraki Gulf. 10 fms. 29/XII.14. 1 specimen.

North Cape, New Zealand; under stones, at low water., 3/I.15. 4 specimens.

Plimmerton; 15/I.15. 3 specimens.

Halfmoon Bay, Stewart Island; 5—7 fms; sand bottom. 19/XI.14. 2 specimens.

Masked Island, Carnley Harbour, Auckland Isl. 3/XII.14. 12 specimens.

Carnley Harbour, Auckland Isl.; 45 fms., sand, mud. 6/XII.14. 2 specimens.

Further I have received from Mr. W. R. B. Oliver, 2 specimens from Cook Strait, 120 fms, collected by Mr. Hazelwood, 13/VIII.1920.

Like the authors who have previously dealt with the New Zealand form of *Amphipholis squamata* I do not find it distinguishable from typical European specimens. It is a very extraordinary fact that this small, viviparous Ophiurid should as the only one have a cosmopolitan distribution. A more profound comparative study of the whole question, based on rich material from all parts of the world, would be very desirable, and might perhaps lead to the distinguishing of local forms, or subspecies. For the present we must regard all as one species.

It is very interesting to note that one of the New Zealand specimens (Plimmerton) is infested with a specimen of the parasitic Copepod *Cancerilla;* also on one of the specimens from Carnley Harbour, 45 fms, this parasite was found. Mr. K. Stephensen, who has examined these specimens, informs me that they are not identical with *Cancerilla tubulata* Dalyell, the species infesting *Amphipholis squamata* in the European seas. This is most interesting, showing that the parasite is not so widely distributed as is its host, but replaced in the New Zealand seas by a related, but quite distinct species.

Through the present studies the group of the Amphiurids has been shown to be very richly represented in New Zealand seas, no less than 16 (17) species having now been found there (not counting the *Ophiactis* species, as this genus, in my opinion, does not really belong to the family Amphiuridæ, but rather forms, together with *Ophiopholis*, *Ophiopus* and a few other forms, a separate family, Ophiactidæ). As it is, upon the whole, no easy matter to identify Amphiurids, it may be of some practical value to give here the following key to these species.

Key to the New Zealand species of Amphiuridae.

1. Oral papillæ forming a continuous series along each side of jaw; more than one outer oral papilla .... 13.
   Only a single outer oral papillæ, widely separated from the inner, infradental papilla; in the interval between these papillæ there is one situated at a lower level in the mouth, belonging to the first tentacle .... 2.
2. Two tentacle scales, at least in the proximal part of the arm. No spines on the disk. .... 3.
   Only one tentacle scale; no spines on the disk. .... 7.
   No tentacle scales; spines on the disk.
   Amphiocnida pilosa (Lym.)
3. Two tentacle scales in the whole arm length .... 4.
   Only a few of the proximal joints with two tentacle scales, farther out only one; arms very long; 7—6 armspines.
   Amphiura aster Farquhar.
4. Oral side of disk naked; 4 armspines.
   Amphiura norae Benham.
   Oral side of disk completely covered with scales. ..... 5.
5. Spines (6—7) distinctly flattened.
   Amphiura amokuræ Mrtsn.
   Spines not flattened. .... 6.
6. Oral shields spearhead-shaped, distinctly longer than wide; radial shields very small. *Amphiura eugeniæ* Ljungm. var. *latisquama* Mrtsn.
   Oral shields rounded, about as wide as long; radial shields rather long. *Amphiura rosea* Farquhar.
7. Oral side of disk naked. *Amphiuræ hinemoæ* Mrtsn.
   Oral side of disk completely covered with scales. ..... 8.
8. Lowermost spine on the middle part of the arm much elongated and slightly curved, downwards directed ..... 9.
   Lowermost spine not much elongated. .... 10.
9. Viviparous, hermaphroditic; armspines rather coarse.
   Amphiura magellanica Ljungm.
   Not viviparous; sexes separate; armspines rather delicate.
   Amphiura spinipes Mrtsn.
10. Tentacle scale small, triangular..................... 11.
    Tentacle scale large, leafshaped.................... 12.

11. Viviparous, hermaphroditic; oral shields triangular; 4 armspines. *Amphiura annulifera* Mrtsn.
Not viviparous, sexes separate; oral shields spearhead-shaped; 6—5 armspines. *Amphiura alba* Mrtsn.
12. Oral shields triangular; ventral plates wider than long, corners not rounded; 5—4 armspines.
Amphiura præfecta Koehler.
Oral shields roundly heart-shaped; ventral plates longer than wide, with rounded corners; 6 armspines.
Amphiura pusilla Farquhar.
13. Outer oral papilla very broad; radial shields contiguous; viviparous, hermaphroditic.
Amphipholis squamata (D. Ch.).
Outer oral papilla not very broad; radial shields not contiguous; not viviparous, sexes separate.[1] .... 14.
14. Four lateral oral papillæ; oral shields short, triangular; disk on both sides completely covered with scales.
Amphioplus basilicus Koehler.
Three lateral oral papillæ; oral shields elongate, with straight outer edge. Disk (probably) nearly naked.
Ophionephthys stewartensis Mrtsn.

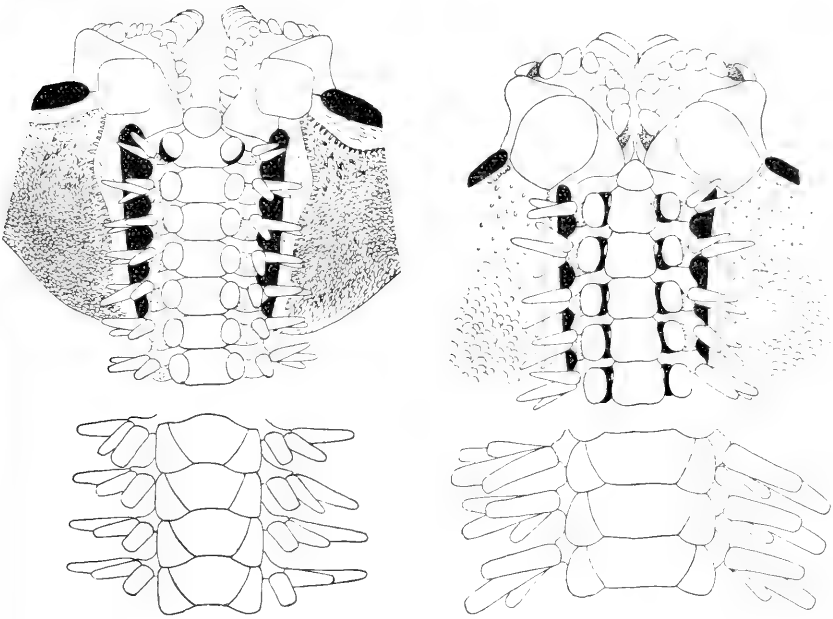
36. *Ophionereis fasciata* Hutton.

Fig. 30.

Ophionereis fasciata. Hutton. 1872. Catalogue of the Echinod. of New Zealand. p. 2.
— — Hutton. 1872. Descr. of some new Starfishes from N. Zealand. P. Z. S. p. 811.
— *Schayeri.* Farquhar. 1895. Notes on New Zealand Echinoderms. Trans. N. Z. Inst. XXVII. p. 197.
— — Farquhar. 1898. On the Echinoderm Fauna of N. Zealand. P. L. S. N. S. W. p. 307.
— — Farquhar. 1907. Notes on N. Z. Echinoderms; with descr. of new species. Trans. N. Z. Inst. XXXIX. p. 124.
— — Benham. 1909. Sci. Res. N. Z. G. Trawling Exp. Echinodermata. Rec. Canterbury Mus. I_2. p. 23.
— — Benham. 1911. Stellerids & Echinids from the Kermadec Isl. Trans. N. Z. Inst. XLIII. p. 152
Non: *Ophiolepis Schayeri.* Müller & Troschel. 1844. Beschreibung neuer Asteriden. Arch. f. Naturgesch. p. 182.

[1]) Genital organs and radial shields of *Ophionephthys stewartensis* unknown.

Several specimeus were taken under stones, at low water, at the following localities: Mahia Peninsula; Slipper Island; Bay of Islands; North Cape; Plimmerton. Further in Queen Charlotte Sound, 3—10 fms, and in Paterson Inlet, Stewart Isl., 5—15 fms. The latter of these localities alone is of interest, the species not having hitherto been recorded from South of Dunedin.



30. 31.

Fig. 30. *Ophionereis fasciata* Hutton. Part of oral side and four armjoints from middle of arm, dorsal side. 8/1. — Fig. 31. *Ophionereis Schayeri* M. & Tr. Part of oral side and three armjoints from middle of arm, dorsal side. 5,5/1.

Ever since Farquhar in 1895 declared the New Zealand species *Ophionereis fasciata* Hutton to be identical with the Australian *Ophionereis Schayeri* (Müller & Troschel) this identity has been unanimously accepted by the authors, who have dealt with these species, doubtless without having directly examined the question themselves. It is probably due to the curious fact of these forms never having been figured[1]) that nobody has become suspicious as to their alleged identity.

As seen on a comparison of the figures given here the two

[1]) Only H. L. Clark (Catalogue of Recent Ophiurans, 1915, Pl. 13.1—2) gives a pair of photographic figures of the true *O. Schayeri* (from Port Jackson); they do, however, not show any of the structural details by which this species is distinguished from *O. fasciata*.

forms are very easily distinguished, mainly through the quite different shape of the oral shields, which are distinctly rhomboidal equally long and wide, in *O. fasciata*, whilst in *O. Schayeri* they are elongate, egg-shaped, with the outer edge truncate, and distinctly longer than broad. This difference is quite constant, and equally distinct in younger and adult specimens. Further the dorsal plates are distinctly broader in *Schayeri* than in *fasciata*, the distal edge being twice the width of the supplementary plates in the Australian, only equalling the width of the supplementary plates in the New Zealand species. Also another feature appears to represent a valuable distinguishing character. In the New Zealand form the edge of the genital slits, especially at the inner end, bends outwards and looks like a sort of web, being more conspicuous on account of its white colour. There is a distinct row of small papillæ along the edge; sometimes the papillæ continue so far dorsally along the base of the arm as to get the appearance of an armcomb. The "webs" from the two genital slits in each interradial space almost meet in the midline outside the oral shield. In *O. Schayeri* and other species of this genus, this "web" is much less distinct and a wide space separates the two slits outside the oral shield. The shape of the ventral plates would appear from the two figures to differ rather considerably in the two forms; I do not, however, find the difference sufficiently constant for forming a reliable distinguishing character. The same holds good for the small inner tentacle scale seen in the figure of *O. Schayeri.* It is true, I have never observed this small scale in the New Zealand species, but, on the other hand, I have not found it constantly in the Australian form — perhaps its lacking in some specimens is due to bad preservation; but for the present, I do not venture to lay any stress on this feature as a distinguishing character. The scales of the interradia on the ventral side are somewhat larger in the Australian than in the New Zealand form, and also the proximal part of the interradia is more naked in the former than in the latter form; small spines are found on the proximal part of the interradia in both forms.

The differences here pointed out leave no doubt that the New Zealand form is a distinct species, not identical with the Australian form. The type specimen of Müller and Troschel's *Ophiolepis*

Schayeri being from Tasmania it could not beforehand be stated which of the two species must keep the name *Ophionereis Schayeri*. Through the kindness of the late Professor R. Hartmeyer I have had the opportunity of examining the type specimen, which is in the Berlin Museum; although it is in a poor condition there is no doubt that it belongs to the Australian form, and accordingly this latter must keep the name *Ophionereis Schayeri* (Müller & Troschel). For the New Zealand species the name *Ophionereis fasciata* Hutton must be revived.

This result, that the New Zealand form is specifically distinct from the Australian form, considerably restricts the geographical distribution of both. *O. Schayeri* is known only from Australia and Tasmania. Regarding *O. fasciata* the question remains whether it is really identical with the species of *Ophionereis* occurring at Juan Fernandez, as it is maintained by Ludwig in his report on "Die Ophiuren der Sammlung Plate" (Zool. Jahrb. Suppl. IV. 1898, p. 765). This question I am also able to solve through the kindness of the late Prof. Hartmeyer, who sent me some material of the Juan Fernandez form. I must agree that it is very difficult to find characters by which to distinguish between the Juan Fernandez and the New Zealand form. Nevertheless these forms are certainly not identical. This is proved by the fact that the eggs of the former are twice the size of those of the New Zealand species (0,2 mm against 0,1 mm); this evidently means that the development is quite different in these two forms.[1] Probably the Juan Fernandez-form is also a separate species (it does not appear to me to be identical with *O. albomaculata* E. A. Smith from the Galapagos Islands). But this question does not concern us here; for the present it must suffice to have shown that the New Zealand species is not identical either with the Australian or the Juan Fernandez form and is known only from the New Zealand region.

In 1916 Professor H. B. Kirk published in the "Transactions of the New Zealand Institute", Vol. XLVIII, a short preliminary notice "On the much-abbreviated development of a Sand-star (Ophionereis Schayeri?)." [2] His reason for referring the eggs and em-

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[1] This also holds good for *Ophionereis Schayeri*, the eggs of which are likewise twice the size of those of *O. fasciata*.

[2] p. 383—84. Pls. XXVII—XXVIII.

bryos, which he found on the underside of stones in the Bay of Islands, Wellington, to *Ophionereis Schayeri* (viz. *O. fasciata*) are, that the terminal plate of the young Ophiurids resembles that of the said species, and that this species is very common in the neighbourhood.

Grave objections may be raised to the referring of these eggs and embryos to *Ophionereis fasciata*. Above all: the eggs of this species are very small, ca. 0,1 mm, while the eggs observed by Kirk were 0,5 mm. This small size of the eggs in *Ophionereis fasciata* almost certainly indicates that it has typical pelagic larvæ, not direct development. Further Kirk states that the tubefeet of the young Ophiurids were provided with a number of bristle-like processes; but the tubefeet of *O. fasciata* are perfectly smooth. It is, of course, possible that in the quite young newly metamorphosed specimens the tubefeet may be provided with such bristle-like processes — but it is not very probable. The terminal plate of *O. fasciata* is by no means so characteristic as to afford any proof of the identity of the embryos with this species. Finally there are other Ophiurids occurring under the stones in the same way and the same places as *O. fasciata* viz. e. g. *Pectinura cylindrica, Ophioplocus Huttoni, Ophiopteris antipodum, Ophiozonoida picta, Ophiocormus notabilis.* Any one of these species is more likely to come into consideration in the question about the parency of the directly developing embryos described by Kirk, in so far as nothing is known as yet to prevent their coming into consideration.

37. *Ophiozonoida picta* H. L. Clark.

Figs. 32—33.

Ophiozonoida picta. H. Lyman Clark. 1915. Catalogue Rec. Ophiurans. p. 340. Pl. 18, Figs. 3—4.

Pectinura sp. F. Jeffr. Bell. 1917. British Antarctic ("Terra Nova") Exped. 1910. Zoology. Vol IV. 1. Echinoderma, p. 6.

Off White Island (37° 40' S. 177° 1' E.), 55 fms. Sandy mud. 4 specimens.

Little Barrier Isl.; 30 fms. Shells. 1 specimen.

2 miles E. of North Cape, 55 fms. Hard bottom. 1 specimen.

10 miles N.W. of Cape Maria v. Diemen, 50 fms. Hard bottom. Some small specimens.

Off Three Kings Isl., 65 fms. Hard bottom. 5 specimens.

This species was hitherto known only from the coast at Wellington, where Farquhar collected some specimens under stones, near low-water mark. Although I have been collecting at the same place and also in other places of the New Zealand coast in the littoral region, I have not come across this species there. — It is interesting that it has now been proved to be rather widely distributed in the seas off the North Island of New Zealand, in depths until at least 55 fathoms.

The specimens on which Clark had to base his description being quite young, it will be necessary to give some additional

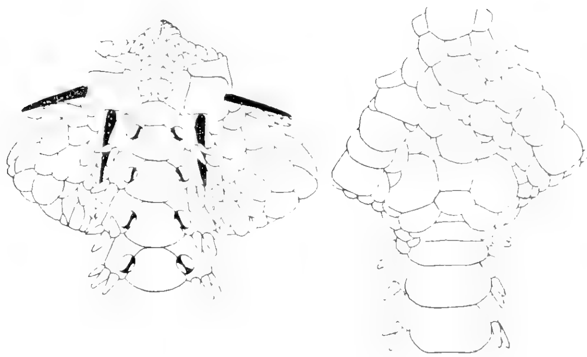


Fig. 32. *Ophiozonoida picta* H. L. Clark. Part of oral and dorsal side. $^6/_1$.

remarks on the characters of this species as shown by the adult specimens (Fig. 32).

The larger of the specimens before me measure 10 mm diameter of disk, the arms, which are rather thick and stiff being ca. 30 mm long. Disk covered with somewhat thickened scales, among which the primary plates remain more or less distinct, according to the varying size of the smaller secondary plates surrounding them. Generally there is a median series of 3—4 large plates in each interradius, but the series is sometimes indistinct, on account of smaller plates intruding among the larger ones. The small ovoid radial shields are widely separated by a series of three squarish plates, almost as large as the interradial ones. Adjoining the distal one of this series is a slightly larger plate outside each radial shield, these three plates together forming a conspicuous band across the base of the arm. The dorsal plates are about twice as broad as long, the outer edge arched with a slight concavity in the middle, made more conspicuous through the coloration, the notch itself being dark coloured, and the corners being white. They are broadly in contact almost to the end of the arm. The characters of the ventral side in the adult specimens do not differ essentially from those found in the young specimens; I must merely emphasize that the oral shields are not pentagonal, but have the outer sides

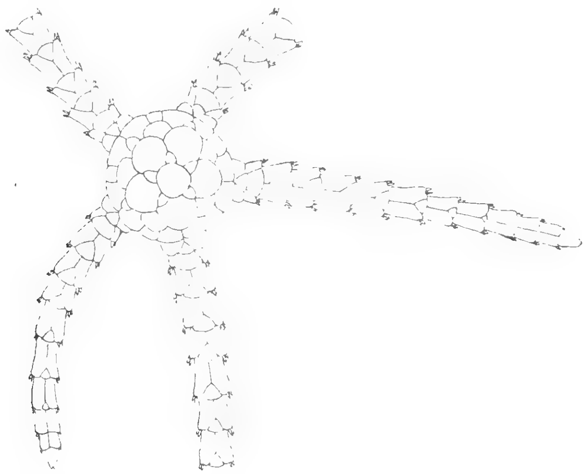


Fig. 33. *Ophiozonoida picta* H. L. Clark. Young specimen. 12/1.

distinctly concave, the outer part thus being distinctly narrower than the inner part; they may be said to be almost spearshaped. The madreporite alone retains the pentagonal shape. Also in younger specimens I find the oral shields more or less narrowed in their outer part, not so distinctly pentagonal as they are in the specimen figured by Clark (Op. cit. Pl. 18, fig. 4). The ventral plates are generally more or less distinctly brownish and thus form a continuous brownish median band, lined on both sides with white, viz. the side plates. The outer edge of the ventral plates sometimes appears to have two distinct small whitish spots; it is, however, the inner, adradial point of the sideplates, which is thus coloured. The tentacle scales are single, as stated by Clark; but in the larger specimens there may be a very distinct elevated rim along the adradial side of the pore, which may convey the impression that there are two tentacle scales.

The genital slits are narrow, not reaching beyond the second armjoint; an indication of papillæ along their edges. The teeth are strong, broad, squarish, six in each column. The mouth-structure upon the whole rather robust, recalling that of *Ophiopholis*.

In the larger specimens it is not rare to find some of the dorsal armplates divided in two lateral halves through an oblique median line. — In a very young specimen, only 1,5 mm diameter of disk (Fig. 33), the primary plates are very prominent, the secondary plates have just made their appearance, viz. 5 interradial ones, adjoining the corners of the central plate, and 5 radial ones (or rather 3, the fourth and fifth having not yet appeared) beginning to separate the radial shields, which are still almost completely contiguous. The plate outside each radial shield has already appeared and is, on account of its white colour, very conspicuous. They very much give the impression of representing the side armplates corresponding to the inner dorsal plate. This, however, they do not, the side plates proper of this joint lying wholly on the oral side. It is a noteworthy fact that the arms of the young specimens may be of unequal length (Fig. 33). The coloration of the disk plates in the young specimen — brown, with the distal part white — makes them very conspicuous.

The Ophiurid which Bell (Op. cit.) mentions as *Pectinura* sp. I have had the opportunity of examining in the British Museum. There is no doubt that it belongs to the present species.

Also in this species the eggs are rather large and yolky, which fact tends to indicate that it has, probably, direct development, without a pelagic larva of the typical Ophiopluteus-form.

38. *Ophioplocus Huttoni* Farquhar.

Fig. 34.

Ophioplocus Huttoni. H. Farquhar. 1899. Description of a new Ophiuran. Proc. Linn. Soc. N. S. Wales. p. 187. Pl. XV.
— — H. L. Clark. 1915. Catalogue Recent Ophiurans, p. 344.

Slipper Island; under stones, at low water. 1 specimen.
North Cape; under stones, at low water. 1 specimen.

To the careful description of this species given by Farquhar I shall only add that in the larger specimen before me (8 mm diameter of disk) the shape of the ventral plates is somewhat different from that shown in Farquhar's figure, these plates being more broadly in contact than there (Fig. 34). The difference is simply due to age. In the second specimen before me (5 mm diameter of disk) the ventral plates have exactly the shape given in Farquhar's figure (from a specimen 6 mm diameter of disk.)

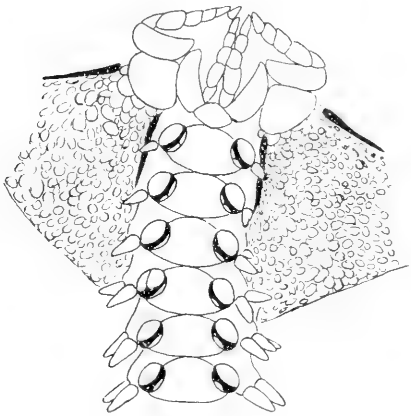


Fig. 34. *Ophioplocus Huttoni* Farquhar. Part of oral side. 12/1.

It may also be pointed out that the genital slits are very short, reaching from close by the oral shield to the end of the second armjoint; in the smaller specimen they are still shorter, not reaching beyond the first armjoint.

The species was known hitherto only from the coast off Wellington. It has now been shown to occur along the East coast of the North Island of New Zealand up to the northern end, and most probably it will thus prove to occur along the whole coast of the North Island.

From the other species of *Ophioplocus* hitherto described it is easily distinguished through its single tentacle papilla (the semicircular rim along the outer side of the tentacle pore is found also in the other species) and through the armspines being only two.

39. *Pectinura cylindrica* (Hutton).

Figs. 35.1—2.

Ophiura cylindrica. Hutton. 1872. Catalogue Ech. New Zealand. p. 3. Descr. new Starfish from N. Zealand. P. Z. S. p. 811.

Ophiopeza — Farquhar. 1895. Notes on some New Zealand Echinoderms. Trans. N. Z. Inst. XXVII. p. 198.

— — Farquhar. 1897. A Contribution to the History of N. Z. Echinoderms. Journ. Linn. Soc. Zool. XXVI. p. 190. Pl. XIV. figs. 4—5.

— — Farquhar. 1898. On the Echinoderm Fauna of N. Z. Proc. Linn. Soc. N. S. W. p. 306

Pectinura cylindrica. H. L. Clark. 1909. Notes on some Australian and Indo-Pacific Echinoderms. Bull. Mus. Comp. Zool. LII. p. 117.
— — H. L. Clark. 1915. Catalogue of Recent Ophiurans. Mem. Mus. Comp. Zool. XXV. p. 303.

Some few specimens of this species were taken at Mahia Peninsula, under stones at low water (18/XII.14). Further, a single, very young specimen was taken at the Three Kings Isl., in a depth of 65 fathoms, 5/I.15, and must undoubtedly belong to this species. — Some remarks on the characters which distinguish this species from *Pectinura gracilis* are given under the latter species.

40. *Pectinura gracilis* n. sp.

Figs. 35.3—5; Fig. 36.

Paterson Inlet, Stewart Isl., 5—15 fms; mud bottom; 17/IX.14. A few specimens.
Queen Charlotte Sound, 3—10 fms. 20/I.15. 2 specimens.
Three Kings Isl., ca. 65 fms. 5/I.15. 1 specimen.

Diameter of disk of largest specimen 8 mm; arms 3 times the diameter of disk, slender and very flexible. Disk, as usually in this genus, completely covered with fine grains. Mouth papillæ as in *P. cylindrica*, but the oral shields distinctly smaller than in that species (Figs. 35.1, 3.). Supplementary plate generally distinct, semicircular. Ventral plates about as long as broad, sometimes with a small keel in the proximal part. No grooves between the inner ventral plates. Two tentacular scales of the typical shape and arrangement. Dorsal plates fanshaped, only slightly broader than long; the inner one, following the one or two rudimentary plates within the notch at the armbasis, almost semilunar. Armspines 6, rarely 7 (on a few of the proximal armjoints); they are rather slender, about half the length of the side plate. — Colour of disk and arms almost black, the arms somewhat banded with white.

In some of the larger specimens a few of the dorsal plates in the proximal part of the arm have a somewhat different shape, the outer corners being somewhat rounded truncate. This character I find more pronounced in the two specimens from Queen Charlotte Sound (Fig. 35.5). These specimens otherwise agree so completely with those from Stewart Isl. (— excepting only that the coloration is somewhat lighter —) that there can be no doubt but that they must be referred to the same species.

More doubtful is the specimen dredged at Three Kings Isl., ca. 65 fathoms (5/I.15). In this specimen the dorsal plates are broader, more angular than in the type, as seen from a comparison

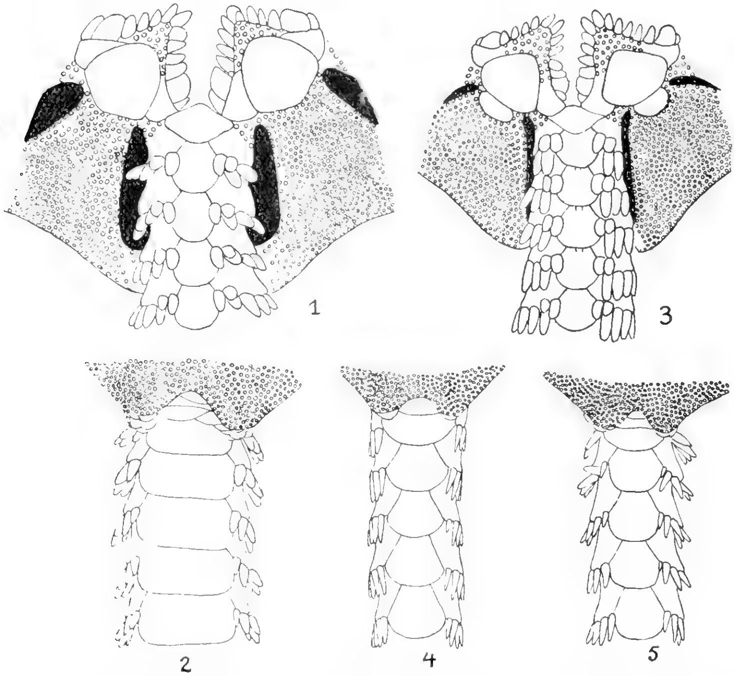


Fig. 35. *Pectinura cylindrica* Hutton (1—2); *Pectinura gracilis* Mrtsn. (3—5). — 1 and 3. part of oral side; 2, 4 and 5. base of arm, dorsal side, with part of the disk. 10/1.

of fig. 36 with fig. 35.3–5. Also the oral shields are more rounded, and the colour is much lighter, nearly white. Whether these differences indicate this form to be a separate species or only a variety of *P. gracilis* cannot, of course, be decided from the single specimen in hand. For the present I must simply refer it to *P. gracilis*; but if the characters pointed out prove to be constant, I should think it a distinct species.

From *Pectinura cylindrica* the present species is very well distinguished, especially through the character of the dorsal plates, which are twice as broad as long in the said species (Comp. figs. 35.1–2 and 3–5). The oral shields are much larger, and the space covered with grains inside the oral shields smaller than in *P. gracilis*. Also the spines are shorter and more flattened in *cylindrica*. The ventral plates do not present marked differences in the two species. Finally it would appear that *P. cylindrica* grows to a somewhat larger size than *P. gracilis*. The figures of the two species were drawn from specimens of nearly the same size in order to eliminate differences solely due to age.

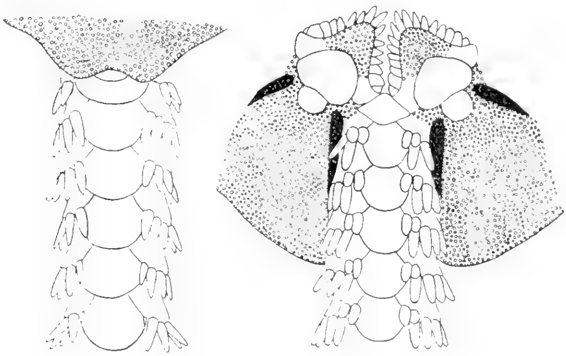


Fig. 36. *Pectinura gracilis* Mrtsn.; specimen from Three Kings Isl. Part of oral side, and base of arm, dorsal side, with part of the disk. 10/1.

The two species appear to have the same distribution along the Northern coasts of New Zealand, from Three Kings Island to Cooks Strait. Whether this holds good also for the Southern coasts is still uncertain; only *P. gracilis* has been recorded from Stewart Isl. and thus evidently is distributed all along the coasts of the South Island. Recently I received from Prof. Benham some specimens of "*P. cylindrica*" from Stewart Isl.; they proved, however, to be *P. gracilis*. The facts at present available would thus seem to indicate that *P. cylindrica* does not extend so far South as *P. gracilis*.

After the above was written I received from Mr. W. R. B. Oliver a specimen stated to be the type of Hutton's *Ophiura cylindrica*. There is no doubt but that this specimen belongs to the species described here as *P. gracilis*, not to the one here named *Pectinura cylindrica* (Hutton) in accordance with the figures and description of the latter, given by Farquhar (Op. cit.). According to this, the two names should be interchanged. This does not, however, seem to me desirable or necessary. On the board, which carries the name *Ophiura cylindrica*, two specimens have been mounted. Only one of these is left. I cannot help suggesting that the two specimens may have been one of each of the two species here mentioned, because of a discrepancy in Hutton's description. The colour given by Hutton decidedly agrees far better with the form here mentioned as *P. cylindrica* than with *P. gracilis*; on the other hand, the shape of the dorsal plates — "convex on the outer edge, and tapering inwards, nearly as long as broad" is in conformity with *P. gracilis*, not with the *P. cylindrica* of Farquhar and later authors. — In view of these facts, and as nothing at all is gained by the changing of the names, only a considerable confusion certain to arise from this change, I think it the best course to keep the name *Pectinura cylindrica* (Hutton) for the species figured and described under this name by Farquhar.

41. *Pectinura maculata* (Verrill).

Pectinura maculata. H. Farquhar. 1898. Echinoderm Fauna of New Zealand. Proc. Linn. Soc. N. S. W. p. 306. (References to previous literature given here).

— — R. Koehler. 1907. Revision de la coll. des Ophiures du Mus. d'hist. nat. Paris. Bull. Sci. Fr. et Belgique. XLI. p. 285. Pl. X.3 -4.

— — H. L. Clark. 1909. Notes on some Australian and Indo-Pacific Echinoderms. Bull. Mus. Comp. Zool. LII. p. 118.

— — H. L. Clark. 1915. Catalogue Rec. Ophiurans. p. 303.

Of this large and magnificent species several specimens were taken in Queen Charlotte Sound, 3—10 fathoms, 19/I.1915.

Further a few specimens were dredged in Paterson Inlet and in Halfmoon Bay, Stewart Island in 5—15 fms, in November 1914.

One of the specimens from Queen Charlotte Sound is 4-rayed. — In the only young specimen in hand (9 mm diameter of disk) the grooves between the first and the second ventral plate are not to be observed; in the larger specimens they are always distinct, though their entrance may be reduced to a mere narrow slit.

I find the eggs of this species fairly large and yolky, which would appear to indicate that its larva does not assume the typical Pluteus-shape.

Explanation of the Plates.

Pl. III.

Ophiocreas longipes n. sp. Natural size.

Pl. IV.

Fig. 1. *Gorgonocephalus chilensis* Phil., var. *novae-zelandiae* n. var.
— 2. *Astrotoma Waitei* Benham. Type-specimen.
— 3. *Astroceras elegans* Bell; two specimens with arms interlaced; one from the oral, the other from the aboral side.
— 4—5. *Ophiocreas constrictum* Farquhar, young specimen; 4. from the oral, 5. from the aboral side. (The specimen named as *Ophiomyxa brevirima* in Bell's Report).
— 6—7. *Astrotoma Benhami* Bell; 6. oral side; 7. aboral side.
— 8—9. *Astroporpa Wilsoni* Bell; 8 oral side; 9. aboral side.

All figures natural size.

26—6—1924.

Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XXI.

Actiniaria from New Zealand and its Subantarctic Islands.

By

Oskar Carlgren, Lund.

(With 53 figures in the text).

Though several Actiniaria from New Zealand and its subantarctic islands have been described by various authors, our knowledge of the Actinian fauna of these islands is rather imperfect. Almost all species, described before, are littoral forms and so it is also with the species in the collection of Mortensen. The older descriptions of the species, as those by Farquhar and especially Hutton, are for a great part rather incomplete and based only on outer characters. In the recent descriptions by Stuckey, Kirk and Stuckey, Stuckey and Walton, Stephenson and Clubb also the anatomy of the forms is treated. Especially Stuckey has increased our knowledge of the Actinian fauna New Zealand's. In his paper (1908) is given a review of the forms, known to 1908. Unfortunately the preservation of Stuckey's specimens was often far from good — he has namely used perchloride of mercury as fixation means, which, according to my experience, only exceptionally gives good results — wherefore his anatomical descriptions are often incomplete and sometimes wrong. For this reason it is often difficult to identify his species as also those of which only the exterior is described. After the publication of Stuckey's paper 1908 some contributions to our knowledge of the Actinian fauna in these districts are given by Stuckey and Walton, Clubb and Stephenson (compare the list of literature).

I beg to express my best thanks to Dr. Mortensen for giving me the opportunity to study this collection.

Fam. **Corallimorphidae.**

Though I fully agree wiih Stephenson (1921) that the Protostichodactylinae (Corallimorphidae, Ricordeidae (Watzl 1922) and Discosomidae) are more related to the Madreporaria than all other Actiniaria, in as much as a number of Madreporarian characters are accumulated in these families, I cannot, however, accept Stephenson's proposition to remove the Protostichodactylinae from the Actiniaria — an opinion already pronounced by Krempff (C. R. Acad. Sc. Paris. 139. 1904) though partly based on other arguments than those of Stephenson. Our knowledge of the anatomy of the Madreporaria is namely so imperfect that it is impossible, at least at present, to say where the Protostichodactylinae should be placed in the system of Madreporaria, and I think that if we remove the Protostichodactylinae we must also transfer the Gonactiniidae and the Ptychodactiidae to the Madreporaria, as these families are likewise related to this group. For the explanation of the question, whether the Protostichodactylinae belong to Actiniaria or to Madreporaria, it seems to me important to make it clear whether the Protostichodactylinae have lost their skeleton or never developed one. If the skeleton of this group is reduced we must place them among the Madreporaria; in case that the Protostichodactylinae never had a skeleton I see no reason to remove them from their old place. Though we shall probably never be able to confirm with certainty which alternation agrees with the phylogenese of the Protostichodactylinae, I cannot find anything advocating that a skeleton has been reduced here. In case that all Protostichodactylinae were real deep-sea forms I should be inclined to suppose that a reduction of a skeleton had taken place here, as in *Leptopenus* among the Madreporaria, but as most Protostichodactylinae (except *Corallimorphus* and the nearly allied *Isocorallion*) are strongly marked littoral forms, I cannot find the reason for a reduction of a skeleton. Thus I favour the view that the Protostichodactylinae never developed a skeleton and consider them as forms descending, as the Ptychodactiidae and the Gonactiniidae, from a common ancestor with the Madreporaria and having passed a development parallel with this group. A supposition of a parallelism here offers no difficulties as among the Actiniaria parallel series often appear (Carlgren. Wiss. Ergebn. Schwed. Südpolar-Expedition, Bd. 6, L. 5. Stockholm 1911. p. 26).

Corynactis haddoni Farquhar.

Corynactis haddoni n. sp. Farquhar 1898, p. 532. — Stuckey 1909 c, p. 390 fig. 12.
? „ *mollis* n. sp. Farquhar 1898, p. 534. — Stuckey 1909 c, p. 390.
? „ *gracilis* n. sp. Farquhar 1898, p. 534. — Stuckey 1909 c, p. 390.
? „ *albida* n. sp. Stuckey 1909 c, p. 390.

Diagnosis. Sphincter distinct, rather long. About 40 radial rows of endocoel-tentacles, each row containing 2—4 tentacles. About 40 (35—41) pairs of mesenteries. Not half the mesenteries perfect. 1—3 pairs of directives. Specific nematocysts with very coiled thread in the filaments 72—88 × 26—29 μ, in the caput of the tentacles 65—71 × 13—17 μ, in the actinopharynx 31—36 × 9—10 μ, in the column 31—41 × 7 μ. Spirocyst-like cnidae with visible basal part to the spiral thread in the caput of the tentacles 48—61 × $4{,}_5$—5 μ.

Colour very variable, compare Farquhar and Stuckey.

Dimensions in contracted state about 1 cm high and $0{,}_8$ cm broad. An extended oral disc was $1{,}_2$ cm in preserved state.

Occurrence. Slipper Islands. Coast, at low-water 20.12.1914. Several specimens.

In the neighbourhood of Wellington (teste Farquhar and Stuckey).

Exterior aspect. The exterior of this species agrees with other *Corynactis*-species. A good description is given by Farquhar. The rows of endocoel-tentacles were about 40. The arrangement rather well agrees with that of *Corynactis globulifera* (Carlgren 1900, p. 21). In a specimen with well extended oral disc the arrangement of the endocoel-tentacles was as follows (the figures indicate the number of tentacles in the rows) 3, 2, 4, 3, 4, 3, 3, 4, 3, 4, 4, 3, 2, 4, 3, 3, 4, 3, 4, 3, 4, 3, 4, 3, 3, 3, 4, 2, 3, 3, 4, 2, 3, 2, 4, 3, 3, 2, 3, 2 = 40 rays. Between the endocoel-rows there issues one tentacle from each exocoel. The exocoel-tentacles are larger than the endocoel-tentacles and are situated inside the outmost endocoel-tentacles. Of these latter the innermost are the smaller, the outmost the larger. The actinopharynx is provided with numerous longitudinal ridges and furrows. There are no distinct siphonoglyphes.

Anatomical description. The ectoderm of the column is high and contains numerous mucus cells. At the insertion of the ectoderm at the mesogloea there is on transversal sections a row of small refractive bodies, much more delicate than the transversally sectioned muscles in the mesenteries; whether we really have to do with ectodermal muscles here I cannot decide with certainty, but I am more inclined to regard these bodies as the somewhat thickened bases of the supporting cells. The mesogloea is in every part almost

Fig. 1. *Corynactis haddoni.* Transverse section of sphincter.

homogeneous,with sparse cells. A distinct, rather long, diffuse sphincter is developed, forming rather high folds in its uppermost part (textfig. 1). Stuckey has not observed any sphincter. Below the sphincter the circular muscles form very short folds or none. The tentacles and the actinopharynx show the typical structure in *Corynactis.*

The number of mesenteries varies a little. In two sectioned specimens there were 35 resp. 41 pairs. In a third specimen, the tentacles of which I have counted, the number of pairs was probably 40, as there were 40 rows of endocoel-tentacles. This number agrees with Farquhar's statement, while Stuckey states that there are in all species (compare the synonyms!) 24 pairs of mesenteries. I think that Stuckey has generalized too much in this case, at also when he says that there were typically 12 pairs perfect. It is a well known fact that the mesenterial arrangement in *Corynactis* is very irregular. In the specimen with 41 pairs of mesenteries at least 17, probably 19 pairs reach the actinopharynx. In this specimen 3 pairs of directives were present. The other sectioned specimen was provided with only a single pair of directives. The longitudinal muscles of the mesenteries are weak and form a very coarse-folded lamella, the parietobasilar muscles are weak and not folded, the basilar muscles are lacking. The filaments are structured as in other *Corynactis*-species. I cannot understand what Stuckey means when he states that the filaments in some sections "show an appearence of three three-foils". True enough, the inner parts of the mesenteries on some sections look like a "three-foil" but these parts belong to the undermost part of the actinopharynx, which splits in the middle of its furrows before its end. It is probably these lateral processes (furrows-parts of the actinopharynx) which very soon end, and which McMurrich 1904, p. 295 concerning *Corynactis carnea* homologizes with the ciliated streaks. In fact these processes are no ciliated streaks as far as I can see — I have also sectioned *Corynactis carnea* — although the supporting cells here are somewhat more numerous than in the ridges. These cells are also closer in the outside of the filaments than in the inside.

There are stinging capsules of different size and structure in the ectoderm. In the stalk of the tentacles there seems to be only common spirocysts present. They are also numerous in the caput of the tentacles (here $24 \times 1{,}5$—$53 \times 3\ \mu$) but very sparse in the actinopharynx and in the filaments. In the ectoderm of the column, in the caput of the tentacles, in the actinopharynx and filaments there are large nematocysts with very coiled spiral thread. In the filaments they are largest 72—88 $\times$ 26—29 μ, in the caput of the tentacles 65—71 $\times$ 13—17 μ, in the actinopharynx 31—36 $\times$ 9—10 μ and in the column 31—41 $\times$ 7 μ (these nematocysts are possibly a little different in structure from the others). In the caput of the tentacles there are also spirocyst-like cnidae with visible basal part to the spiral thread. They are somewhat broader in their distal parts than in their proximal, and 48—61 $\times$ $4{,}5$—5 μ in size. In the actinopharynx cnidae of about the same kind are present. They are, however, more opaque, and their spiral thread is hardly visible. Also in the column and filaments there are similar capsules, which however are narrower in the basal end than in the distal, their basal part to the spiral thread is perspicuous but the spiral thread itself is very indistinct. In the column their size was partly 14—19 × 3 μ, partly 19—29 × 4,5—5 μ, in the filament 34—43 × 10—11 μ. In different parts of the ectoderm there were also opaque, often irregular developing-stages of stinging capsules.

Fam. **Edwardsiidae.**

As I have already pointed out (Carlgren 1921, p. 25) I cannot accept the supposition of Bourne (Journ. Linn. Soc. 32 Zool. 1916, p. 513) and Stephenson (compare Stephenson 1921, p. 538, 559) that the Edwardsiids "must rank as a distinct group equal to that containing the Zoanthids" and the Dodecactiniaria (Actiniaria and Madreporaria). The Edwardsiids certainly belong to the group Athenaria among the Actiniaria.

Edwardsia tricolor Stuckey.

Edwardsia elegans n. sp. Farquhar 1898, p. 528. Pl. 36 figs. 1—2.
„ *tricolor* nom nov. Stuckey 1908 c, p. 378, figs. 1—4, Pl. 22 figs. 1—2.
? „ *neozelanica* n. sp. Farquhar 1898, p. 529. Pl. 36 fig. 3.

Diagnosis. Physa well developed. Scapus with a thin periderm and very numerous, small scattered nemathybomes occupying the whole surface. Nematocysts of the nemathybomes partly 41—56 × 5,5—4,5 μ, partly 34—41 × almost 2 μ, the latter strongly diminishing towards the distal end. Especially upper part of scapus and capitulum polygonal. Tentacles 16 (16—24 in *neozelanica*). Nematocysts of the capitulum 10—15 × 1 μ, those of the tentacles 22—24 × almost 2 μ and of the actinopharynx partly 20—24 × 1—1,5 μ, partly 31—36 × 2—2,5 μ. Longitudinal muscle pennons of the mesenteries in the reproductive region well developed with about 20—30 mostly high folds especially ramificated in the outermost part. Outer lamellar part of the mesenteries attached close by the outside of the pennons. Parietal muscles strong. Main lamella of the mesogloea in the region of the parietal muscles thick. Distribution of the parietal muscles on the column considerable.

C o l o u r. Capitulum muddy-brown or orange with eight opaque white lenticular figures, which alternate with eight longitudinal white double lines. Tentacles pellucid white with opaque yellowish-white tips. Disc pale muddy-brown with eight white radiating lines. Actinopharynx orange or white (*elegans*) teste F a r q u h a r. Capitulum, disc, tentacles uniform pellucid white or pinkish white, without any markings (*neozelanica* teste F.). The scapus of Auckland-specimens was yellowish, that of the Slipper-specimen dirty gray.

D i m e n s i o n s in extended state: length of the animal $7_{,5}$ cm, that of the tentacles $0_{,6}$ cm (*elegans* teste F.), length $4_{,3}$ cm, that of the tentacles $0_{,37}$ cm (*neozelanica* teste F.). The well preserved specimen with extended tentacles from Auckland Islands was 3 cm long and up to $0_{,4}$ cm broad, length of the tentacles $0_{,5}$ cm. The specimen from Slipper Islands was very contracted and only $0_{,8}$ cm long and $0_{,45}$ cm broad.

O c c u r r e n c e. Masked Island, Carnley Harbour, Auckland Islands. Rocky coast with *Melobesia*. 3.12.1914. 2 specimens.

Slipper Island, low water. 20.12.1914. 1 specimen. Cook strait, Island Bay, Ohiro Bay (teste F a r q u h a r and S t u c k e y), Lyall Bay, Ohiro Bay (*neozelanica* teste F.)

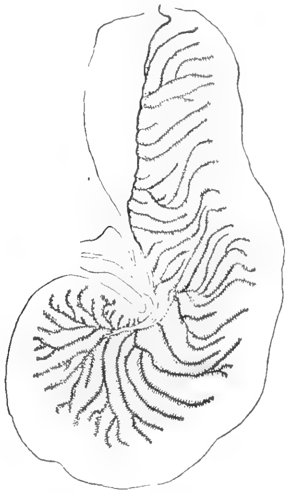
E x t e r i o r a s p e c t. The physa is well developed, retractile. The scapus is provided with a thin cuticle and 8 longitudinal furrows corresponding to the insertions of the mesenteries. Its nemathybomes are small but very numerous, scattered and distributed over the whole surface of the scapus making it appear granulous. The capitulum is deeply furrowed at the insertions of the mesenteries, and polygonal. The cylindrical tentacles are of usual length, in the examined Auckland-specimen 16. F a r q u h a r states in *elegans* 16 and in *neozolanica* 16—24 but usually 16 tentacles. The actinopharynx is provided with 8 longitudinal furrows, one of which forms the ventral single siphonoglyphe.

A n a t o m i c a l d e s c r i p t i o n. The ectoderm of the physa is high and without a cuticle. The cuticle of the scapus is thin, at its outside foreign bodies such as diatoms are sticking. The ectoderm of the scapus is rather thin. The nemathybomes contain 2 kinds of nematocysts, one kind larger and only a little narrower in one end than in the other, the other smaller with the broadest part in one end and the narrowest in the other, which is strongly acuminated. The size of the nematocysts in the nemathybomes was in the three specimens as follows:

Largest specimen from Auckland Island $41-48 \times 4{,}5\ \mu$, $38-46 \times$ almost $2\ \mu$.

Smallest specimen from Auckland Isl. $41-49 \times 4{,}5\ \mu$, $36-43 \times$ almost $2\ \mu$.

Specimen from Slipper Island $46-56 \times 5{,}5-4{,}5\ \mu$, $34-41 \times$ about $2\ \mu$.



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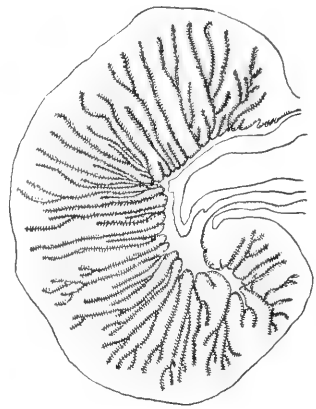

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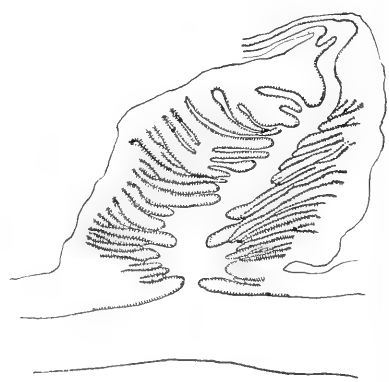

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Fig. 2-5. *Edwardsia tricolor.* Transverse sections of pennons (figs. 2, 4) and parietal muscles (figs. 3, 5) in the upper part of the reproductive region.

The mesogloea of the scapus is thicker than the ectoderm and fibrillous with few cells. The nematocysts of the capitulum were small as usually in *Edwardsia*, their size was $10—15 \times 1{,}5\ \mu$. Concerning the nematocysts of the tentacles and actinopharynx compare diagnosis! The ectoderm of the actinopharynx was very high in the ridges, rather thin to thin in the furrows. The cilia of the siphonoglyphe was longer than in the other part of the actinopharynx.

The mesenteries show an arrangement equal to that in *E. claparedii.* The micromesenteries were very weak. The pennons of the stronger mesenteries were well developed as were also the parietal muscles. The sections of a pennon and a parietal muscle in the reproductive region of a specimen from Auckland Island (textfigs. 2, 3) and of the specimen from Slipper Island (textfigs. 4, 5) show good agreement. The more curved pennon in the latter specimen is of no importance as due to a stronger contraction. I have found sections of about equal appearence also in the former specimen. Concerning the folds etc. compare the diagnosis. One specimen was a male, the other a female.

Remarks. It is impossible to decide, without an examination of the nematocysts in the nemathybomes, whether *tricolor* (*elegans*) and *neozelanica* are two distinct species or not. To my mind they probably belong together.

Fam. **Halcampoididae.**

Peachia neozelanica n. sp.

Diagnosis. Tentacles 10 (always?), Conchula tentacle-like small. Muscle pennons only on the five first couples, the sixth couple agreeing with the weaker mesenteries (4 single mesenteries of the second cycle in the four lateral and ventrolateral exocoels (always?). Muscle pennons not extended but more concentrated with high and ramificated folds. Parietal muscles of the perfect mesenteries with few palisade-like folds. Imperfect mesenteries developed about as the parietal part of the perfect, not forming pennons. Nematocysts of the column $12 \times 1\ \mu$, those of the tentacles $14 \times 1\ \mu$, those of the actinopharynx partly $17—22 \times 1—1{,}5\ \mu$, partly 29—31 $\times$ 7 μ, the latter broader at the basal end. Spirocysts of the tentacles 12 $\times$ 1 μ—36 $\times$ 2 μ.

Colour in alcohol. On each side of the tentacles a dark spot, otherwise uncoloured.

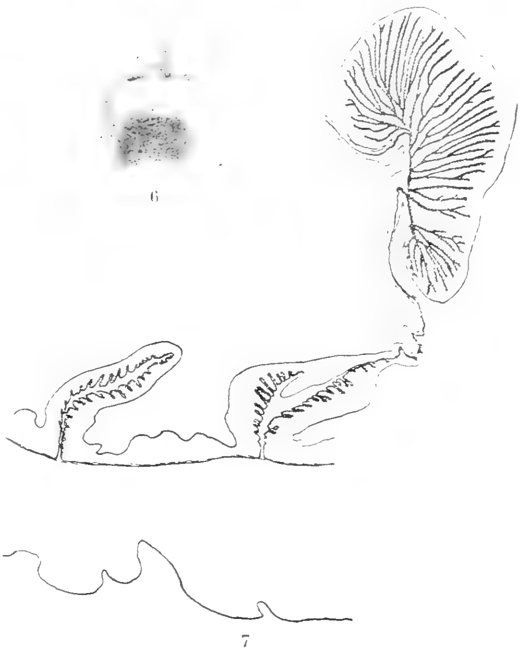
Dimensions in preserved state. Length 2,15 cm, largest breadth 0,3 cm, length of the actinopharynx 0,3 cm, length of the tentacles 0,2 cm.

Occurrence. Three Kings 65 fms. Hard bottom. 1.5.1915. 1 specimen.

Exterior aspect. The column is strongly elongated, in the undermost part with 16 distinct longitudinal furrows probably corresponding to the insertions of the mesenteries. Above this region an area with very small papillae only perspicuous with a strong magnifying glass. The cylindrical tentacles are certainly not more than 10. The actinopharynx is evaginated owing to a strong contraction of the distal part of the body and provided with numerous longitudinal folds. The siphonoglyphe is broad and furnished with a small tentacle-like conchula (textfig. 6).

Anatomical description. For the anatomical examination I have sectioned a piece transversally rather below the actinopharynx and a piece of the evaginated actinopharynx region and made maceration preparations of the ectoderm in the column, tentacles and actinopharynx. The maceration preparations of the column are taken from its undermost part as the ectoderm was lost in the other regions. Concerning the size of the nematocysts and spirocysts I refer to the diagnosis. The smaller nematocysts of the actinopharynx were rib-like, the larger broader at the basal end which is sometimes square, the basal part of the spiral thread and the thread itself perspicuous. The actinopharynx as also the siphonoglyphe agree in structure with other *Peachia* species. Not having sectioned the upper part of the actinopharynx I cannot, however, decide if a strongly ciliated boundary zone is present between the actinopharynx and the siphonoglyphe (compare Carlgren 1921, p. 102).

The mesenteries were only 16. Of the 6 pairs of the first order only the 5 first couples were perfect and provided with pennons, the sixth couple (the ventral mesenteries of the ventrolateral pairs) is imperfect and devoid of pennons but furnished with filaments as the five other couples. The mesenteries of the second order are situated as usual in *Peachia*, in the lateral and ventrolateral exocoels, but do not consist of pairs but of single mesenteries. It is true that I have sectioned only one part of the specimen, but as this part is situated rather close to the tentacles, and as also in the undermost part of the body there are only 16 longitudinal furrows probably corresponding to the insertions of the mesenteries, and as the single mesenteries of the second order are well developed in the sectioned part, I think that the single mesenteries have no partner also in other regions of the body. The muscle pennons below the actinopharynx are not as much extended as for inst. in *Peachia hastata*, but somewhat more concentrated and provided with high ramificated folds. The parietal part of the perfect mesenteries consists of rather high folds arranged pallisade-like. In textfigure 7 I have reproduced a transverse section of a mesentery of the first couple and an imperfect lateral mesentery of second order. The muscle folds of the parietal part of the perfect mesenteries, as also the imperfect mesenteries, are often higher than shown in the figure. The imperfect mesenteries of the sixth couple are only slightly stronger than those of the second order. At least most of the perfect mesenteries inclusive the directives are provided with ovaries containing partly very large ova.



Figs. 6—7. *Peachia neozelanica*. Fig. 6. Siphonoglyphe, conchula and directive tentacle.
Fig. 7. Transverse section of mesenteries in the reproduction region (compare the text).

Remarks. As to the mesenteries, the species shows an organization somewhat different from the previously described *Peachia* species. It is possible that the species is an anormal Individuum (compare Carlgren 1921, p. 104) and never develops the missing mesenteries of the second order. It is, however, more likely that the specimen is not full-grown, though the reproductive organs are rather well developed.

Judging from the description of *Peachia hilli* (Wilsmore 1911, p. 39) dredged in Broken Bay, New South Wales, this species is not identical with *P. neozelanica*. I have not identified our species with *P. carnea* Hutt. (Hutton 1879, p. 275) as it is very doubtful if this species really is a *Peachia*. Hutton's short description of *P. carnea* is as follows: "Column flesh colour, semitransparent with pale longitudinal lines, contracted below the mouth and again about one third from the posterior end but the form is variable, anus (!) large and conspicuous. Disc pale flesh colour, rayed with brown. Mouth rayed surrounded by a brown-banded ring, on one side a number of small papillae. Tentacles 12, rather longer than the diameter of the disc, simple pale flesh colour with about five brown, often chevroned, bands on the upper surface. Length about $1^3/_4$ inch. A single specimen, Ocean Beach, Dunedin."

Fam. **Condylanthidae**.

I accept Stephenson's proposition to form a family Condylanthidae for the genus *Condylanthus*. According to this author, (1922, p. 262) *Charisea* should be a synonym of *Condylanthus*. To my mind it is not so, as the description and especially the figures of Torrey (Proc. Wash. Acad. Sc. 4. 1902, p. 388) indicate that there is no real pedal disc in this genus. Therefore, and also on account of other structural characters, I have (1921, p. 92) suggested that *Acthelmis* and *Charisea* are synonyms. In *Condylanthus* the lower part of the column is much broader and provided with more numerous mesenteries than the upper part, while in *Charisea* with its vermiform body the number of tentacles and mesenteries agree. On account of the excluding of *Charisea* from the Condylanthidae and of the structure of the genus *Condylanthus* (compare below) the diagnosis of the family must be altered as follows:

Thenaria with a broad pedal disc and distinct basilar muscles. Column without marginal sphaerules, verrucæ and vesicles, divisible in scapus and capitulum. Tentacles fewer (always?) than mesenteries, retractile. Longitudinal muscles of tentacles and radial muscles of oral disc mesogloeal. No sphincter or a weak, diffuse. Six pairs of macrocnemes with filaments, gonads and strong retractors. Microcnemes without these organs, in the lower part more numerous than in the upper (always?)

For reasons, which I will give in another paper, I maintain the group Thenaria, as I cannot accept Stephenson's groups Endomyaria and Mesomyaria.

Genus *Condylanthus*.

Diagnosis. Condylanthidae with well developed pedal disc. Column divisible in scapus and capitulum without papillae or warts. Scapus provided with cuticle. Ectoderm of the capitulum with spirocysts. Sphincter weak diffuse or absent. Tentacles short, considerably fewer than mesenteries. Longitudinal muscles of the tentacles and radial muscles of the oral disc mesogloeal. The six pairs of macrocnemes with pinnate circumscript pennons and very strong parietal muscles. 2 pairs of directives. Microcnemes without muscle pennons, those of the second order recalling the parietal part of those of the first. Basilar muscles well developed.

The diagnosis of the genus *Condylanthus* is here altered because a renewed examination of the very bad preserved tentacles and oral disc in the examined type-specimen of *C. magellanicus* has shown that the longitudinal muscles of tentacles and oral disc are mesogloeal and not ectodermal. In another paper I will give a more complete description of the geno-type, based on examination of new material better preserved. The species, described below, is separated from *C. magellanicus* by the structure of the parietobasilar muscles and the pennons. Below the actinopharynx the parietobasilar muscles form no deeper fold and are more robust in *aucklandicus* than in *magellanicus,* in which they are very broad and form a very deep but thin fold. The muscle folds of the pennons are also comparatively more ramificated in *aucklandicus* than in *magellanicus*.

Condylanthus aucklandicus n. sp.

Diagnosis. Body conical. Cuticle of the scapus thin, easily deciduous. Sphincter weak, diffuse close to the tentacles. Tentacles 24 hexamerously arranged, conical, short. Longitudinal muscles of the tentacles considerably stronger on the inside than on the outside. Actinopharynx long with indistinct siphonoplyphes. Pairs of mesenteries at least in four cycles, the last cycles very weak, present only in the undermost part of the body. Muscle pennons in the upper part of the mesenteries, strong, richly ramificated, in the under part considerably weaker. Parietal part of the longitudinal muscles and the parietobasilar muscles very strong and richly ramificated in the under part of the mesenteries, weak in the upper. Mesenteries of the second order recalling the parietal part of those of the first. Mesenteries of the third and fourth orders very small, only in the proximal part. Nematocysts of the capitulum 19—22 $\times$ almost 2—2 μ, those of the tentacles 19—24 $\times$ almost 2—2 μ, those of the actinopharynx about 24 $\times$ 4,5 μ, the last broader at the basal end, spirocysts of the capitulum 29—41 $\times$ 2—2,5 μ, those of the tentacles 12 $\times$ 1—38 $\times$ 2 μ.

Colour?

Dimensions in preserved state: Height 0,9 cm. Largest breadth of the pedal disc 1,2 cm, Length of the tentacles 0,15 cm.

Occurrence. Masked Island. Carnley Harbour. Auckland Islands. Rocky shore with *Melobesia*. 3.19.1914. 1 spec.

Exterior aspect. As to the exterior, the single specimen (textfig. 8) was not well preserved, the column very contracted and very folded, the actinopharynx for a great part evaginated. The pedal disc is broader than the upper part of the column and furnished with a cuticle. The column is divisible in scapus and capitulum, the former is rather thick and provided with a thin, easily deciduous, dirty gray cuticle. The thin capitulum is rather long. The tentacles are 24, hexamerously arranged in three close standing cycles. In contracted state they are conical, very short and thick. The almost wholly evaginated actinopharynx was provided with 12 longitudinal ridges. If siphonoglyphes are present they are weak.

Fig. 8. *Condylanthus aucklandicus*. Magnif. 2,5/1.

Anatomical description. The ectoderm of the scapus is rather thick, but considerably thinner than the mesogloea, and contains very numerous gland-cells. In the high ectoderm of the capitulum there are very numerous spirocysts 29—41 × 2—2,5 μ and rather numerous nematocysts 19—22 × almost 2—2 μ. The mesogloea of the capitulum is thin. The circular muscles of the column are very weak, in the capitulum somewhat stronger than in the scapus. The sphincter is weak, endodermal, diffuse (textfig. 9) and

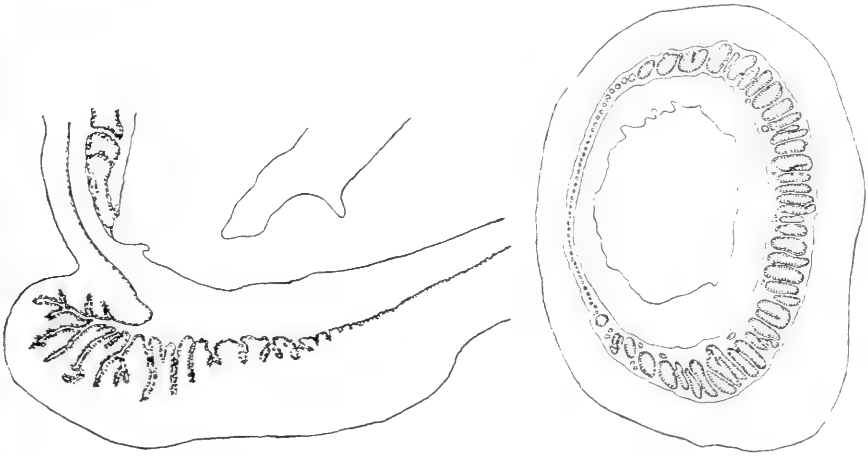


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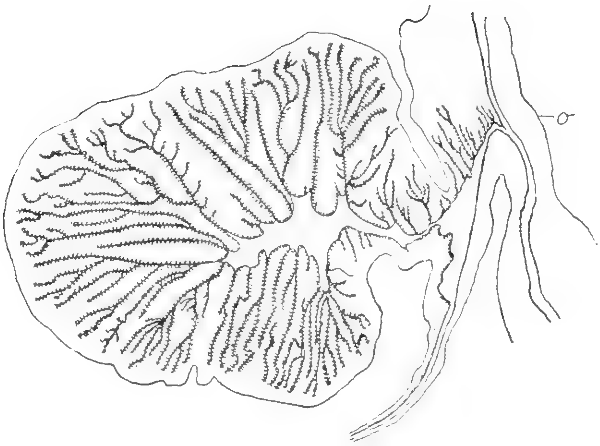
Fig. 9, 10. *Condylanthus aucklandicus.* Transverse section of sphincter and longitudinal section of the base of one tentacle (fig. 9). Transverse section of tentacle (fig. 10).

situated close to the tentacles. The ectoderm of the tentacles is high and contains rather numerous nematocysts 19—24 × almost 2—2 μ and numerous spirocysts 12 × 1—38 × 2 μ. The longitudinal muscles of the tentacles are mesogloeal, stronger on the inside of the tentacles than on the outside, in the latter place the muscle meshes are small, in the former large and extended in radial direction (textfig. 10). The radial muscles of the oral disc are also mesogloeal. The actinopharynx ectoderm is rather high, in the ridges supported by mesogloeal thickenings.

The pairs of mesenteries are in the upper half 12, of which 2 pairs of directives, and in the proximal part of the body there are also a third and a fourth cycle of mesenteries present, possibly also traces of a fifth cycle hexamerously arranged. Only the six



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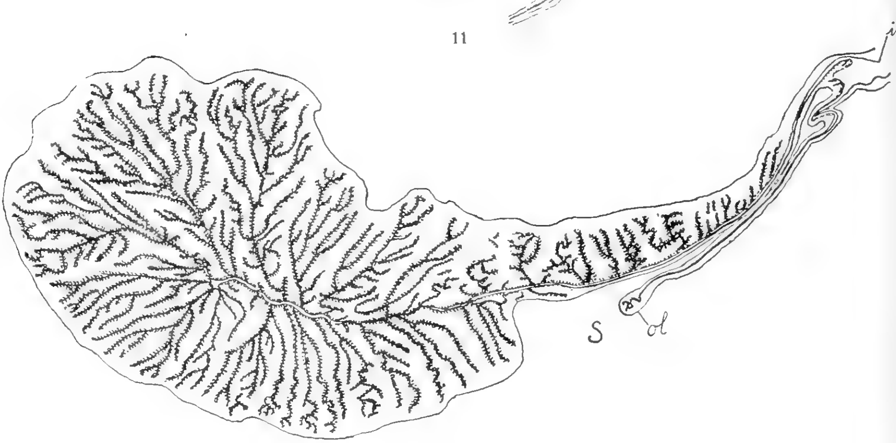

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Figs. 11, 12. *Condylanthus aucklandicus.* Transverse sections of pennons at the oral disc *(o)* (fig. 11) and at the undermost part of the actinopharynx (fig. 12). *S*, Stoma, *il*, *ol*, inner and outer lamellar part of the mesentery.

first pairs are provided with filaments and reproductive organs. Also in other respects the mesenteries of the different cycles are unequally developed. The longitudinal muscles form pennons only on the 6 first pairs. They are attached to the oral disc immediately inside the tentacles and here richly ramificated, and are of a distinct pinnate circumscript appearance (textfig. 11). Also in the undermost part of the actinopharynx the pennons are strong and here more broad (textfig. 12). Almost the whole upper half of these mesenteries, except the pennons, are thin and lamellar, as is also the small parietal part of the mesenteries. In the lower half the mesenteries show another structure. The pennons, indeed, retain their character but are here considerably weaker and, in comparison with the parietal part of the mesenteries, inconsiderable (textfig. 13 mp). In the undermost part they are yet somewhat stronger. The lower half of the mesenteries are namely considerably thickened in the here broad parietal region, and the longitudinal muscles richly ramificated on the pennon side as well as especially on the parietobasilar muscle side (textfig. 13). At the same time as the pennons diminish, the parietal part increases and vice versa. The ova in the mesenteries were very large.

The muscles of the mesenteries of the second cycle recall the parietal part of those in the first cycle. Thus they are strong in the lower half (textfig. 13), weak in the upper. The mesenteries of the third and fourth cycles are weak, in their uppermost part not reaching above the endoderm of the column wall, and only present in the lowest part of the body. The filaments are of usual structure.

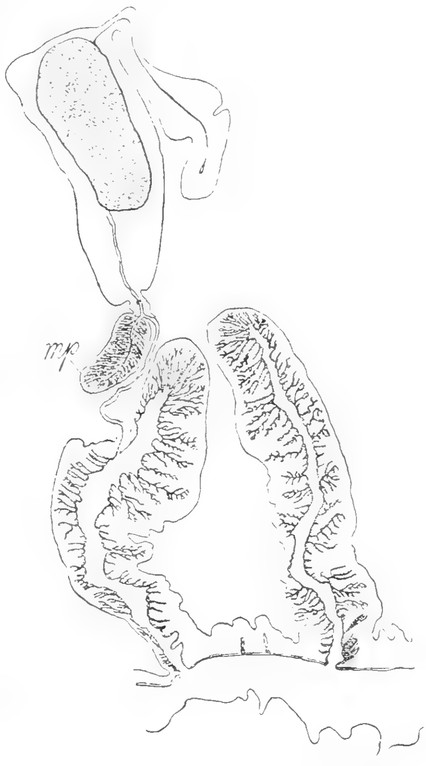


Fig. 13. *Condylanthus aucklandicus.* Transverse section of one mesentery of the first order, of one mesentery of the second and of 2 mesenteries of the third order in the under part of the body. *mp*: pennon.

Fam. **Actiniidae.**

According to Stephenson (1921, p. 528) there is no real difference between the families Bunodactiidae and Actiniidae as the sphincter in the former sometimes agrees with that in the latter.

If this variation is constant in some species, as it seems, and the sphincter in some species of Bunodactiidae appears weak in its whole circumference, I have nothing to object to the suppression of the Bunodactiidae. Thus at least provisionally I refer the species of Bunodactiidae described here to the Actiniidae. I cannot here discuss Stephenson's revision of the genera, but I think that we can retain the genus *Anthopleura* for forms with marginal sphaerules (acrorhagi), limiting the genus *Bunodactis* to forms without such, in the same manner as we separate *Actinia* from *Gyrostoma*. As far as I know, there is namely no variation as to the marginal sphaerules in the species of *Anthopleura*, so that a species may have or miss these organs. In this connection I cannot understand for what reason Stephenson assigns *Tealia* (*Urticina*) *sulcata* and *carlgreni*) acrorhagi. Clubb (1902) mentions no such organs in these species and, in fact, there are none (stated by myself on material determined by Clubb). Besides, both these species belong to the genus *Bunodactis* and not to *Tealia*. Owing to Stephenson's enclosing of these *Bunodactis*-species in the genus *Tealia*, Stephenson's diagnosis of this genus is not good (compare my diagnosis of the genus *Urticina* 1921, p. 160).

Actinia tenebrosa Farqh.

Actinia tenebrosa n. sp. Farquhar 1898, p. 535.
„ „ Farq. Stuckey 1909 c, p. 380. Pl. 23 figs. 1, 2, textfig. 5.
„ *australiae* n. sp. Carlgren 1900, p. 32.

Diagnosis Column shorter than broad. Marginal sphaerules very well developed. Sphincter diffuse, rather well developed with tendency to form humps. Tentacles at least to about 144 (200 or more Stuckey). More than half the disc without tentacles. Actinopharynx with numerous longitudinal furrows and two well developed siphonoglyphes forming aboral prolongations. Pairs of mesenteries hexamerously arranged in 4 or 5 cycles, the fifth cycle more or less complete with irregular development in the different compartments. 2 pairs of directives. Longitudinal muscles weak, forming no distinct pennons. Parietobasilar and basilar muscles strong. Nematocysts of the column 14—20 $\times$ 1,5—2 μ, those of the marginal sphaerules 37—53 $\times$ 2,5—3,5 (4) μ, those of the tentacles 19—24 $\times$ about

1,5—almost 2 μ, those of the actinopharynx 19—29 $\times$ about 1,5 —2 μ, spirocysts of the tentacles 14 $\times$ 1—31 $\times$ 2,5 μ.

Colour greenish or brown from reddish-brown to brownish-black or yellowish-green, marginal sphaerules whitish with a blue or lavendar tinge. Tentacles and oral disc dusky crimson or dull red (teste Farquhar and Stuckey).

Dimensions. Column about 2,7 cm, diameter of the disc about 4 cm, length of the tentacles about 1,5 cm (Farquhar). The 3 largest specimens from Slipper Islands were 2,1—2,5 broad and 1,5 cm high in preserved state.

Occurrence. Slipper Island; low water. 20.12.14. Several specimens.

New Zealand. Manakau Harbour, Cook Strait, Queen Charlotte Sound (Grant) Robin Hood Bay (Skelley), Stewart Island (Morrison) teste Stuckey and Walton, Auckland Isl. (Kirk) teste Stuckey, Kermadec Islands (teste Stuckey). Port Jackson (Mortensen) 4 specimens.

Exterior aspect. The exterior of this species agrees with that of *Actinia equina*. The pedal disc is wide, the column smooth, its height shorter than its diameter. The margin is distinct. The marginal sphaerules, situated in the deep fossa, are large, in contracted state often deeply transversally furrowed so that they sometimes look as if there were a short row of sphaerules instead of a single sphaerule. Their number varies in connection with the number of compartments. Sometimes they are miscarrying in some parts. The tentacles are conical, short, and arranged in several cycles. Their number varies. Stuckey states 200 or more. The three largest specimens from Slipper Islands had 144, 138 and 114 tentacles. More than half the oral disc lacks tentacles. The mouth is situated on a conus. The actinopharynx is provided with numerous longitudinal ridges and two well developed siphonoglyphes forming well developed aboral prolongations.

Anatomical description. The anatomy of this species is described by Stuckey but in some points incompletely. Stuckey states that there is no sphincter. In fact a rather well developed diffuse sphincter is present, showing a tendency to form humps, and situated as usual in *Actinia* between the tentacles and the marginal sphaerules. I have sectioned 2 specimens, one from the

Slipper Islands and one from Port Jackson and in both the sphincter shows the same structure. In the textfig. 14 I have reproduced the sphincter from the Port Jackson specimen. The ectodermal longitudinal muscles of the tentacles are ordinarily developed (Stuckey says: very strong) and form palissade-like close folds. The radial muscles of the oral disc are stronger than the longitudinal muscles of the tentacles between the insertions of the mesenteries, at the insertions of the mesenteries weaker. I have not observed any anastomoses between the muscle folds.

Fig. 14. *Actinia tenebrosa.* Transverse section of sphincter. *r*: marginal sphaerule.

The pairs of mesenteries vary in number. Stuckey states that the normal number appears to be 48 pairs, in one specimen he observed 56 pairs. As the number of mesenteries here agrees with that of the tentacles it should thus be 200 or more, if the statement of Stuckey is correct. In the specimen with 114 tentacles and 57 pairs of mesenteries there were 11, 9, 7, 7, 9, 8 pairs of younger mesenteries in the compartments between the 6 first pairs, counted from the one directive pair, in the specimen with 144 tentacles and 72 pairs 14, 8, 11, 10, 8, 15. The development of the mesenteries in the different compartments thus was irregular, in some compartments richer than in others. There were always two pairs of directives. In the large specimens the mesenteries of the first, second, third, and part of the fourth were perfect, a larger number than Stuckey states. The mesogloea of the mesenteries is rather thick. The longitudinal muscles form no distinct pennons, only in the lower and inner part of the mesenteries the muscle lamella forms some higher folds. The parieto-basilar muscles are strong and form inwards a very distinct fold on the mesenteries. Between the fold and the main lamella of the mesenteries the muscles are enclosed in the mesogloea. Also the basilar muscles are very strong and recall those in *Bolocera longicornis* (Carlgren 1893). The "curious three division of the filaments provided with trefoils of the mesentery", which Stuckey describes, is certainly arisen by contraction. The mesenteries and filaments are namely normally structured. The reproductive organs were best developed in the weaker mesenteries, in some stronger ones there were also a few ova or testes. All three examined specimens were provided with a few large young in the coelenteric cavity. It is very remarkable that two of these three specimens were males, one a female. In the latter the ovaries were small, in the former the testes were very well developed on the mesenteries of the last cycle. I have not observed any traces of testes in the female or ova in the males. Under such circumstances it is hardly probable that the species is a proterandric hermafrodite. In the case that the species is dioecious, the embryos must in some manner have immigrated in the coelenteric cavity of the males and there been retained.

The size of the nematocysts (n) and spirocysts (sp) in different parts of the animal was as follows.

Habitat	Column n	Marginal sphaerules n
Slipper Island	17—19 × well 1,5 μ.	46—53 × 2,5—3 μ.
Port Jackson	14—20 × 1,5—2.	37—48 × (2,5) 3 μ.
—	—	41—50 × 3—3,5 μ.

Habitat	Tentacles n	Tentacles sp
Slipper Island	19—23 × 1,5—almost 2 μ.	14×1—31×2,5 μ.
Port Jackson	20—24 × about 1,5—almost 2 μ.	17×1—30×2 μ.
—	20—24 × about 1,5 μ.	—

Habitat	Actinopharynx n
Slipper Island	21—29 × almost 2—2 (2,5) μ.
Port Jackson	19—24 × 1,5—about 2.
—	22—29 × almost 2—2.

The nematocysts in the column and tentacles were sparse, in the actinopharynx more numerous, in the marginal sphaerules very numerous, in the latter there were also sparse spirocysts. In the specimen from the Slipper Isl. I observed also very large nematocysts ($62-79 \times 6-6{,}5\ \mu$) in the maceration preparations of some tentacles, in other tentacles however no such nematocysts. Probably these nematocysts do not belong to the tentacles but are stuck to them.

Genus *Parantheopsis* McMurr.

Diagnosis. Actiniidae with more or less cylindrical body and well developed pedal disc. *Urticina*-verrucae in longitudinal rows at least in the upper part of the column. Margin and fossa distinct. (Little? or) no sphincter. Tentacles short, the outer almost as long as the inner. Longitudinal muscles of the tentacles and radial muscles of the oral disc ectodermal. Siphonoglyphes well developed. Mesenteries arranged octo-, penta- or hexamerously. All or most mesenteries perfect. 2 pairs of directives (always?). Longitudinal muscle pennons of the mesenteries well developed as also the parietobasilar and basilar muscles. Reproductive organs on the mesenteries of the first order and on all or almost all of the other orders.

Owing to the different length of the tentacles in the typical *Condylactis*-species and in some other species described as *Condylactis*, for inst. *C. cruentata*, I have 1903 proposed to divide the genus *Condylactis* in two genera or subgenera. The following year 1904 McMurrich also erected a new genus *Parantheopsis* for *C. cruentata* and a new species *ocellata*. According to him the genus *Parantheopsis* should be distinguished from *Condylactis* "by the possession by the latter of a "collar" in place of a parapet, and of longer and stouter tentacles." In Stephenson's paper of 1922 *Condylactis* as well as *Parantheopsis* are on his list of genera, but the characters given by him are not good. Stephenson remarks (p. 269) "that it seems possible that two distinct species have been described under the name *cruentata*. The description rather suggests this and that one of the two is a *Condylactis* and the other a *Parantheopsis*." I cannot agree with him in this point, the specimens anatomically described by McMurrich, myself and Clubb are undoubtedly the same species. Only the identification of Couthouy's *Actinia cruentata* with the species, described by the above named authors is somewhat uncertain. Stephenson retains *Condylactis* "for forms with smooth collar aud no acrorhagi or appreciable sphincter," and *Parantheopsis* "for such as have vertical rows of verrucae and also acrorhagi but little or no sphincter." Concerning the acrorhagi (marginal sphaerules) there are in fact no such neither in *Condylactis* nor in *Parantheopsis.* True enough that McMurrich speaks of pseudoacrorhagi in *P. ocellata,* and Clubb of such in *P. cruentata,* but at the same time Clubb remarks that they have no trace of nematocysts, and McMurrich says, concerning the distal papillae in *cruentata* and the pseudoacrorhagi in *ocellata,* that they have no special development of nematocysts. Under such circumstances these formations cannot be considered as pseudoacrorhagi, a name proposed by myself (1899, p. 70) for such formations which look like marginal sphaerules but are provided with rather numerous nematocysts, though not so numerous as in the real acrorhagi (marginal sphaerules). The nematocysts of the pseudoacrorhagi are besides of about the same length as those of the other part of the column, while the nematocysts of the real acrorhagi mostly are considerably larger. In fact, as far I can see, the distal papillae ("pseudoacrorhagi") are nothing but the uppermost verrucae, which are sometimes not so much contracted as the other verrucae, but more vesicle-like.

Parantheopsis cruentata (Couth.) McMurr.

Actinia cruentata n. sp. Couthouy in Dana 1849, p. 8 Pl. 3 fig. 23. Gay 1852, p. ? (compare McMurrich 1904).
Cereus cruentatus Milne Edwards 1857—60, p. 268.
Bunodes cruentata Gosse 1860, p. 194, Verrill 1869, p. 467, Andres 1883, p. 832, 1884, p. 215.
Bunodactis cruentata Verrill 1899a, p. 42.
Actinioides cruentata Verrill 1899b, p. 146.
Condylactis cruentata McMurrich 1893, p. 150. Pl. 21 figs. 20—21. Carlgren 1897, p. 170 textfigs. 4, 5, 1899, p. 10 figs. 13—14, 1903, p. 3, Pax 1907, p. 30, Stephenson 1922, p. 269.
Parantheopsis cruentata McMurrich 1904, p. 233, Clubb 1908, p. 2. Pl. 1 fig. 1, Stephenson 1922, p. 270.
Anemonia dichogama n. sp. Kirk and Stuckey 1909, p. 384, Pl. 19, 20.
Gyrostoma dichogama Kirk and Stuck. Stephenson 1922, p. 268.
Bunodes kerguelensis n. sp. Studer 1878, p. 543 Pl. 4 fig. 16.

Condylactis kerguelensis Stud. Carlgren 1900, p. 31, Pax 1907, p. 32.
Condylactis crassa n. sp. Pax 1922, p. 78
Anthea (?) kerguelensis (Stud.) Kwietniewski 1895, p. 595.

Diagnosis. Column with rather well developed verrucae in the upper part of the column. No sphincter. Tentacles cylindrical, up to 48. Actinopharynx with two siphonoglyphes forming well developed aboral prolongations. Pairs of mesenteries up to 24. Between the stage of 12 pairs and that of 24 pairs there is often an intermediate octomerous stage, which is at least mostly (perhaps always) transient. Development of the mesenteries of the third order from the dorsal towards the ventral side. 2 pairs of directives. All or almost all mesenteries perfect and fertile. Parietobasilar muscles very strong forming a distinct fold inwards and reaching almost to the distal body-end, with muscle meshes also in the mesogloea. Nematocysts of the column $14-19 \times 1{,}5\ \mu$, those of the tentacles $19-29 \times 1{,}5$—about $2\ \mu$, those of the actinopharynx partly (24) $26-38 \times 2{,}5-3\ (3{,}5)\ \mu$, partly $19-26 \times 3{,}5-4\ \mu$, the latter broader at the basal end, spirocysts of the tentacles $12 \times 1-24 \times$ about $2\ \mu$.

Colour variable. Column grayish, grayish-white, white, olive-green, the proximal part often paler, sometimes rose-coloured, distal part sometimes deep carmine-purplish-red with numerous vertical lines of darker red, verrucae rose-white (*cruentata*), dirty white (*A. dichogama*), rose-red (*B. kerguelensis*). Tentacles olive-green or olive-gray sometimes in the distal part carmine-coloured or deep carmine with spots of gray or intense rose blood-red (*cruentata*) — purple (*B. kerguelensis*).

Dimensions in preserved state to about 3 cm long and 1,5 cm broad, length of the tentacles 0,5—0,6 cm. The largest specimen from Auckland Island was 2,8 cm long and 1,7 cm broad, and the length of the tentacles 0,5—0,6 cm.

Occurrence. Masked Island; Carnley Harbour; Auckland Islands. Under stones. 29.11.1914. Numerous specimens. Rocky shoal. 3.12.1914. 3 specimens.

Campbell Island; Perseverance Harbour. Under stones, low water. 8.12.1914. 1 specimen.

Further distribution. Campbell Island (teste Kirk and Stuckey. *A. dichogama*).

Kerguelen, Accessible Bay (Studer *B. kerguelensis*), Kerguelen

(*C. crassa* teste Pax), Chile, Talcahuano (teste McMurr.), Smyth Channel, Isthmus Bay, Strait of Magellan, Punta Arenas (teste also McMurr.), Sandy Point (teste McMurr.), Forests strait, Londonderry Isl., Gente Grande, Terra del Fuego, Cabo Espiritu Santo (teste McMurr.), Orange Bay (teste Couthony), Lapataia nueva, Uschuaia, Picton Isl., Navarin Isl., Lennox Isl., Puerto Pantalon, Harberton Harbour.

Falkland Islands. Port Harris (teste Clubb), Port Stanley.

Remarks. The exterior and anatomy of this species is described by McMurrich, myself and Clubb (compare the literature above). I will here only add some notes concerning the size of the nematocysts (n) and spirocysts (sp) in specimens from different localities.

Occurrence	Column n
Carnley Harbour	17—19 × 1,5 μ.
—	15—19 × 1,5 μ.
Campbell Island	—
—	—
Falkland Islands	—
Punta Arenas	14—18 × 1,5 μ.
Kerguelen (*P. kerguelensis* Stud.)	—

Occurrence	Tentacles n	Tentacles sp
Carnley Harbour	22—29 × 1,5—almost 2 μ.	11 × 1—24 × 1,5 μ.
—	22—26 × 1,5— —	12 × 1—24 × almost 2.
Campbell Island	22—29 × 1,5— —	—
—	22—26 × 1,5— —	—
Falkland Islands	24—29 × about 2 μ.	12 × 1—24 × 1,5.
Punta Arenas	19—24 × almost 2 μ.	12 × 1—24 × about 2.
Kerguelen (*P. kerguelensis* Stud.)	about 24 μ long.	—

Occurrence	Actinopharynx n	Actinopharynx n
Carnley Harbour	26—38 × almost 3 μ.	24—26 × 4 μ.
—	(24)—26—31 × 3.	—
Campbell Island	26—33 × almost 3—3.	20—24 × 3,5.
—	29—34 × almost 3.	—
Falkland Islands	26—35 × almost 3—3.	19—24 × about 3,5.
Punta Arenas	29—36 × about 3 (3,5).	26 × 4.
Kerguelen (*P. kerguelensis* Stud.)	30—36 × 3—3,5.	24 × 4.

As seen from the literature of the species I regard *Parantheoides cruentata* (Couth.), *Anemonia dichogama* Kirk and Stuck., (*Gyrostoma dichogama* Stephens.), *Bunodes kerguelensis* Stud. and *Condylactis crassa* Pax as synonyms. Hardly anything in the descriptions given by Kirk and Stuckey contradicts that we have to do with a species of *Parantheoides*. Only the distribution of the reproductive organs, according to K. and S. present on several secondary mesenteries, speaks against such a supposition. I think, however, that it is not worth much attention. If Kirk's and Stuckey's statement of brood-pouches with embryos in specimens containing testes is right it is clear that the testes were not fully developed. The description of the brood-pouches is besides very curious. ("The embryo lies in a distinct brood-pouch occupying the whole thickness of the mesentery!") The "false" mesenteries from the wall of the actinopharynx, described by K. and S., are of course the sectioned inner parts of perfect mesenteries, only with a lobe attached to the actinopharynx. To my mind *Parantheoides cruentata* and *Anemonia dichogama* are the same species.

I have also examined the type specimen of *Bunodes kerguelensis* and cannot find any distinct character, by which it could be separated from *cruentata*. Also Pax's description of *Condylactis crassa* from Kerguelen indicates that it is one and the same species, having thus a very wide circumsubantarctic distribution.

Bunodactis rubro-fusca n. sp.

Diagnosis. Pedal disc well developed. Column with longitudinal rows of rather small *Urticina*-verrucae, especially distinct in the upper part. Fossa deep. Sphincter rather weak to ordinarily developed, concentrated diffuse or palmate-circumscript. Tentacles cylindrical rather short, the outer almost as long as the inner, in numbers from 56 to about 100, often irregularly arranged. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Actinopharynx with numerous longitudinal furrows and ridges, and with 1—3 siphonoglyphes. Mesenteries more numerous than tentacles, in varying numbers to 122. 1—3 pairs of directives. Most mesenteries perfect. Pennons diffuse ordinarily developed. Parietobasilar muscles strong, forming a very distinct fold inwards. Basilar muscles very strong. All stronger mesenteries excl. the directives fertile. Nematocysts of the column 15—22 $\times$ almost 1,5—1,5 μ, those of the tentacles 19—29 $\times$ almost 1,5—2,5 μ, those of the actinopharynx partly 22—31 $\times$ 2—2,5 μ, partly 24—26 $\times$ 4—5 μ.

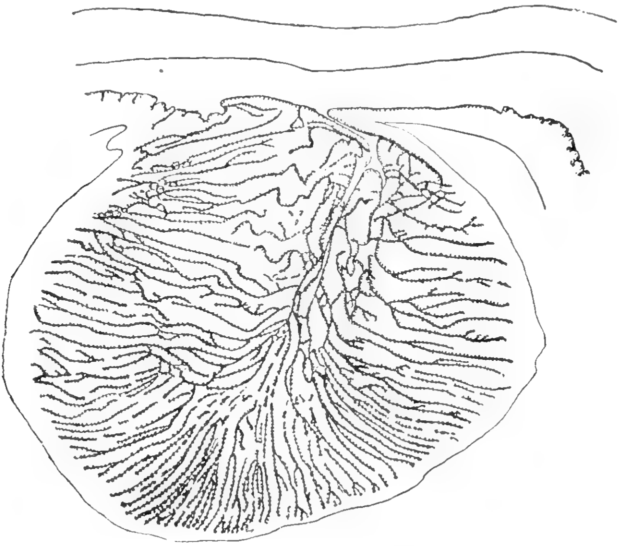
Colour in formaline: (specimens from Bay of Islands) Column dark reddish-brown, tentacles, oral disc, and actinopharynx of similar colour but paler, especially the actinopharynx. Specimens in alcohol (from Slipper Island and North Cape): column more or less distinct olive-brown.

Dimensions of two contracted specimens: length of the column 1,4 resp. 1,7 cm, breadth 2 cm, length of the tentacles about 0,4 cm.

Occurrence. Bay of Islands, under stones, 1.1.1915. 4 specimens. North Cape, under stones, 3.4.1915. 7 specimens. Slipper Island, littoral, 20.12.1914. 3 specimens.

Exterior aspect. The pedal disc is wide, the column especially in its upper part provided with rather small verrucae, which in its lower part are probably more sparse. The warts were most distinct in the specimens from Bay of Islands, in one of them, a very contracted specimen, the warts were obscure. Also in the alcoholic specimens they were indistinct, as the longitudinal and transversal furrows, the latter due to the strong contraction of the column, make the body look checkered. The fossa is deep. There are no marginal sphaerules. The tentacles are rather short, cylindrical or somewhat acuminated in their apex, smooth or somewhat longitudinally sulcated, according to the state of contraction. The outer tentacles are almost as long as the inner. Their arrangement is probably often irregular in connection with an often appearing irregular development of the mesenteries. The numbers vary; I counted in 8 specimens 56, 66, 66, 75, 78, 94 (96?), 98 and 99. The oral disc is indistinctly radially furrowed, about half the oral disc lacks tentacles. Of 10 examined specimens 6 were provided with a single siphonoglyphe, 2 specimens were normally developed with 2 siphonoglyphes, and 2 had 3 siphonoglyphes one of which weaker than the others. The aboral prolongations of the siphonoglyphes are inconsiderable.

Anatomical description. The ectoderm of the column is high and contains, besides rather numerous nematocysts, numerous rather elongated gland-cells. As far I can see from the not well preserved ectoderm the verrucae are of the same structure as in *Urticina*. The mesogloea of the column is of ordinary thickness,



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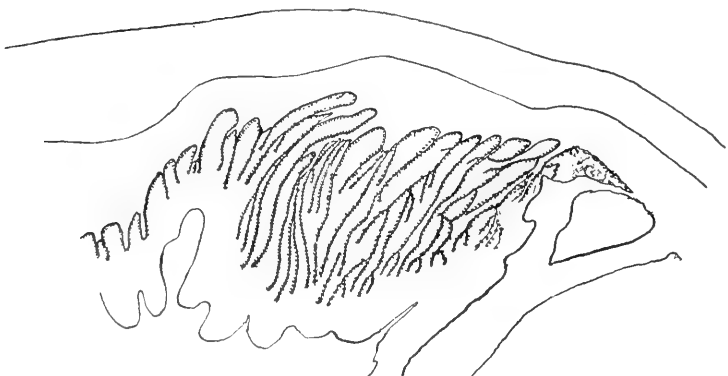

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Fig. 15, 16. *Bunodactis rubro-fusca*. Transverse sections of sphincters. Tentacle side to the right (fig. 15) on the left (fig. 16).

the circular muscles of usual development. The sphincter is rather weak to ordinarily developed. In three specimens, one from each of the three localities, it was palmate-circumscript (textfig. 15) in one of them (from Bay of Islands) more typical than in the other; in one specimen (from Bay of Islands) concentrated diffuse (textfig. 16). The endoderm of the column, tentacles and oral disc is strongly pigmented, in the other parts of the endoderm the pigment cells are more sparse. The endoderm lacks Zooxanthellae. The ectoderm of the tentacles is high and its nematocysts very numerous, the folds of the longitudinal muscles high and palissade-like arranged.

The number of mesenteries varies and is, at it seems, always somewhat larger than that of tentacles. In the specimen with 66 tentacles there were 39 pairs of mesenteries, a short distance below the tentacles, in the under part of the body, 45 pairs, in the specimen with 75 tentacles 45 pairs in the upper part, in that with 99 tentacles 58 pairs in the under part of the column. The largest number of mesenteries which I have observed, in a specimen from Slipper Island, was 122 (33 × 29 pairs), this specimen had 94 or possibly 96 tentacles. The examined specimens were furnished with 1—3 pairs of directives, corresponding to the siphonoglyphes. In the two specimens with 3 pairs of directives the directives were the first, seventh and twenty-seventh (resp. twenty-sixth). The muscle pennons were diffuse and ordinarily developed, in their under part somewhat more concentrated than in the upper, where they were broader. The parietobasilar muscles were strong, very broad in their under parts and forming a distinct fold inwards. Part of the muscles are enclosed in the mesogloea. The basilar muscles were very strong. All stronger mesenteries except the directives were fertile. The species is dioecious.

The size of the nematocysts (n) and spirocysts was as follows:

	North Cape	Slipper Island
Column (n)	16—22 × almost 1,5—1,5 μ.	17—19 × 1,5 μ.
Tentacles (n)	19—29 × almost 1,5—2,5.	21—29 × 1,5—about 2.
„ (sp)	11 × almost 1—19 × 1,5.	12 × almost 1—24 × 1,5.
Actinopharynx (n)	22—29 × almost 2—2,5.	25—31 × 2.
„	24 × 4.	26 × 5.

	Slipper Island	Bay of Islands
Column (n)	—	15—19 × 1,5 μ.
Tentacles (n)	—	20—27 × 1,5—2 (2,5).
„ (sp)	—	12 × 1—22 × 1,5.
Actinopharynx (n)	25—31 × 2—2,5.	24—26 × about 2 μ.
„	24 × 5.	—

The broad nematocysts with visible basal part to the spiral thread were extraordinarily sparse. In the specimens from North Cape and Slipper Island there were also some broader nematocysts, often irregular, probably developmental stages of the typical nematocysts.

Besides this species there were in a glass from New Zealand, Puhoi Rock, Hauraki Gulf (littoral under stones. 29.12.1914) some small specimens, the largest of which I have examined. The tentacles were 40 in number, the sphincter recalls that given in the textfig. 14 of *Bunodactis rubro-fusca*, the size of the nematocysts in the column was 13—14 $\times$ 1,5—almost 2 μ, in the tentacles 19—24 $\times$ almost 2—2,5 μ, in the actinopharynx 34—41 $\times$ about 3,5 μ, the spirocysts in the tentacles 8—16 $\times$ almost 1—1,5 μ. The endoderm lacks Zooxanthellae. Owing to the large nematocysts in the actinopharynx the species does not belong to *rubro-fusca*, but I will not give this species a name as the specimens were badly preserved, wherefore the description must be incomplete.

Anthopleura aureo-radiata (Stuck.).

Bunodes aureo-radiata n. sp. Stuckey 1909 a, p. 367, Pl. 17.
Bunodes aureo-radiata Stuck., Stuckey 1909 c, p. 394.

Diagnosis. Pedal disc rather wide. Column pillarlike provided in the upper part with distinct verrucae, in their configuration agreeing with those in *Urticina*. Margin distinct with a small fossa. At the margin 24 or more distinct marginal sphaerules. Sphincter palmate circumscript with comparatively few, but ramificated folds. Tentacles short, conical from 48 to about 70. Actinopharynx with numerous longitudinal ridges and two siphonoglyphes with well developed aboral prolongations. Mesenteries more numerous than tentacles. Pairs of mesenteries from 48 to about 76, hexamerously arranged. 2 pairs of directives. Mesenteries of the first, second and at least part of the third perfect, those of the first and second order fertile; of the mesenteries of the fourth order those situated at the mesenteries of the second order developed earlier than those at the first. Pennons of the mesenteries diffuse with rather low, often richly ramificated folds. Parietobasilar muscles broad, forming a distinct fold inwards. Nematocysts of the column partly 12—14 $\times$ 1 μ, partly 14—17 $\times$ 2, the latter sparse, those of the marginal sphaerules

28—34 × (2) 2,5—3 μ very numerous, those of the tentacles 12—17 × 1—1,5 (2) μ, those of the actinopharynx partly 19—24 × well 1,5—almost 2 μ, partly 19 × 4, the latter very sparse; spirocysts of the tentacles 12 × 1—19 × 2 μ.

Colour. Lower half pale brown or yellowish-brown, upper half greenish-brown. Tentacles and oral disc bronze-green. The mouth surrounded by a broken circle of yellow, from which extend 6 groups each consisting of 3 radiating yellow lines with a shorter yellow line between each 2 groups (Stuckey).

Dimensions of the largest specimens: length about 2 cm, greatest breadth in the distal part about 1 cm, length of the inner tentacles about 0,5 cm.

Occurrence. Bay of Islands. 1.1.1915. Several specimens. Oriental Bay, Wellington Harbour (teste Stuckey).

Exterior aspect. The pedal disc is well developed but not broad. The column is pillar-like, also in contracted state higher than broad, and provided with distinct hollow verrucae in the upper third. Below it they are indistinct. They correspond to the endocoels and are most numerous in the vicinity of the margin, where they are hemisphaeric. The margin is distinct with a small fossa. At the end of the rows of the warts there are at least 24 very distinct marginal sphaerules, in the larger specimens the number of marginal sphaerules is greater in connection with the development of new endocoels. Sometimes some sphaerules are miscarried. The tentacles are conical, short, at least 48, but in larger specimens to about 70 and hexamerously arranged. The oral disc is wide and more than half of it lacking tentacles. The actinopharynx is rather short with numerous longitudinal ridges and 2 distinct siphonoglyphes forming well developed aboral prolongations.

Anatomical description. The anatomy of this species was described by Stuckey; it is, however, in some points incomplete. As the ectoderm of the column is not sufficiently well preserved I cannot decide if the verrucae are structured as those of *Urticina*. It is possible that they agree more with the bladder in *Phymactis*. In the maceration preparations of the hemisphaeric warts in the uppermost part of the column I namely observed rather many small nematocysts, but they are probably situated in the edge-zone of the warts. The endoderm in all parts of the body contained numerous

Zooxanthellae as also in Stuckey's specimens. The sphincter is weak, almost palmate circumscript, with rather few but often richly ramificated folds (textfigure 17).

Concerning the mesenteries Stuckey states that there are 24 pairs of which 12 perfect. In a specimen with 48 tentacles there

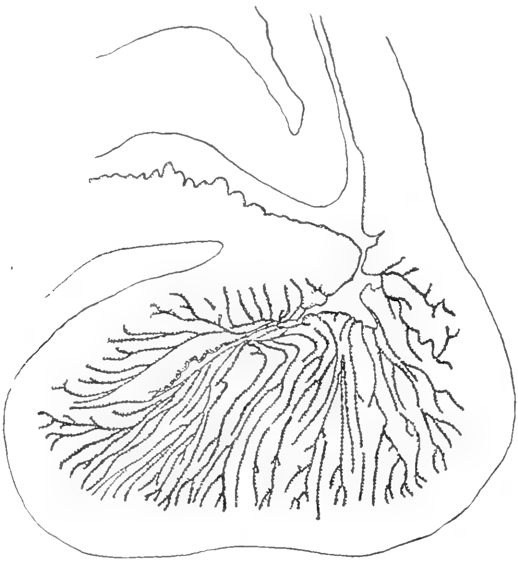


Fig. 17. *Anthopleura aureo-radiata*. Transverse section of sphincter. Tentacleside upwards.

were 24 pairs at the tentacles, 30 pairs in the aboral part of the actinopharynx, in another specimen with about 70 tentacles 38 pairs in the lower part of the body. If the cycles are indicated by letters the arrangement of pairs was as follows. (dm: directives).

dm dm
In the first specimen: 132431342431323132313424313243.

dm dm
„ „ second „ 1324313424313424313424315434243413424З.

The mesenteries of the fourth cycle seem to arise earlier in the exocoels situated on both sides of the mesenteries of the second order than in those bordered on the first. The mesenteries of the first, second and at least part of the third order are perfect, the last only in the uppermost part of the actinopharynx, and provided with filaments. The mesenteries of the first and second order were fertile. The species is dioecious. The pennons are diffuse, their folds not high but often richly ramificated, the pennons are broad on the mesenteries of the first order (compare the fig. 2, Pl. 17, Stuckey 1909a). The parietobasilar muscles are broad and form a distinct fold inwards, their muscle lamellae are low. The oral stomata are large, the marginal stomata smaller. The mesogloea in the region of the ciliated tract contains numerous cells.

Anthopleura sp.?

Diagnosis. Pedal disc broad. Column in contracted state conical, in the upper part with distinct *Urticina*-verrucae corresponding to the endocoels. Fossa distinct. Sphincter as in *aureoradiata*. Tentacles from 38—54. 2 distinct gonidial tubercles and siphonoglyphes. Mesenteries about 24 pairs one half perfect. Pennons of the mesenteries strong with high and ramificated folds (stronger than in *aureo-radiata*). Parietobasilar muscles strong, forming a distinct fold. Nematocysts of the column $12—17 \times (1)1{,}5—2\ \mu$, those of the tentacles $17—22 \times 1{,}5\ \mu$, those of the marginal sphaerules partly $29—37 \times 3{,}5—4{,}5\ (5)\ \mu$, partly $(22)\ 25—31 \times (2)2{,}5—3{,}5\ \mu$ (probably transition stages between the two kinds present), those of the actinopharynx $22—24 \times 2\ \mu$. Spirocysts of the tentacles $10 \times 1—23 \times 2{,}5\ \mu$. Endoderm with Zooxanthellae.

Colour in alcohol reddish or white.

Dimensions. Largest specimen from Paterson Inlet: breadth of the pedal disc 0,8 cm, height 0,7 cm.

Occurrence. Stewart Island, Paterson Inlet; littoral, under stones 18.11.1914 numerous specimens. Stewart Island, Port Pegasus; littoral, under stones 22.11.1914. 2 specimens.

I have not given a name to this species, because the specimens were not sexually ripe and it is possible that it is a young form of *Anthopleura inconspicua* (*Phymactis inconspicua* Hutton, *Bunodes inconspicua* Stuckey) or of *A. rosea* (*Bunodes rosea* Stuckey and Walton). The *Urticina*-verrucae were mostly distinct, in some specimens they had stones attached to them. The tentacles were 38, 38, 48, 54 in 4 examined specimens, in the last specimen (from Port Pegasus) the tentacles were 24 on one side, 30 on the other. In the largest sectioned specimen from Paterson Inlet the mesenteries were 48, of which one half perfect. Also in hand-section through the under part of the largest specimen from Port Pegasus I counted 48 stronger mesenteries, but it is probable that some very small mesenteries were besides present (compare the number of tentacles).

Gen. *Isocradactis* nov. gen.

Diagnosis. Actiniidae (Bunodactiidae) with well developed pedal disc. Column high with sucking warts (*Urticina*-verrucae) arranged in longitudinal rows and encreasing enormously in number a short distance from the tentacles. Several warts in bunches projecting from a common stalk form here in each compartment "frond"-like formations. Sphincter diffuse (or circumscript, *I. plicata* Hut. teste Stuckey). Tentacles numerous, short, conical, hexamerously arranged, the outer somewhat shorter than the inner. Longitudinal muscles of the tentacles and radial muscles of the oral disc ectodermal. Actinopharynx well developed. 2 siphonoglyphes with well developed aboral prolongations. Mesenteries hexamerously arranged. Most mesenteries perfect. Longitudinal muscle pennons diffuse bandlike. Parietobasilar and basilar muscles well developed. All mesenteries excl. the directives fertile.

The genus *Cradactis* proposed by McMurrich (1893 p. 197) is characterised by him as follows: "Phyllactidae with the "fronds" represented by bunches of simply or slightly branched, short tentacle-like structures. Sphincter aggregated or circumscribed. Column with verrucae." Unfortunately McMurrich gives no description of the structure of these "fronds". Stephenson (1922 p. 284) regards the genus *Saccactis*, proposed by Lager (1911) as identical with *Cradactis*. Lager describes the nature of the branched "fronds" in *Saccactis* and states that they are nematocyst batteries ("die kleinen Nesselkapseln scheinen indessen immer und vorzugsweise an den Spitzen der Zweige sich zu befinden und liegen daselbst dicht aneinander gedrängt" — 1911, p. 220). There are in all three specimens described here besides marginal sphaerules (Randsäckchen), which seem to be lacking in *Cradactis*. Thus it seems that *Cradactis* and *Saccactis* are two different genera.

However this may be, it is impossible to place *Cradactis magna*

Stuckey and *C. plicata* Hutton together with *Saccactis*. The "fronds" in these two species are namely nothing but aggregates of sucking warts (*Urticina*-verrucae) and no nematocyst-batteries. Stuckey also states (1909c p. 393) concerning *C. plicata* that "the lobes of the fronds are able to act as suckers". *Cradactis magna* and *plicata* are thus to be placed in the family Cribrinidae (Bunodactiidae) or Actiniidae (if in conformity with Stephenson we join the both families to one). As the type-species of the genus *Cradactis* is imperfectly described but as it is probable that the "fronds" here are batteries of nematocysts and not sucking warts, I have preferred to propose a new genus *Isocradactis* for *Cradactis magna* and *C. plicata*. If, however, it should appear that the genus *Cradactis* and *Isocradactis* are identical, the genus *Saccactis* must at any rate be kept, as I cannot agree with Stephenson in his supposition that the sucking warts are predecessors to the vesicles (1921 p. 500, 1922 p. 282). In such a case we should namely have to presume a change of function of the warts, accompanied by a re-appearance of the nematocysts, which are lacking in the apex of the warts. It seems more probable that these formations are developed independantly of each other. Besides, it is a pity that Stephenson (1921 p. 500) uses the term acrorhagi "to cover marginal sphaerules of any sort whether simple or compound, whether nematocyst-batteries or not". This leads to a confusion of almost the same kind as that concerning the terms "suckers", which has been used for so different formations as *Halcampa*-papillae, *Urticina*-verrucae, elevations of cinclides and other papillae of various structure on the body-wall.

Isocradactis magna (Stuckey).

Cradactis magna n. sp. Stuckey 1909c p. 394.

Diagnosis. Column cup-like. "Fronds" with very numerous sucking warts, especially in the endocoelar parts of the column, where their number amounts to considerably more than 100. Sphincter diffuse, in comparison with the size of the body rather weak. Tentacles, at least in contraction, distinctly longitudinally furrowed, about 192. Mesenteries about 96 pairs of which 2 pairs of directives, almost all perfect. Nematocysts of the column 12—14

$\times 1\ \mu$, those of the tentacles $19-23 \times 1{,}5$ — almost $2\ \mu$, those of the actinopharynx $26-31 \times 2{,}5$ — almost $3\ \mu$. Spirocysts of the tentacles $14 \times 1-26 \times 1{,}5\ \mu$.

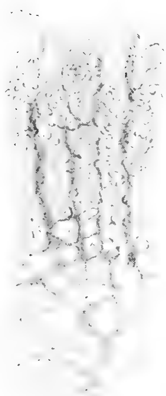
Colour: Column brownish-yellow, pinkish yellow, yellowish-green, green, dull gray. Tentacles bicoloured, proximal end deep purple or orange, distal end bright claret or yellow. Oral disk marked with brown streaks with regular white patches between (Stuckey). The single specimen preserved in formaline had the fronds blue-gray. The endoderm of the tentacles was almost black, the oral disc olive-brown.

Dimensions. Diameter of the pedal disc about 3,5 cm and of the oral disc about 7 cm, height of the column 7 cm.

Occurrence. Cape Maria van Diemen. In a rock pool. 4.1.1915. 15 specimens.

New Zealand. Plimmerton (teste Stuckey), Manakau harbour (teste Stuckey and Walton).

Exterior aspect. The pedal disc is well developed but considerably narrower than the oral disc. The column is cuplike and strongly enlarged at the distal end, which is folded. The two upper thirds of the column are provided with sucking warts (*Urticina*-verrucae), in the largest part of the warts-region arranged in longitudinal rows corresponding to the compartments. In the undermost part the warts are sparse, higher up they stand more close, in the uppermost part they increase rapidly in number at the same time as they diminish considerably in size. Here they are arranged on several pedunculate bunches forming together "fronds"-like formations in all compartments (textfig. 18). In the lower part of these "fronds" the warts are not so numerous as in the distal end. In the compartments corresponding to the exocoels the "fronds" contain about 30—40 warts, in those corresponding to the endocoels 130—140 or more. The endocoel-"fronds" are thus mostly more than twice as long as the exocoel-fronds and extend a good deal further towards the tentacles than these. There is no distinct limit between the larger warts and the warts in the "fronds", as some warts in the undermost part of the "fronds" form a transition in size to the larger warts of the column. The tentacles are about 192, hexamerously arranged. They are short, conical and in preserved state distinctly longitudinally furrowed, the outer are somewhat longer than the inner, which are often broader at the base than the outer. Probably there is no great difference in the size of the tentacles in extended state. The oral disc is very wide, hardly one third of it is provided with tentacles. It is deeply sulcated, the furrows correspond to the insertions of the mesenteries. The long actinopharynx is furnished with numerous longitudinal ridges and two broad siphonoglyphes, the aboral prolongations of which are well developed.



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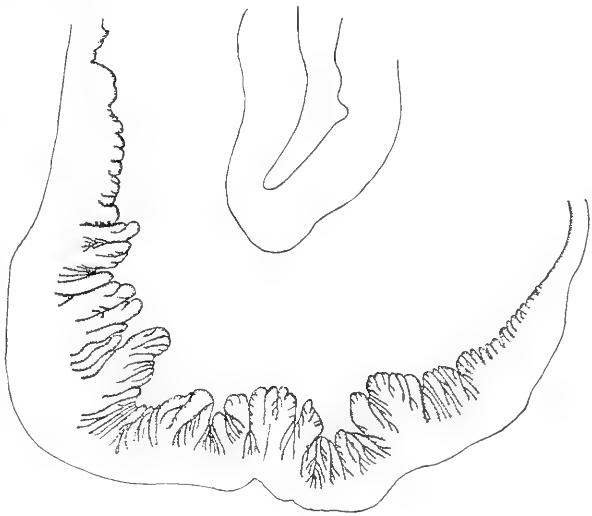

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Figs. 18, 19. *Isocradactis magna*. Fig. 18. Part of the upper body-wall with simple and composed verrucae ("fronds"). Fig. 19. Transverse section of sphincter. Tentacle-side on the left.

Anatomical description. The ectoderm of the column is high and contains few nematocysts $12-14 \times 1\ \mu$. The warts are structured as in *Urticina felina* and there are no nematocysts in their apex. The mesogloea is thick, fibrillar and provided with rather numerous, small protoplasma-poor cells, in the warts the mesogloea is thinner. The endoderm of the column is pigmented, especially in the region of the fronds, in the tentacles and oral disc. The circular muscles are well developed between the large warts as in *Urticina*, weak in the warts, the fronds-region shows a considerably weaker musculature than in other parts of the column. The sphincter is diffuse (textfig. 19), elongated and rather well developed, but in comparison with the size of the specimen rather weak. It is questionable if the contracted sphincter can cover the tentacles. The ectoderm of the tentacles is high. Its nematocysts are rather numerous, $19-23 \times 1,5$ — almost $2\ \mu$, its spirocysts very numerous $14 \times 1 - 26 \times 1,5$. The longitudinal muscles of the tentacles are ectodermal with palissade-like, inconsiderably ramificated folds about one third the height of the ectoderm. The mesogloea is thick and longitudinally folded. The radial muscles of the oral disc are also ectodermal and of the same appearance as the longitudinal muscles of the tentacles, but the folds are somewhat higher except at the insertions of the mesenteries. The ectoderm of the actinopharynx contains nematocysts with visible basal part to the spiral thread and somewhat acuminated in the distal end. Their size is $26-31 \times 2,5$ — almost $3\ \mu$.

The number of mesenteries agrees with that of the tentacles. The mesenteries are hexamerously arranged $6+6+12+24+48 = 96$ pairs of which 2 pairs of directives. The mesenteries of the four first orders are perfect. Also those of the fifth order reach almost to the actinopharynx, and some of these mesenteries seem to be perfect. Stuckey states that there are only 24 pairs perfect, probably he has not dissected the mesenteries at the mouth, where many more mesenteries are perfect than further down. The longitudinal muscles of the mesenteries form on the stronger mesenteries broad, band-like, diffuse pennons, on the weakest mesenteries the pennons are somewhat more concentrated. The folds are rather high, very numerous, thin and richly ramificated, especially on the stronger mesenteries and show a tendency to form humps (on sections) in the inner part of the mesenteries. The parietobasilar muscles are very strong and are enclosed in the mesogloea between the mesogloea-thickenings of the basilar-muscles and the main lamella of the mesenteries. The basilar muscles are strong. All mesenteries exclusive the directives were provided with ovaries.

Epiactis mortenseni n. sp.

Diagnosis. Margin distinct with a well developed fossa. Cinclides in the region of the margin. Sphincter strong, circumscript, of various appearance. Tentacles of the same number as the mesenteries, in large specimens 70—88. Longitudinal muscles of the tentacles and radial muscles of the oral disc palisade-like arranged. 2 siphonoglyphes with long aboral prolongations. Mesenteries hexamerously arranged in 4 cycles, the fourth cycle incomplete. Mesenteries of the fourth order developing earlier in the exocoels situated next to the mesenteries of second order than in those next to the first. All mesenteries of the three first orders and part of the fourth perfect. Longitudinal muscle-pennons strong, band-like. Strong parietobasilar and basilar muscles. Mesogloea in the region of the ciliated tract with numerous cells. Embryos developing in a deep circular fold round the column. Nematocysts of

20 21

Fig. 20, 21. *Epiactis mortenseni* with young ones on the column (comp. the text). Fig. 20. Specimen from Campbell Isl. Magnif. 3/1. Fig. 21. Specimen from Auckl. Isl. Magnif. 1,3/1.

the column $17—26 \times 1{,}5–2\ \mu$, those of the tentacles about $20—31 \times 2(—2{,}5)\ \mu$, those of the actinopharynx partly $29—38 \times 2{,}5\ \mu$, partly $22—29 \times 3{,}5—4\ \mu$.

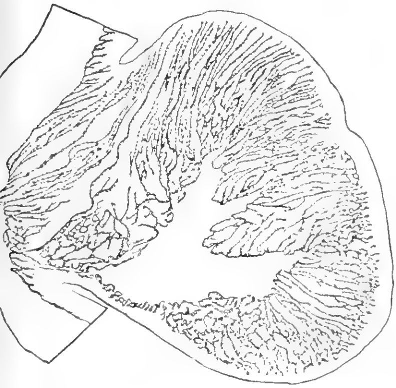
Colour?

Dimensions of the largest specimen in contracted state: Breadth of the pedal disc 2,2 cm, hight of the column 2 cm.

Occurrence. Auckland Islands, Carnley Harbour, under stones, low-water. 29.11.1914. Several specimens. 30.11.1914. 1 spec. Campbell Island, Perseverance Harbour. Under stones, low-water. 8—9.12.1914. Several specimens, most of them small.

Exterior aspect. Pedal disc is wide. Column. as far I can see, without sucking warts, in the Auckland-specimens very contracted, so that there have arised deep circular and shallower longitudinal furrows. 4 of the Auckland-specimens and 4 of the Campbell-specimens bear small young arranged in a more or less distinct annulus round the column (figs. 20, 21). In one specimen there was round the column a deep fold, in which several young were hidden wholly or for the greater part. In some of the other specimens provided with young the circular fold for the young was hardly differentiated from the other circular folds of the column. The embryos had mostly immigrated from the brood-pouch. It is namely clear that we have to do with a species, the young of which develop their first stages in a brood-pouch of the same kind as in *Cricophorus nutrix* (compare this species). The margin is distinct with a deep fossa. In sections through the marginal region I have observed cinclides (stated in 5 specimens). The tentacles are hexamerously arranged. The youngest cycle is incomplete. The number of tentacles varies in the larger specimens from 70 to 88. Strange to say I have not observed the largest number in the largest specimens. Two specimens, each with 88 tentacles, were not more than 1 resp. $1{,}_8$ cm broad at the pedal disc and $0{,}_5$ resp. 1 cm high, while 3 specimens with a pedal disc of $2{,}_3$ resp. $2{,}_3$ and 2 cm diameter and with a column $1{,}_9$, $1{,}_8$ and $1{,}_5$ cm high had at most 76 tentacles. The tentacles were short, conical and in consequence of a bad preservation strongly depressed in the apex and here with a wide perforation. The oral disc is radially furrowed. The actinopharynx is well developed with numerous longitudinal ridges and furrows and 2 as a rule symmetrically situated siphonoglyphes, which are provided with long aboral prolongations.

Anatomical description. The ectoderm of the column is high with numerous gland cells and nematocysts. The mesogloea is, at least in contracted state, thicker than the ectoderm, fibrillar and provided with numerous protoplasma-poor cells. The circular muscles of the endoderm are ordinarily developed. The sphincter is circumscript and mostly strong but varies in its structure. I have sectioned the sphincter of several specimens both from Auckland and Campbell Island. In the textfigure 22 we observe a main lamella of the mesogloea strongly thickened in the inner parts and divided in 2 thick branches; in a second specimen the main lamella was thickened in the inner part without partition, in a third specimen (textfig. 23) it was thin, in a fourth specimen it was thick but short. In a fifth specimen, which I have sectioned in two different plans, the main lamella was in one place divided in two portions, making the sphincter look almost double, in the other place there was no main lamella and the sphincter is with a broad base attached to the column. In the Campbell specimens the main-



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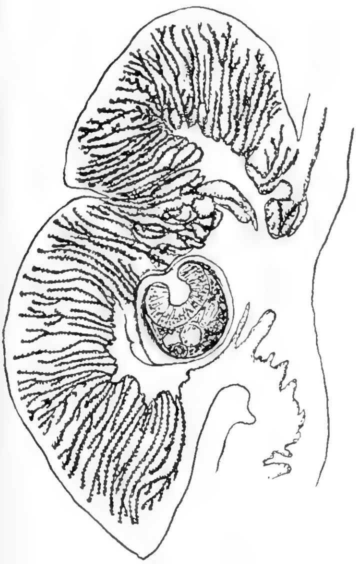

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Figs. 22—24. *Epiactis mortenseni.* Transverse sections of sphincters. Tentacle-side downwards. The organism seen in fig. 24 is, probably, a parasitic Trematod (cf. text).

lamella was mostly thin, as also in some of the Auckland specimens. There were more or less anastomoses between the muscle folds. In the sphincter I have often observed a parasite, as far I can see a Trematod (textfig. 24), once I have found it in the pennon of a mesentery. It is possible that this parasite has had some influence upon the structure of the sphincter. The ectoderm of the tentacles is high with rather numerous nematocysts. The longitudinal muscles of the tentacles and radial muscles of the oral disc are ectodermal. Their folds are not or only a little branched and palisade-like arranged. The actinopharynx is high and contains 2 kinds of nematocysts, partly riblike, partly broader at the basal end, and with visible basal part to the spiral thred. The siphonoglyphes are distinctly differentiated, their endoderm considerably thickened, in other parts of the actinopharynx thin.

The mesenteries are hexamerously arranged in 4 cycles, of which the fourth is incomplete. In no dissected specimen I have found more than 44 pairs in all and this in 2 specimens with 88 tentacles. 3 other specimens had 37, 37 and 38 pairs. Characteristic to the development of the mesenteries of the fourth cycle is that they always seem first to arise in the exocoels situated next to the mesenteries of the second order. In two specimens with 37 pairs the arrangement was in 5 primary exocoels (1)34243(1), in the sixth (1)434243(1). There is thus only a single pair of the fourth order developed in the exocoels next to the mesenteries of the first order. In the specimen with 38 pairs the arrangement was similar except that two pairs of the fourth order were developed next to the primary mesenteries. In the specimens with 44 pairs most mesenteries of the fourth cycle were regularly arranged, in 4 exocoels bordering the primary mesenteries they were lacking. In no case have I seen the mesenteries of the fourth cycle developed earlier in the outer compartments of each hexamer than in the inner. All mesenteries of the three first cycles and at least part of those of the fourth are perfect. The longitudinal muscles of the mesenteries form well developed broad bandlike pennons. These latter show often deep longitudinal furrows (humps on sections). The muscle folds are in the strongest mesenteries of the longest specimens richly branched and numerous. The parietobasilar muscles are well developed and form a distinct fold on the mesenteries. Where the parietobasilar muscles have grown on the main lamella of the mesenteries there are mesogloeal muscles. The basilar muscles are well developed. The mesogloea in the region of the ciliated tract is provided with numerous cells, especially at the middle streak. All mesenteries inclusive the directives were fertile. The species is dioecious.

The size of the nematocysts and spirocysts in four specimens was as follows. (The three first specimens were taken at the Auckland Islands, the fourth at the Campbell Island. n: common nematocysts, nv: nematocysts with visible basal part to the spiral thread, sp: spirocysts.

	Length and breadth (at the pedal disc) of the specimens		Column n	Tentacles n
1)	2	2	$22—26 \times 1{,}5—2\ \mu$	$24—31 \times 2\ \mu$
2)	1,3	1,6	$19—24 \times 1{,}5$ (2)	$20—29 \times 2$
3)	1,5	2,2	—	$26—29 \times 2$
4)	1,4	2,2—1,4	$17—20 \times 1{,}5$ (2)	$23—26 \times 2$ (2,5)

	Tentacles sp	Actinopharynx n	Actinopharynx nv
1)	$22 \times 2 —41 \times 2{,}5$ (3) μ	$31—38 \times 2{,}5\ \mu$	$22—29 \times 4\ \mu$
2)	$17 \times 1{,}5—36 \times 2{,}5$	—	—
3)	—	$31—36 \times 2{,}5$	$22—26 \times 3{,}5—4$
4)	$17 \times 1{,}5—31$ (2,5) 3	$29—36 \times 2{,}5$	—

The specimen 4 was not so much contracted as the others.

Epiactis Thompsoni (Cough.)

Actinia Thompsoni n. sp. Coughtrey 1874 p. 280.
„ „ Cough. Hutton 1878 p. 313.
„ ? „ „ Farquhar 1898 p. 527.
Leiotealia „ („) Stuckey 1908 b. p. 370, Pl. 18, figs. 1, 2, Pl. 19, figs. 1—3, Pl. 20, fig. 1.; 1908 c. p. 395.
Epiactis Thompsoni (Cough.) Stephenson 1922, p. 274.
Epiactis novo-zealandica n. sp. Stephenson 1918 p. 24, Pl. 1, fig. 8, Pl. 3, fig. 28, Pl. 6, figs. 3—4.

Diagnosis. Pedal disc well developed. Column thick, cylindrical, forming irregular flat papillae or folds on the surface, most distinct in the upper part. Fossa deep. Sphincter strong, circumscript with a more or less distinct main lamella and densely packed folds. Tentacles of ordinary length about 60—96, the inner somewhat longer than the outer, conical and in contracted state longitudinally sulcated. Oral disc radially furrowed. Longitudinal muscles of the tentacles and radial muscles of the oral disc very well developed with high, dichotomically ramificated folds. Two deep siphonoglyphes with long aboral prolongations. Actinopharynx with numerous longitudinal ridges. Pairs of mesenteries in variable numbers unto 48. 2 pairs of directives. All or most mesenteries perfect. Muscle pennons strong, diffuse, in the youngest mesenteries more concentrated. Parietobasilar muscles very strong, forming a distinct projection, some of its part enclosed in the mesogloea. Basilar muscles very strong. Nematocysts of the column 19—22 $\times$ almost 2 μ, those of the tentacles 29—34 $\times$ almost 2 μ — alm. 2,5 μ, those of the actinopharynx 23—29 (31) $\times$ 2 $\times$ well 2,5 μ. Spirocysts of the tentacles 22 $\times$ almost 2—53 $\times$ 4,5 μ.

Colour: Column white and red in alternate longitudinal lines, the red in small irregular spots, the white markings more or less elliptical (Stuckey), striped vermillion and whitish-yellow (Coughtrey). Tentacles dull white, often with tips manoe, or light-brown (Stuckey), yellowish-white; or sometimes purple (Coughtrey). Oral disc reddish brown, marked in radiating lines by the insertions of the mesenteries. Peristome of darker colour (Stuckey). Column with red stripes (Mortensen). In preserved state in formaline: Column yellowish-fleshcoloured, the tentacles somewhat darker (Mortensen's specimens); in alcohol?: yellowish (Stephenson).

Dimensions of the largest specimen: hight 5,5 cm, breadth of the pedal disc 4 cm, breadth of the column mostly 3,5 cm (height 6—7 cm, breadth 4—5 cm, tentacles 2,5 cm, Stuckey).

Occurrence. E. of North Cape. 55 fms. Hard bottom. 2.1.1915. 6 specimens. (Mortensen). 7 miles E. of North Cape. 70 fms. (British Antarctic-Exp. teste Stephenson). Debora bay, Port Chalmers (teste Coughtrey). Cock strait from Plimmerton to Seatown, littoral (teste Stuckey).

Exterior aspect. The exterior of Mortensen's specimens agrees with that given by Stuckey and Stephenson. The number of tentacles were in 4 specimens 82, 82, 87, 96, while Stuckey states 60 and Stephenson 96. The arrangement is probably hexamerous although from the stage with 48 tentacles to that with 96 a transitory decamerous state may appear. (Compare besides the diagnosis).

Anatomical description. I have not much to add to Stuckey's and Stephenson's descriptions of the anatomy. The structure of the column is well described by these authors. In the uppermost part of the column I have on sections observed endodermal bays extending into the mesogloea to about half its thickness and arranged in longitudinal lines in the endocoels, which are here considerably larger than the exocoels. If these bays have arisen by contraction or are present also in wholly expanded spec-

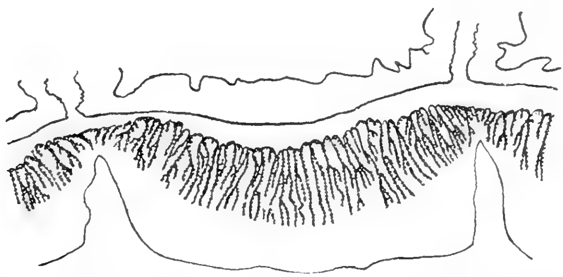

Fig. 25. *Epiactis Thompsoni.* Transverse section of oral disc.

imens I cannot decide. The structure of the sphincter varies. In one specimen the sphincter agrees mostly with that reproduced by Stephenson, the main lamella is, however, indistinct as in Stuckey's figure of the sphincter. Sections of the sphincter in another specimen showed fewer folds than in the sphincter previously reproduced, the main lamella is considerably stronger and in the distal part now divided in two branches, now thickened in the middle part, being here either more solid or more or less divided in meshes. Stuckey's figure of the muscles in the tentacles agrees with the figures in my sections, only in the furrows the longitudinal muscle layer is weaker in my sections. Stuckey has certainly sectioned a very extended tentacle. The radial muscles of the oral disc agree with the longitudinal muscles of the tentacles (textfig. 25), they are weaker at the insertions of the mesenteries than between the insertions.

The pairs of mesenteries were in the specimen with 96 tentacles 48 $(6 + 6 + 12 + 24)$, in a specimen with 82 tentacles 41 $(6 + 6 + 12 + 16 + 1)$. In the latter the mesenteries of the fourth cycles are missing in several exocoels, one pair of a fifth cycle was besides present. If we indicate the different cycles by letters the arrangement of the pairs was as follows (dm: directives).

```
dm                                dm
1 3 4 2 3 1 3 4 2 4 3 4 1 4 3 4 2 4 3 1 3 4 2 4 3 4 1 4 3 4 2 4 3 4 1 3 2 4 3 4 5.
```

The two closer examined specimens were not provided with reproductive organs.

Concerning other anatomical structures compare the diagnosis and Stuckey's and Stephenson's descriptions.

Remarks. As far as I can see Stephenson's *Epiactis novozealandica* is identical with the specimen described by Stuckey as *Leiotealia Thompsoni.* I cannot find any real difference between these species. The structure of the sphincter varies namely so much in the specimens that one might propose two species only on the base of the nature of the sphincter.

Fam. **Phelliidae**.

Genus *Acraspedanthus* nov. gen.

Diagnosis. Pedal disc well developed. Column smooth with cinclides in the lower part. Sphincter mesogloeal, weak. Margin rather distinct, without fossa. Tentacles short, conical, hexamerously arranged, the outer tentacles considerably shorter than the inner. Longitudinal muscles of the tentacles and radial muscles of oral disc ectodermal. 2 well developed siphonoglyphes. Mesenteries more numerous in the distal part than in the proximal. Perfect pairs of mesenteries (macrocnemes) 6, fertile, with strong pennons, with filaments and acontia. Imperfect mesenteries (microcnemes) sterile without filaments, pennons and acontia. Basilar muscles well developed also on the stronger imperfect mesenteries. Nematocysts of the acontia rather small.

As this genus is provided with only 6 macrocnemes, cinclides and acontia, it should be referred to the family Diadumenidae if we follow Stephenson. But as I have pointed out (1921 p. 21) this family is certainly heterogeneous and *Diadumene* itself not allied with the other genera. *Pelocoetes, Phytocoetes* and *Mena* belong to the *Athenaria*, as far I can judge from Annandale's and Stephenson's descriptions. Comparing *Acraspedanthus* and *Dia-*

dumene with each other they also seem not to be related to each other. The thing is I cannot accept Stephenson's interpretation that the mesenteries in *Diadumene* (*Metridium*) *schilleriana* are divisible into macrocnemes and microcnemes. It is not certain that Annandale has always sectioned the whole specimens, and in that case it is possible that gonads, filaments and pennons were always present also in the stronger imperfect mesenteries. (Compare *Diadumene neozelanica*, where these organs begin rather far down on the imperfect mesenteries). In each case there is in some individuals in *Diadumene*, in opposition to *Acraspedanthus*, no distinct difference between the mesenteries of the first and the second order. To my mind *Diadumene* is more allied with the genus *Aiptasia* than with *Acraspedanthus* (compare *Diadumene* p. 234). Concerning the last genus I think we can, at least provisionally, place it among the Phelliidae. It agrees with *Phellia* in almost all characters Only the structure of the column is different, in *Phellia* the column is divisible into scapus and capitulum, in *Araspedanthus* not. Further the cinclides are absent in *Phellia*, present in *Acraspedanthus*. I am, however, of opinion that we can hardly base family characters on the presence or absence of cinclides. Stephenson as well as I myself have shown that cinclides may appear or be lacking in species belonging to one and the same genus outside the old Sagartiidae. Besides, we are at present far from a satisfactory classification of the Actinians with acontia. Only when the anatomy of these forms shall have been revised and their nematocysts in the acontia examined, the relationship between the genera can be expected to be brought to a close.

Acraspedanthus elongatus n. sp.

Diagnosis. Body cylindrical, pillarlike, also in very contracted state mostly higher than broad. Sphincter close to the tentacle base, reticular, wholly separated from the endodermal circular muscles. Tentacles 6 + 6 + 12 + 24 + an incomplete fifth cycle. More than half the oral disc provided with tentacles. Actinopharynx more than one third of the length of the body with about 14 longitudinal ridges. Pairs of mesenteries 6 + 6 + 12 + an imperfect fourth cycle only in the uppermost part of the body. 2 pairs of directives, Pennons very strong, circumscript. Nematocysts of the column

17—24 × 1,5 μ — almost 2,5 μ, those of the tentacles 16—27 × 1,5 — almost 2—2,5 μ, those of the actinopharynx partly 14—29 × 3—4,5 μ, partly 26—34 × about 2—2,5 μ, those of the acontia partly 22—34 × about 2 (2,5) μ, partly 14—17 × 1,5 μ. Spirocysts of the tentacles 12 × almost 1 μ—30 × 2,5 μ.

Colour?

26

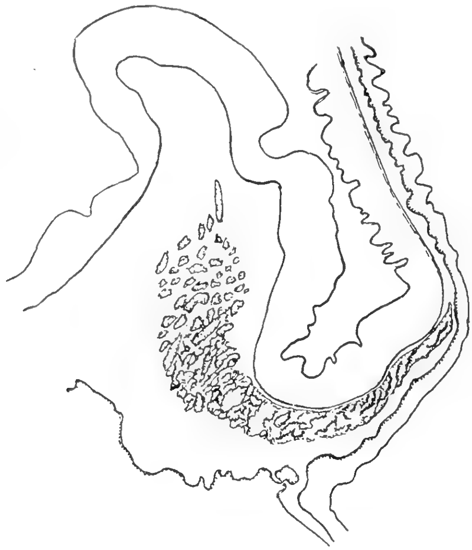

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Fig. 26, 27. *Acraspedanthus elongatus*. Fig. 26. Specimen from North Cape. Magnif. 2,5. Fig. 27. Transverse section of sphincter and longitudinal section of part of a tentacle.

Dimensions of the longest specimen from North Cape: length of the column 2 cm, largest breadth 1,2 cm, length of the inner tentacles 0,5 cm — of the smallest specimen: length 1 cm, breadth 0,3 cm, length of the inner tentacles 0,3 cm. The very contracted specimen from Slipper Isl. was 1,4 cm high and 1,8 cm broad.

Occurrence. North Cape 3.1.1915. 14 specimens. Slipper Isl. at ebb; 20.12.1914. 1 sp.

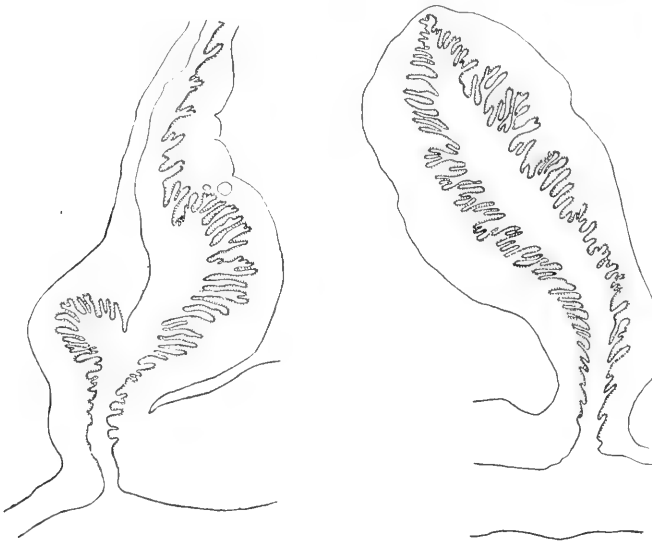
Exterior aspect. The pedal disc is distinct, flat and well outlined from the column. The column is pillar-like (Fig. 26) and must in wholly expanded state be of considerable length in comparison with the breadth. Although namely the column in all specimens from North Cape was strongly transversally folded, the length of the body is much greater than its breadth. Only in the very contracted specimen from Slipper Island the breadth was greater than the height. In some specimens the column was provided with indistinct longitudinal furrows corresponding to the insertions of the mesenteries.

28 29

Fig. 28, 29. *Acraspedanthus elongatus.* Transverse sections of pennons in the actinopharynx region (fig. 28) and the reproduction region (fig. 29). Fig. 28 spec. from Slipper Isl. Fig. 29 from North Cape. Inner side upwards.

In the lower half of the column I have observed cinclides in sections. The column is not provided with verrucae, the margin is rather distinct but there is no fossa. Though the mesenteries are most numerous in the uppermost part of the column, the oral disc is not broader than the column. The number of tentacles varies from 48 (the specimen was not sexually ripe) to 70. They are conical, short and the inner considerably longer than the outer ones which may be partly very small. More than half the oral disc is provided with tentacles. The actinopharynx is long and provided with 7 longitudinal ridges on each side of the directives. Both siphonoglyphes are of ordinary breadth and lack aboral prolongations.

Anatomical description. The ectoderm of the column is rather high, but considerably thinner than the mesogloea. It contains numerous gland cells and nematocysts 17—24 × about 1,5 μ — almost 2,5 μ. The cinclides seem to have arisen partly by in-



30 31

Fig. 30, 31. *Acraspedanthus elongatus*. Fig. 30. Transverse section of the outer part of the mesentery figured in fig. 28. Fig. 30. Transverse section of one mesentery of the second order.

vaginations from the ectoderm, partly by evaginations from the endoderm. The circular muscles of the column are ordinarily developed, on the other hand, the mesogloeal sphincter is weak and situated close to the outer tentacles. It is mostly reticular, broader in the proximal part than in the distal, and wholly separated from the endodermal circular muscles. It stands nearer to the ectoderm than to the endoderm (textfig. 27). The ectoderm of the tentacles is high and contains numerous nematocysts 16—27 × 1,5—2,5 μ (in four examined specimens 16—22 × 1,5 μ, 17—27 × 1,5 — almost 2 μ, 17—22 × 1,5 μ, 21—26 × 2—2,5 μ) and numerous spirocysts 12 × almost 1 μ—30 × 2,5 μ. The longitudinal muscles of the tentacles and radial muscles of the oral disc are ectodermal, rather weak than strong. The ectoderm of the actinopharynx is high and provided with numerous gland cells and nematocysts partly 26—34 $\times$ about 2—2,5 μ, partly 14—29 $\times$ 3—4,5 μ. The former nematocysts are sparse, the latter numerous and broader at their basal end, the basal part to the spiral thread is here perspicuous.

The pairs of mesenteries are 24 (6 + 6 + 12 of which two pairs of directives) in the greater part of the body. In the uppermost part an incomplete fourth cycle is present. There is a great difference between the 6 first pairs and the rest of them. The former are macrocnemes (perfect, provided with reproductive organs, strong pennons, filaments and acontia) the latter microcnemes (imperfect and without these organs). The longitudinal muscle pennons are very strong, circumscript, the insertions of the lamellar inner and outer parts of the mesenteries at the pennon stand very close to each other or concur. The folds of the pennons are very high and richly ramificated (textfigs. 28, 29), sometimes, especially in the directives, there is in the pennon a rather thick mainlamella from which the thinner folds branch off. The parietal parts of the longitudinal muscles are well developed and form a rather distinct projection. The parietobasilar muscles are not so broad as the former, but agree with them in structure (textfig. 30). Both are stronger in their inner parts than in the outer, where the folds are low. The imperfect mesenteries are narrow, in the undermost part at the insertions on the pedal disc considerably broader. The folds of their longitudinal muscles, covering the whole surface of the mesenteries, agree with the parietal part of the muscles in the macrocnemes (textfig. 31). The prominences of the mesogloea to which the muscles are attached are rather thick and in the distal part sometimes a little ramificated. The mesenteries of the third cycle are weaker than those of the second. The basilar muscles are well developed also on the imperfect mesenteries. The acontia are rather thick and contain numerous nematocysts 22—34 $\times$ about 2 (2,5) μ, (22—31 $\times$ about 2 μ; 26—34 $\times$ about 2 μ, 24—34 $\times$ 2 (2,5) μ, three specimens examined). Exceptionally I have here observed some small nematocysts 14—17 $\times$ 1,5 μ. In the specimen from Slipper Isl. I observed also a few nematocysts 26—34 $\times$ 3—3,5 μ. They are possibly development stages of the larger nematocysts. The species is dioecious.

Gen. *Synphellia* n. gen.

Diagnosis. Pedal disc large, considerably broader than the oral disc. Column divisible into scapus and capitulum, the former with *Halcampa*-papillae. Sphincter strong and long, mesogloeal. Tentacles considerably fewer than the mesenteries, the inner longer than the outer. Longitudinal muscles of the tentacles and radial muscles of the oral disc ectodermal. 2 siphonoglyphes. Mesenteries more numerous in the basal part than in the proximal, 6 pairs or a few more perfect. Perfect mesenteries with strong, high, diffuse to almost circumscript pennons, imperfect mesenteries without pennons. Filaments on the perfect as well as on the stronger imperfect mesenteries. Parietobasilar muscles in the perfect mesenteries rather well developed. Acontia with nematocysts of ordinary length. Distribution of the reproductive organs? (Perfect mesenteries probably fertile?).

As the species described below is not sexually ripe, it is very difficult to decide if we have to do with a new genus or not, as also whether the genus really belongs to the Phelliidae. It is certainly different from *Phellia* and *Isophellia* on account of the more numerous mesenteries in the proximal than in the distal part, but recalls in that respect *Paraphellia* (compare Haddon's and Stephenson's description of that genus). Possibly it will appear in the future that *Synphellia* and *Paraphellia* are synonyms, and in that case *Synphellia* may be dropped.

Synphellia aucklandica n. sp.

Diagnosis. Cuticle of the papillae strong. Sphincter not stratified, not occupying the whole breadth of the mesogloea, with small but numerous rather close meshes. Tentacles about 48. Pairs of mesenteries in the upper part about 24. 6 or a few more perfect. Nematocysts of the capitulum $14-18 \times 2\ \mu$, those of the tentacles $14-19 \times 1{,}5$—almost $2\ \mu$, (those of the actinopharynx $13-14 \times 2-2{,}5\ \mu$?), those of the acontia $29-41 \times 2{,}5-4(4{,}5)\ \mu$, spirocysts of the tentacles $14 \times$ about $1-29 \times 3\ \mu$.

Colour in alcohol. *Halcampa*-papillae brown, other parts pale yellow.

Dimensions of the largest specimens: length 0,8—0,9 cm, breadth of the pedal disc 0,5—0,6 cm, length of the inner tentacles about 0,2 cm.

Occurrence. Auckland Islands, Masked Island, Carnley Harbour. Under stones, at low-water. 3.12.1914. 4 specimens.

Exterior aspect. The pedal disc is broad but often somewhat damaged. The column is conical with the narrowest part at

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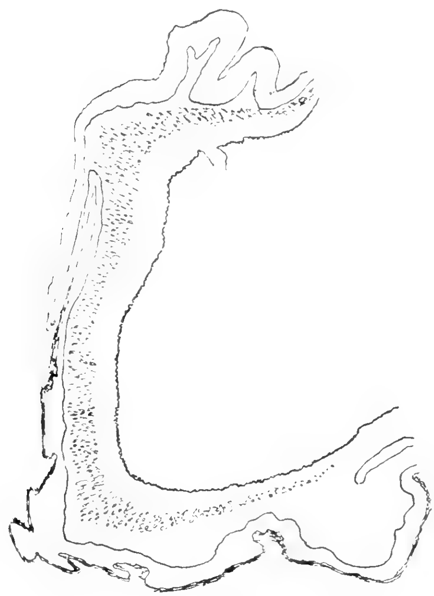

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Fig. 32, 33. *Synphellia aucklandica.* Fig. 32. Magnif. 5/1. Fig. 33. Transverse section of sphincter. Tentacleside upwards.

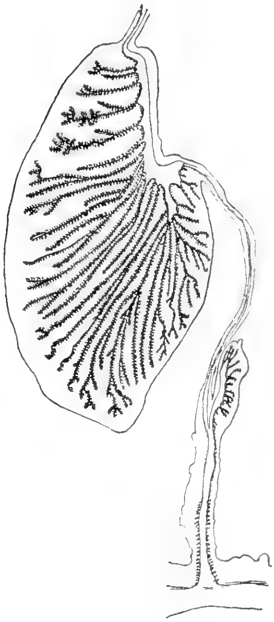
the margin of the scapus, as shown in the fig. 32. The column is namely divisible into scapus and capitulum, of which the former is provided with large, close papillae and a cuticle, which is in the apex of the papillae several times thicker than in the other parts of the scapus. The scapus recalls that in *Halcampa arctica* Carlg. The capitulum is short, longitudinally wrinkled. The tentacles are about 48 in number and probably a little irregularly but hexamerously arranged. They are cylindrical, the inner of ordinary length but considerably longer than the short outer ones. The oral disc is not broad and is radially sulcated. The actinopharynx is long and longitudinally wrinkled, in the sectioned specimens there are 2 siphonoglyphes, especially in the one specimen asymmetrically arranged.

Anatomical description. The specimens were not well preserved, wherefore I cannot give a perfect description of the anatomy of this species.

The ectoderm of the scapus and capitulum is rather thick, the former is provided with a rather well developed cuticle, which in the apex of the *Halcampa*-papillae is strongly thickened. In the capitulum there are nematocysts $14—18 \times 2 \mu$ in size and often somewhat curved. The mesogloea of the column is thick, on its outer side very folded and contains very numerous ramificated cells. The sphincter (textfig. 33) is long and strong and extends rather far into the scapus. It does not occupy the whole breadth of the mesogloea and approaches more to the ectoderm than to the endoderm, except in its undermost part. Its muscle meshes are small and rather close. The circular muscles of the column are ordinarily developed. The high ectoderm of the tentacles is provided with very sparse nematocysts $14—19 \times 1{,}5$—almost 2μ and very numerous spirocysts $14 \times$ about $1 \mu—29 \times 3 \mu$. The longitudinal muscles of the tentacles are ectodermal and rather well developed, weaker are the ectodermal radial muscles of the oral disc. The ectoderm of the actinopharynx is rather high and contains nematocysts with visible basal part to the spiral thread. Their sizes were $13—14 \times 2—2{,}5 \mu$ (possibly these nematocysts belong to the oral disc as it was difficult to get a good maceration preparation of the actinopharynx). The mesogloea of the actinopharynx is thin in the furrows, considerably thickened in the ridges; the ridges of the siphonoglyphes are stronger than the rest of them.

The mesenteries are somewhat irregularly but evidently hexamerously arranged. I have sectioned 2 specimens transversally, one of which (a) completely. In the specimen a there were 26 pairs of mesenteries in the upper part, of which 6 pairs perfect. In 5 of the 6 primary exocoels there were 3 pairs of mesenteries (of a second and third order) in the sixth 5 pairs, one of which very weak. The two pairs of directives were asymmetrically arranged. On one side, between the directives, only 7 pairs — among these one perfect pair — were developed, on the other side

17, of which 3 pairs perfect. The sixth exocoel containing 5 mesenteries was situated on the latter side. In the undermost part of the column a fourth cycle is present, but I cannot decide if this cycle is complete, as the specimen was somewhat damaged in this part.



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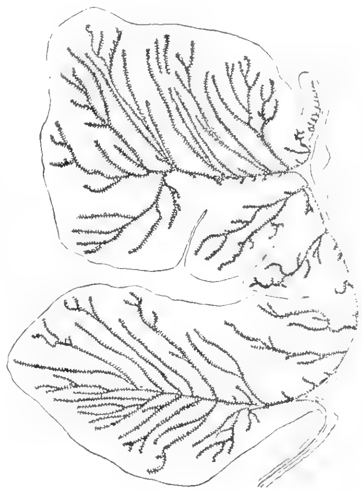

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Figs. 34, 35. *Synphellia aucklandica.* Transverse sections of a directive mesentery (fig. 34) and of a pennon of a non-directive (fig. 35).

The second specimen was in the upper part provided with 27 pairs of mesenteries. Between the two pairs of directives there were on one side 11 pairs, of which 2 pairs and a single mesentery of the second order perfect, on the other side 14 pairs, of which 3 pairs perfect. In the exocoels between these perfect pairs normally 3 pairs were developed, only in a single exocoel one pair of the third order was missing.

The perfect mesenteries were furnished with strong, high, diffuse to almost circumscript pennons (the latter in the directives). In the textfig. 34 I have reproduced a section of the pennon of a directive mesentery, in the textfig. 35 a pennon of a non-directive.

The shortest muscle folds in these latter are often situated in the middle part of the pennons. The parietobasilar muscles of the perfect mesenteries are distinct but not strong. They are, however, by a fold inwards separated from the main lamella of the mesenteries (textfig. 34). In the imperfect mesenteries the parietobasilar muscles and the longitudinal muscles — both more strongly developed in their inner parts — form an almost continuous layer. The imperfect mesenteries of the second order have filaments. Also in some of those of the third order I have observed filaments. The acontia are well developed and contain numerous nematocysts 29—41 $\times$ 2,5—well 4 (4,5) μ. Possibly there are here two kinds of nematocysts, partly 29—31 $\times$ 2,5, partly 34—41 $\times$ 3—4 (4,5) μ. The basal part to the spiral thread is mostly perspicuous in the former, indistinct in the latter. The reproductive organs were not developed in the two examined specimens.

Fam. **Diadumenidae.**

Diagnosis. Thenaria without sphincter. Column without ectodermal muscles. Margin not distinct. Tentacles not retractile or not perfectly. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Mesenteries not or not distinctly divisible into macro- and microcnemes. Muscle pennons diffuse or with a tendency to be circumscript. Reproductive organs from the mesenteries of the first cycle. Nematocysts of the acontia well developed (in the type-specimen of *Diadumene*?).

The diagnosis of the family Diadumenidae is altered here, owing to the excluding of all genera except *Diadumene* itself from the family (compare p. 224) and the enclosing of the genus *Aiptasiomorpha* in the genus *Diadumene*. I am namely of opinion that if we retain the family Diadumenidae we must transfer *Aiptasiomorpha*, distinguished from *Aiptasia* by the absence of a sphincter, to this family. On the other hand it seems that Diadumenidae and *Aiptasia* with its cognates are nearly related to each other, wherefore in the future it may possibly be necessary to place *Diadumene* in a family Aiptasiidae (as subfamily already proposed by Simon 1892). The genus *Aiptasia* and its related forms, *Bartholomea*, *Carlgreniella* and *Heteractis*, are namely not so heterogeneous as shown in Stephenson's diagnosis (1920), but are a very homogeneous group and, in opposition to Stephenson's classification, to my mind not belonging to the Metridiidae. There are, indeed, in the anatomy of *Aiptasia* and allied genera some points which certainly need a revision. Concerning the sphincter, we see in Stephenson's diagnosis, based mostly on statements by previous authors, that *Aiptasia* and *Heteractis* have a mesogloeal sphincter, *Aiptasiomorpha*, among other species *A. diaphana*, and *Bartholomea* no sphincter. The sphincter of *Carlgreniella* is, according to Watzl, mesogloeal. As to the type species of *Aiptasia*, *A. couchii*, Stephenson has shown, that it is provided with a mesogloeal sphincter, completely imbedded in the mesogloea. Through kind obligingness of Stephenson I have had the opportunity to control the correctness of his statements on some of his sections. Further I have recieved from him[1]) a glass with 3 specimens of this species and sectioned one of them, and also here the mesogloeal sphincter was distinct. On the other hand, an examination of two specimens from the station in Plymouth, which were smaller than the others ($2{,}_4$ resp. 2 cm long and $1{,}_2$ resp. $1{,}_1$ cm broad at the oral disc) showed no distinct mesogloeal sphincter. In some sections I have not observed any sphincter, in other sections there were, however, rudiments of muscle-fibrils in the mesogloea. Thus it seems that the mesogloeal muscle meshes here arise rather late. Besides, the sphincter in *A. couchii* is weaker than in the other species mentioned below, and the muscles separated from the endoderm only by a very thin mesogloeal lamella. Concerning the sphincter in *Heteractis lucida*, I can confirm the statement of McMurrich and Watzl that it is mesogloeal. On the other hand, Duerden declares that there is no sphincter in this species (1899 p. 356). I have sectioned one part of a specimen recieved from Duerden and certainly investigated by him, and there was indeed a mesogloeal sphincter present. The sphincter of *Carlgreniella* is likewise mesogloeal. *Bartholomea* has no sphincter in Stephenson's diagnosis. Watzl has however stated that *B. annulata* and *werneri* are provided with a mesogloeal sphincter. I have controlled Watzl's statement and come to an identical result (2 specimens of *B. annulata* and one

1) I beg here to express my best thanks to Dr. Stephenson for sending me this material.

specimen of *B. werneri* examined). I have also sectioned a specimen of *annulata* from Bermudas and one of Duerden's specimens from Jamaica, and there was a mesogloeal sphincter in both (Duerden's description of the arrangement of the mesenteries agrees perfectly with the observations I have made on the Bahamas-specimens, so that there is no doubt that they belong to one and the same species). According to McMurrich (1889) and Pax (1910) *Aiptasia* (? *Bartholomea*, Stephenson 1920) *tagetes* has no sphincter, according to Watzl (1922) a mesogloeal one. A control examinations of two Bahamas specimens examined by Watzl confirms the correctness of his observations. A specimen determined by Duerden as *A. tagetes* and received from him is also provided with a mesogloeal sphincter. For comparison I have also examined *Aiptasia diaphana*, *mutabilis* and *saxicola*, of which the first (O. a. R. Hertwig 1879) and the second (Simon 1892) should be without a sphincter. *Saxicola* (1 spec. examined) as well as *diaphana* (2 spec. examined) are however like the other species provided with a mesogloeal sphincter.

How are we to interpret these various statements? Is there in one and the same species a variation from no sphincter to a weak mesogloeal one, is there one species described under different species-names or do the various statements of the presence or absence of a sphincter depend upon erroneous observations? In the cases in which I have been able to control the observations, f. inst. of Duerden's specimens of *lucida*, *tagetes* and *annulata*, erroneous observations explain the differences. Although I am mostly inclined to regard the many differences concerning the nature of the sphincter as depending upon less exact observations — it is, in fact, often difficult to discover the sphincter in strongly expanded specimens, especially if the sections are somewhat obliquely cut, — the possibility is not quite excluded that a variation concerning the sphincter can occur and that some authors have described one and the same species under two different names.

Also concerning the distribution of the reproductive organs the statements of different authors variate, no doubt owing to incomplete observations, possibly also to the fact that the specimens were examined at the end (or beginning?) of a reproductive period. As to first *Aiptasia couchii* I have not been able to decide, if the main-mesenteries are fertile, as my specimens, as well as those examined by Stephenson, were not sexually ripe. On account of a special structure of the mesenteries outside the filaments I believe that these mesenteries later on become reproductive organs. According to my observations on *Bartholomea annulata* (3 specimens examined), *werneri* (1 spec. examined), *Aiptasia tagetes* (2 spec. examined), *mutabilis, saxicola* and *diaphana*, and *Heteractis lucida* (1 spec. of each species examined), the mesenteries of the first cycle are fertile. So it is also with *Carlgreniella*. (Watzl's statement of sterile mesenteries of the first order is false, he has not examined the lower part of the body). Thus it seems clear to me that the genera are perfectly homogeneous concerning the distribution of the reproductive organs. As regards the size of the mesenteries of the first cycle, it ought to be remarked that the fifth and sixth couples are often more weakly developed than the other mesenteries of this cycle. I have observed this in *B. annulata, A. tagetes* and *saxicola*.

Also in a third character the species examined by myself show agreement. Stephenson (1920) has observed that *A. couchii*, the type of *Aiptasia*, is provided with an ectodermal longitudinal muscle layer in the uppermost part of the column. I can confirm his observations. But not only *A. couchii*, also all the species (*mutabilis*?) mentioned above are according to my examinations furnished with such a layer, weaker in some species, somewhat stronger in others. The muscles do not seem to form a continuous muscle lamella as for inst. in *Protanthea* and *Boloceroides*, but the muscle fibrils seem more isolated. The muscle layer also ends rather soon, the greater part of the column lacks an ectodermal musculature. Also the nematocysts of the acontia show good agreement in all species.

I give here at last a diagnosis of the family *Aiptasiidae*.

Thenaria with a very weak, elongated mesogloeal sphincter (sometimes in young specimens almost endodermal?). Uppermost part of the column with weak ectodermal longitudinal muscles. Tentacles not retractile. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. Mesenteries not divided in macro- and microcnemes. Fifth and sixth couples often weaker than the other mesenteries of the first order. Muscle pennons diffuse. Reproductive organs from the mesenteries of the first order. Acontia and their nematocysts well developed.

Gen. *Diadumene* Stephenson.

Diagnosis. Pedal disc well developed. Column smooth (or with suckers!). Cinclides scattered. A ring-like convex collar present round upper part of the column (always?). Margin not distinct. No differentiated sphincter. Tentacles numerous. Oral disc with tendency to be undulated. 6 or some more perfect pairs of mesenteries. Longitudinal muscle pennons diffuse or with tendency to be circumscript. Reproductive organs on the perfect mesenteries incl. the directives and on the stronger imperfect. Nematocysts of the acontia well developed (in the type specimen?).

As before mentioned I have enclosed *Aiptasiomorpha* in the genus *Diadumene* (compare p. 234). Of the species of *Aiptasiomorpha*, set down in the paper of Stephenson (1920, p. 531), *A. minima* is here described as a *Diadumene* and *A. diaphana*, which is provided with a mesogloeal sphincter, belongs to the genus *Aiptasia*. Concerning *Aiptasiomorpha paxi* and *leiodactyla* a renewed examination of the sphincter is necessary, as it was probably overlooked by Pax. It ought namely to be remarked that this author has not observed the mesogloeal sphincter in *tagetes* and *annulata*.

As to Stephenson's division of the mesenteries into macrocnemes and microcnemes in the type species of *Diadumene* I have already (p. 225) expressed my doubt. Also the constancy of the presence of a collar in all stages of expansion of the column is somewhat dubious. Annandale (1915, p. 77) says namely that if the column is fully expanded "the oral disc is withdrawn for some distance into the column and the wall of the latter are partially closed by a constriction above the tips of the tentacles", and further "When the oral disc has been completely extruded the column itself contracts strongly" because of a contraction of the longitudinal muscles in the mesenteries. In this stage "a very distinct fold "(collar)" of the body-wall can be seen some little distance below the base of the tentacles". Whether the collar is visible also when the uppermost part of the column is expanded I find not mentioned in Annandale's paper. Besides, it is remarkable that a collar-like formation is perspicuous in *Aiptasia diaphana* and *A. tagetes* in certain stages of preservation. I have, however, provisionally put down the presence of a collar in the diagnosis. Concerning at last the "suckers", which usually should be present in the type-species it remains to decide their nature. The term suckers has namely been used for several very different formations (compare p. 213). Are they perhaps elevated cinclides? Before the nature of the "suckers" and the size of the nematocysts in the acontia have been examined, it is difficult to decide, whether *Diadumene* and *Aiptasiomorpha* are different genera or not.

Diadumene neozelanica n. sp.

Diagnosis. Column smooth. Collar very distinct in contracted state of the column. Margin somewhat undulated. Tentacles 160 to about 200 (or more) cylindrical, the inner considerably longer than the outer. Tentacles distributed over the greater part of the oral disc. Actinopharynx long with 2 siphonoglyphes well developed and with aboral prolongations. 6 or a few more pairs of mesenteries perfect. Well developed diffuse longitudinal muscle pennons on the perfect and stronger imperfect mesenteries. Parieto-basilar and basilar muscles weak. Nematocysts of the column 12—19 $\times$ (2,5) 3—(3,5) μ, those of the tentacles partly (17) 19—29 $\times$ almost 3—4 (5) μ, partly 15—19 $\times$ 1,5 (2) μ, those of the actinopharynx partly 22—29 (34) $\times$ 3—3,5 μ, partly 24—26 $\times$ 1,5 — almost 2 μ, those of the acontia partly 46—70 $\times$ 5—6 μ, partly 13—17 $\times$ 1,5 μ, partly 17—19 $\times$ 2,5—3 μ.

Colour?

Dimensions in preserved, rather contracted state: Largest specimen from Kaipara: length 2 cm, breadth 1,3 cm, that from Slipper Island, length: 1,5 cm, diameter of the column a short distance from the pedal disc 0,6—0,8 cm, diameter of the oral disc 0,7 cm, length of the inner tentacles about 0,3 cm. Smallest specimen: height of the column 0,7 cm, breadth of the pedal disc 0,5 cm.

Occurrence. Slipper Island, low water, together with *Thoë vagrans*. 20.12.1914. 3 specimens.

Kaipara, on conglomerates of sand. 8.1.1915. Several specimens.

Exterior aspect. The pedal disc is well developed, of almost the same breadth as the oral disc. The column is smooth with indistinct longitudinal furrows, which are more distinct and more numerous above the collar. In all specimens there is namely a perspicuous collar at some distance from the tentacles as in *Metridium.* Whether this collar is formed by a contraction of the pennons in the lower part of the body, resulting in a small invagination of the upper part of the column in the lower, or the collar

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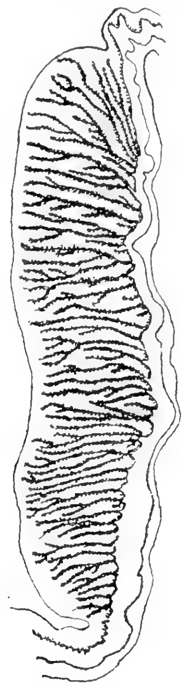

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Figs. 36, 37. *Diadumene neozelanica.* Fig. 36. Specimen from Kaipara. Magnif. 5/1. Fig. 37. Transverse section of pennon in the mesentery of first order.

is visible also in not contracted specimens, it is difficult to decide in preserved specimens. The circumstance, that in two very expended and elongated specimens (the one specimen is figured in fig. 36) there was a low, but rather distinct wall in the same place as in the other more contracted specimen, possibly speaks for the presence of a real collar. Above the collar the column is broader towards the tentacles at the same time as showing a tendency to be lobed. The cinclides are not visible in contracted state of the animal, but I have observed them in sections as well in the vicinity of the oral part of the actinopharynx, and at the basal disc as also in the collar region. Thus they are probably scattered. The tentacles are very numerous, I counted in the largest specimen about 160 tentacles. They are more cylindrical than conical, the inner tentacles considerably longer than the outer, one part of which are very small. Almost the whole disc is provided with tentacles. The actinopharynx is long and furnished with about 16 longitudinal folds. In the single examined (the largest) specimen from Slipper Island there were 2 siphonoglyphes not symmetrically situated, ordinarily developed and provided with aboral prolongations, in two examined Kaipara-specimens 2 siphonoglyphes were present, in one specimen one siphonoglyphe was weak (compare below).

Anatomical description. The ectoderm of the column is ordinarily high and contains numerous gland cells and nematocysts. The latter are sometimes a little broader in their basal part than in their distal and somewhat curved, their basal part to the spiral thread is visible. Their sizes are 12—19 $\times$ (about 2,5) 3—(3,5) μ. The mesogloea of the column is in the preserved specimens of about the same thickness as that of the ectoderm, sometimes thinner, sometimes a little thicker. It is fibrillar and contains very numerous cells. The cinclides are invaginations of the ectoderm as well as excavations of the endoderm. The circular muscles of the column are weak, especially in the region above the collar. There is no trace of a sphincter (3 specimens sectioned). The nematocysts of the tentacles are numerous and of two kinds, the one agrees in its structure with the nematocysts in the column but is somewhat larger (17) 19—29 $\times$ about 3—4 (5) μ, the other is opaque and rib-like and 15—19 $\times$ about 1,5 (2) μ in size. The longitudinal muscles of the tentacles and the radial muscles of the oral disc are ectodermal and rather weak. The ectoderm of the actinopharynx is high and thicker than the mesogloea. Its nematocysts are partly 22—29 (34) $\times$ 3—3,5 μ, partly 22—26 $\times$ 1,5—almost 2 μ, the basal part to the spiral thread is visible in the former.

The mesenteries. I have sectioned transversally the proximal half of the largest specimen from Slipper Island. There were in the under part of the actinopharynx 50 pairs of mesenteries, of which 2 pairs of directives not symmetrically arranged. 8 pairs were perfect, between the directives on one side 2 on the other

4. In the latter half the mesenteries were almost regularly developed, between the perfect pairs there were mesenteries of a second, third and fourth order intercalated, only a pair of the fourth order was lacking. In the other half the arrangement was more irregular, only between one of the directive pairs and the adjacent perfect pair the arrangement was regular. In the uppermost part of the body the mesenteries are more numerous, probably about 160, just as the number of tentacles. Also in the uppermost part of the actinopharynx only 8 pairs seem to be perfect (controlled by dissection); it is, however, possible that some of the mesenteries of the second order reach the actinopharynx with a small flap. In one specimen from Kaipara there were in its uppermost part 6 pairs of perfect mesenteries and 2 siphonoglyphes of the same structure. In another specimen from the same locality I have found 9 pairs of perfect mesenteries, three pairs on one side of the two directives and four on the other. The extra-pairs are situated in the vicinity of the one directive pair, and their pennons are weaker than those of the other perfect mesenteries. The siphonoglyphe, connected with this directive pair, is weaker than the other. The mesenteries are thin, except at the pedal disc and in the region of the pennons. The mesenteries of the first and second order are namely provided with well developed diffuse pennons in their inner half (textfig. 37). Also the mesenteries of the third order show a tendency to form pennons. The other mesenteries are very weak. The parietobasilar and basilar muscles are weak. The mesenteries of the first, second and at least part of the third orders are furnished with filaments. On the second and third order the filaments begin rather far down at the under part of the actinopharynx, the whole upper part of these mesenteries seem to lack filaments. The filaments are of the usual structure. The mesenteries of the first, second and most of the third order, inclusive the directives, were fertile. The species is dioecious. The nematocysts of the acontia are of three kinds, partly $46—70 \times 5—6\ \mu$, partly $13—17 \times$ about $1{,}5\ \mu$, partly $17—19 \times 2{,}5—3\ \mu$, both the former very numerous, the latter sparse. The basal thread of the largest capsules is perspicuous; the smallest nematocysts are almost of uniform breadth and at one end acuminated as a pin, the short and broad capsules are provided with a visible basal thread, broader at the basal end.

In the largest specimen from Slipper Island there were also larger opaque nematocysts sometimes irregularly curved, and 77—84 × about 5 μ in size. They are probably development stages of the large typical nematocysts. The size of the nematocysts in the acontia is shown in the following table. (Specimens 1—3 from Slipper Island, 4—5 from Kaipara. The specimens 4—5 were larger than spec. 1).

Specimens 1) length 1,5, breadth 0,6—0,8 cm: 58—70 × 5—6 μ,
Specimens 2) length 0,7, breadth 0,7 cm: 46—55 × 5.
Specimens 3) length 0,7, breadth 0,5 cm: 48—55 × 5.
14—17 × about 1,5 μ, 17—19 × 2,5—3 μ.
14 × about 1,5 17—19 × 2,5—almost 3.
13—14 × about 1,5 17 × 2,5.
Sp. 4) 55—70 × about 6, 14—16 × about 1,5, 17 × 2,5—almost 3.
Sp. 5) 49—65 × about 6, 13—15 × about 1,5.

Remarks. It is possible that this species is identical with *Metridium canum* Stuckey 1914 p. 134 from the Kermadec Islands, but the description of this species given by Stuckey is so imperfect and short, that it is impossible to decide its place. Among other things Stuckey does not mention any collar.

Diadumene minima (Stephs.)

Aiptasia minima n. sp. Stephenson 1918, p. 49, Pl. 1 figs. 2, 3, Pl. 6 fig. 1.
Aiptasiomorpha minima (Steph.) 1920, p. 531.

Diagnosis. Pedal disc well developed. Column smooth with probably few cinclides (arrangement?). Sphincter absent. Tentacles conical, smooth to about 70 (or more?) of ordinary length, the inner at least twice as long as the outer. Longitudinal muscles of the tentacles weak, ectodermal. 1 or 2 siphonoglyphes. Perfect pairs of mesenteries 6 or some more, 1 or 2 pairs of directives. The first and second cycles of mesenteries with pennons. Pennons diffuse with rather few but ramificated folds situated in the inner part of the mesenteries, in the directives higher and more concentrated. Parietobasilar and basilar muscles weak. The first and second cycles of mesenteries fertile (teste Stephenson) and with filaments. Reproduction also by longitudinal fission. Nematocysts of the column partly 12—14 × 1,5—almost 2 μ, partly 12—14 × 2,5 (3) μ, the latter broader in the basal end, those of the tentacles partly 17—22 × (2) 2,5 μ

often somewhat curved, partly $10-14 \times 2\ \mu$, partly $12-14 \times 1\ \mu$, those of the actinopharynx $22-24 \times 2{,}5\ \mu$, those of the acontia partly $43-51\ (56) \times 5-6\ \mu$, partly $26-33 \times 2-3\ \mu$ broader in the basal end, partly $17-21 \times 1{,}5\ \mu$. Spirocysts of the tentacles $12 \times 1-17 \times 2\ \mu$.

Colour?

Dimensions of one of the largest specimens: length and breadth $0{,}5$ cm. All other specimens, except one, smaller.

Occurrence. Bay of Islands, 7 specimens. (The same locality, teste Stephenson).

Fig. 38. *Diadumene minima.* Magnif. $^{10}/_{1}$.

Exterior aspect. The specimens agree in their exterior with the description given by Stephenson 1918. All my specimens seem, however, to be in a state of regeneration after longitudinal fission. One side is mostly shorter than the other (Textfig. 38) and the regenerating zone is often very distinct in the short side. There is, therefore, no doubt that the specimen multiplies by longitudinal fission. Possibly some of Stephenson's specimens are also in a state of fission (compare Pl. 1 fig. 3 in Stephenson's paper). The tentacles were in the two largest specimens 48 resp. about 70. In the two largest examined specimens I observed only a single, well developed siphonoglyphe, probably arisen in connection with the asexual reproduction.

Anatomical description. My examination of the anatomy of this species agrees well with that described by Stephenson. Concerning the nematocysts (compare the diagnosis) it is possible, that there are transition forms between the two kinds in the column as also between the smaller nematocysts of the tentacles. It is also uncertain, if the nematocysts $26-33 \times 2-3\ \mu$ really belong to the acontia. I have namely not been able to isolate the acontia, the maceration preparations contained also parts of the filaments. The smallest nematocysts in the acontia I have only observed in sections.

The specimens were not well preserved and the actinopharynx often evaginated. In one specimen, sectioned in its whole length, there were 7 perfect pairs of mesenteries, of which, as far I can see, only a single directive pair. Also in another specimen I observed only one such pair. The mesenteries were in the proximal part of the former specimen some sixty, probably 66; the exact number I cannot confirm as the smallest mesenteries were very weak and the endoderm not well preserved. The mesenteries of the first and second order are provided with pennons situated in the inner part of the mesenteries, while the longitudinal muscles in the outer part were very weak. The pennons are diffuse with rather few but ramificated lamellae. In the directives the folds are higher than in the other mesenteries and somewhat more concentrated. The mesenteries of the first, second and some of the third cycles are provided with filaments. The parietobasilar and basilar muscles are weak. The two examined specimens lacked reproductive organs.

Fam. **Sagartiidae.**

Stephenson has (1920) divided the old Sagartiidae in several new families and expects several more. True enough we can bring together the genera in several groups, more or less distinct from each other, but I prefer, at least at present, to keep the family Sagartiidae for all genera provided with acontia and basilar muscles which are not included in the families Diadumenidae (restr.), Aiptasiidae and Phelliidae. I have namely examined several new genera, provided with acontia, which cannot be referred neither to the families proposed nor to those supposed by Stephenson. More extensive examinations of the anatomy of the Sagartiidae may prove, whether it is necessary to divide this family any further, but in such a case I should think it would have to be done partly on another basis than that proposed by Stephenson. I especially very much doubt that the presence or absence of cinclides is of any real value as a family character, although it can be used in certain cases.

Gen. *Thoe* Gosse.

Diagnosis. Sagartiidae with broad pedal disc. Column smooth, not divisible in regions, without verrucae ("suckers") but with cinclides. Sphincter rather well developed. Tentacles rather numerous, the inner longer than the outer. Longitudinal muscles of tentacles and radial muscles of oral disc ectodermal. More than 6 pairs of mesenteries perfect. Pennons diffuse (rather) well developed. Reproductive organs present from the mesenteries of the first cycle. Nematocysts of acontia (at least) of two kinds, the larger nematocysts of ordinary or more than ordinary size.

As it seems to me necessary to subdivide the genus *Sagartia* I here propose to re-erect the genus *Thoe* for such *Sagartia*-species having a smooth column without suckers and cuticle, and provided with ordinary or more than ordinarily large nematocysts in the acontia. I have namely, among others, examined *Sagartia troglodytes, viduata, luciae* and *sphyrodeta* and found that the three latter species, to my mind belonging to the genus *Thoe,* are so different from the first species that they must be referred to a separate genus. Meanwhile the diagnosis here given of the genus *Thoe* is only tentative as we must expect an examination of more species before a good diagnosis can be established. In this connection I will mention that the real *Thoe* (*Sagartia*) *viduata* (O. F. Müll.) is very probably not identical with the species *viduata* from the coast of Great Britain and from the Mediterranean.

Thoe vagrans (Stuck.).

Sagartia vagrans n. sp. Stuckey 1909 c p. 384, Pl. 17 fig. 2.

Diagnosis. Column cylindrical. Cinclides in the middle third of the column. Margin distinct, in larger specimens somewhat undulated. Sphincter strong, broad, proximally by degrees diminishing, mostly reticular. Tentacles numerous, up to 192, in contracted state rather short, the inner considerably longer than the outer. Somewhat more than half the oral disc provided with tentacles. Siphonoglyphes well developed with aboral prolongations. Pairs of mesenteries to about 96, hexamerously arranged. Mesenteries of the 1—3 (and a part of the fourth) cycles perfect. Longitudinal muscle pennons diffuse, in the middle part of the mesenteries on the three or four oldest cycles. Parietobasilar muscles weak. Reproductive organs only on the third and fourth cycles? (always?). Nematocysts of the column 12—17 × 2—2,5 μ, often somewhat curved, those of the tentacles partly 14—22 × 1,5 μ, partly 11—16 × 2—2,5 μ, partly 16—24 × 3,5—4 μ, those of the actinopharynx partly 22—28 × about 1,5 μ, partly 14 × 1 μ, partly 17—27 × 3,5—4,5 μ, those of the acontia partly 60—79 × 5—almost 7 μ, partly 24—31 × about 1 μ, needle-like.

Colour. Column dirty white and olive-brown in alternate longitudinal lines or dirty white, gray or even pink-coloured. Tentacles salmon-pink, sometimes white. Oral disc generally olive-brown. Actinopharynx rich pink with darker coloured, red, longitudinal lines (Stuckey). The specimens from Kaipara, preserved in formaline, were salmon-coloured.

Dimensions of the largest specimen in preserved state; diameter of the pedal disc 1,2 cm and of the distal end of the column 1,4 cm, height of the column 1,7 cm. Stuckey's largest specimen was 4 cm high and 2 cm broad.

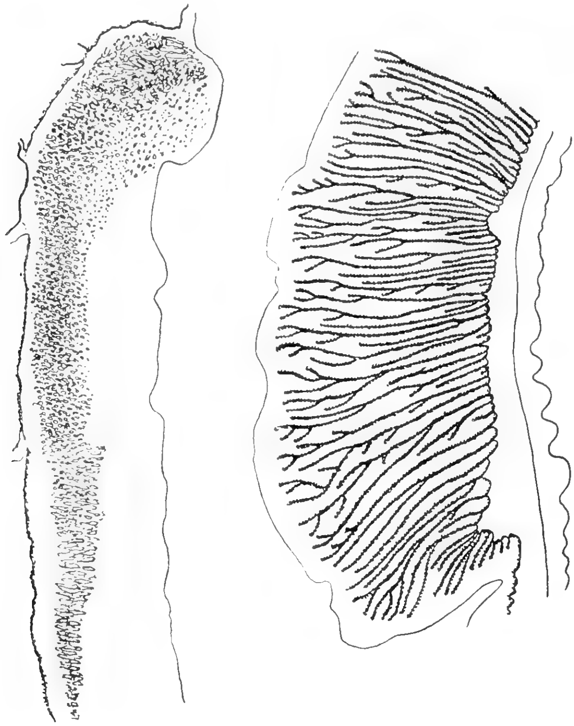
Occurrence. Slipper Isl., low water. 20.12.1914. 8 specimens. Kaipara. 8.1.1915. 13 specimens.

Plimmerton (Kirk) and Wellington Harbour (teste Stuckey). Manakau Harbour (teste Stuckey and Walton).

Exterior aspect. The pedal disc is well developed, its diameter often somewhat smaller than the distal part of the body. Column smooth, longitudinally sulcated, the furrows corresponding to the insertions of the mesenteries. (Textfig. 39). In the middle third there are cinclides, propably not more than 2 in each longitudinal row. To judge from the sections they are probably not numerous. The tentacles are numerous, in the largest specimen about 192. They are in very contracted state almost wartlike, in half contracted state thin, conical. In preserved state the inner tentacles do not reach half the diameter of the wide oral disc in length but are considerably longer than the outer. Somewhat more than half the disc is provided with tentacles. The actinopharynx is of ordinary length and provided with numerous longitudinal furrows and two ordinarily developed siphonoglyphes with distinct gonidial tubercles and rather distinct aboral prolongations.


Fig. 39. *Thoe vagrans*. Specimen from Slipper Isl. Magnif. 2/1.

Anatomical description. The ectoderm of the column is of ordinary height and contains very numerous, longitudinally extended gland-cells and numerous nematocysts $12-17 \times 2-2{,}5\ \mu$, somewhat broader in the basal end, and often a little curved. In contracted state of the column the mesogloea is several times thicker than the ectoderm, in more expanded state only somewhat thicker. It is very fibrillous and contains numerous protoplasma-poor cells. The small cinclides seem to be excavations from the endoderm as well as invaginations from the ectoderm. The circular muscles of the column are ordinarily developed. Their folds are not high, but very fine and numerous, here and there small parts seem to be



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Figs. 40, 41. *Thoe vagrans*. Fig. 40. Transverse section of sphincter, fig. 41. Outer half of pennon in a mesentery of first order in the ciliated tract region.

enclosed in the mesogloea, also between the insertions of the mesenteries. The mesogloeal sphincter (textfig. 40) is strong and wholly separated from the circular muscles of the column. In its upper part it fills out almost the whole breadth of the mesogloea and diminishes by degrees in breadth. It is mostly reticular, in the outer and upper part more alveolar. The muscle meshes are mostly fine, in the upper and lower part of the sphincter larger (textfig. 40).

The ectoderm of the tentacles is high. Its nematocysts are of three kinds, partly riblike and sparse 14—22 × 1,5—2 μ, partly opaque and numerous 11—16 × well 2—well 2,5 μ, partly with conspicuous basal part to the spiral thread and often somewhat curved and numerous 16—24 × 3,5—4 μ. The longitudinal muscles of the tentacles and radial muscles of the oral disc are rather well developed. The ectoderm of the actinopharynx contains very numerous gland cells and nematocysts, partly 22—28 × about 1,5 μ, partly 14 × 1 μ, partly 17—27 × 3,5—4,5 μ. The first are numerous, the second very sparse and the third, which are broader at their basal end, very numerous.

In the distal part the largest specimen was provided with about 96 pairs of mesenteries, of which 2 pairs of directives. Below the actinopharynx the number of mesenteries is possibly a little smaller. The mesenteries of the first, second, third and part of the fourth cycles were perfect. The mesenteries of the fourth and fifth cycles were often unequally developed, in as much as the one mesentery of a pair was stronger than its partner. Below the actinopharynx sometimes only the one mesentery of a pair was perspicuous on sections. The last cycles of mesenteries are weak. A second specimen had 72 pairs of mesenteries in the lower part of the body. The longitudinal muscles of the mesenteries form pennons on the three or four first cycles. The pennons are diffuse and situated in the middle of the mesenteries. The muscle folds are of ordinary and uniform height, stand very close, and are rather richly ramificated (textfig. 41). The parietobasilar muscles are weak and form a small fold or none on the mesenteries. A small oral stoma is present in the perfect mesenteries and often a large marginal stoma in the stronger mesenteries. Three transversally and one longitudinally sectioned specimens were males. The testes were sometimes well developed, sometimes weak. I have observed them in the mesenteries of the third and fourth orders. Probably the specimens are at the end of a reproductive period as there were no testes in the mesenteries of the first and second orders as in other *Thoe*-species. The acontia are well developed and contain two kinds of nematocysts partly 60—79 × 5—almost 7 μ, partly 24—31 × about 1 μ, the latter are needle-formed. Both kinds are numerous. I have examined 5 specimens from Slipper Island and 1 from Kaipara (spec. 6) concerning the nematocysts of the acontia, and all nematocysts showed a good agreement concerning the size, as appears from the following table.

Length and breadth of the specimens		
1) 1,7 × 1,2-1,4 cm	(60) 67—74 × 6—almost 7 μ	24—29 × about 1 μ.
2) 1,3 × 1,3 „	65—79 × almost 7	24—31 × „ 1
3) 1,1 × 0.9 „	60—77 × 5—6	25—31 × „ 1
4) 0,5 × 0,7 „	60—79 × about 6	24—29 × „ 1
5) 0,5 × 0,7 „	66—79 × 6 (almost) 7	26—31 × „ 1
6)	67—79 × 6—6,5	24—29 × „ 1

Remarks. I have with hesitation identified this species with Stuckey's *Sagartia vagrans*, principally on account of Stuckey's statement that the whole body-wall has (more or less) the character of a diffuse mesogloeal sphincter.

Thoe neozelanica n. sp.

Diagnosis. Sphincter strong, in its upper part occupying almost the whole breadth of the mesogloea, reticular-alveolar with tendency to stratification. Tentacles some 60. 2 well developed siphonoglyphes. Mesenteries pentamerously arranged (always?). About 10 pairs perfect with strong, diffuse longitudinal muscle pennons, the folds of which are high and somewhat ramificated. Parietobasilar muscles weak. Imperfect mesenteries without pennons, the stronger of them with filaments. Nematocysts of the tentacles 17—22 × about almost 2—(2,5) μ, those of the acontia partly 41—50 × 5—6 μ, partly 19—24 × about 1—1,5 μ, the latter needle-shaped.

Colour?

Dimensions. Breadth of the pedal disc 0,45—0,3 cm, height of the column 0,2 cm.

Occurrence. North Channel, Kawai Island, Hauraki Gulf 10 fms. Hard bottom. 29.12.1914. 1 specimen.

Exterior aspect. The small, not sexually ripe specimen has a broad pedal disc. The column is smooth. The distribution of the cinclides I have not been able to confirm, but I have observed such on sections in the height of the aboral end of the actinopharynx. The tentacles were some 60, the inner considerably longer than the outer. The actinopharynx was very much folded and provided with 2 well developed siphonoglyphes.

A n a t o m i c a l   d e s c r i p t i o n. As there is only one small specimen present in the collection I cannot give a perfect description of the anatomy.

The ectoderm of the column is high but considerably thinner than the mesogloea, which is fibrillar and contains numerous small protoplasma-poor cells. The circular muscles of the column are weak,

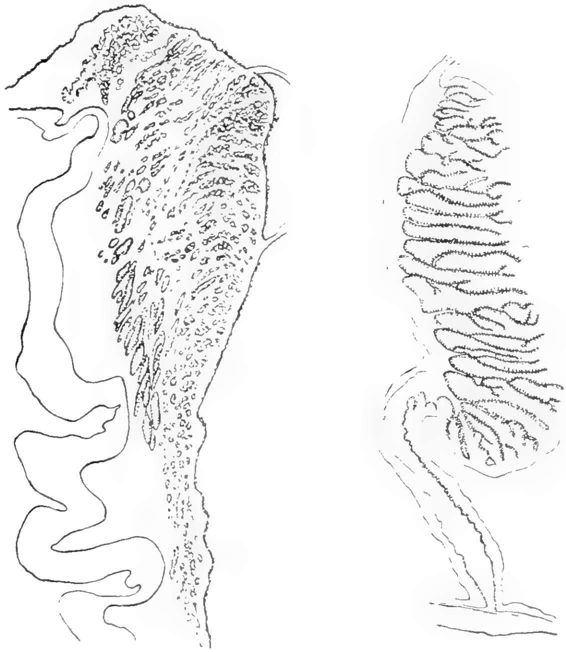

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Fig. 42, 43. *Thoe neozelanica.* Transverse section of sphincter (fig. 42) and of a mesentery of the first cycle (?) (fig. 43).

the sphincter, on the other hand, very strong. It is rather short, probably in connection with a contraction, broad and occupies almost the whole breadth of the mesogloea in its upper part but diminishes, rather abruptly, downwards. The meshes are small, rather close and show a tendency to stratification (textfig. 42). The longitudinal muscles of the tentacles and radial muscles of the oral disc are ectodermal and ordinarily developed.

The mesenteries are pentamerously but somewhat irregularly arranged. The two pairs of directives were symmetrically situated.

On one side of them there were 4 pairs of mesenteries perfect, on the other side 4 pairs and a single mesentery, the partner of which was imperfect. With these 11 pairs some weaker, imperfect alternate. One more but incomplete cycle of very weak mesenteries was besides present. The perfect mesenteries were provided with strong longitudinal muscle pennons, the folds of which are high and somewhat ramificated. Especially some pennons (probably those of the first order) are strong. I have reproduced such a mesentery in the region of the ciliated tract in the textfigure 43. The parieto-basilar muscles are weak. The imperfect mesenteries lack pennons but have filaments. The reproductive organs were not developed. Concerning the nematocysts compare the diagnosis. The needle-shaped nematocysts in the acontia are measured on sections.

Gen. *Cricophorus* nov. gen.

Diagnosis. Pedal disc well developed, at least as broad as the oral disc. Column thin, smooth, without cinclides. Sphincter well developed, mesogloeal. Tentacles rather short, conical, fewer than the mesenteries, the inner considerably longer than the outer. Longitudinal muscles of the tentacles and radial muscles of the oral disc ectodermal. Mesenteries hexamerously arranged, more numerous in the proximal part than in the distal. Only six pairs of mesenteries perfect, of which two directives. Longitudinal muscles of the mesenteries weak, forming no distinct pennons. Parietobasilar and basilar muscles weak. The six first pairs of mesenteries sterile. Acontia slender with very short nematocysts.

As we see below from the description of "*Sagartia*" *nutrix* Stuck. this species is very different from the true *Sagartia*-species and agrees in the absence of cinclides and the sterility of the six first pairs of mesenteries with the subfamily *Chondractiniinae* (family *Chondractiniidae* Stephenson). It is however questionable, if the genus is in reality allied with the other known Chondractiniinae except *Paraphellia*.

Cricophorus nutrix (Stuck.).

Sagartia nutrix n. sp. Stuckey 1909 c, p. 382 fig. 6. Pl. 21 figs. 1, 2.

Diagnosis. Sphincter transversally stratified, in the upper part sometimes reticular. Tentacles to 96 ($6 + 6 + 12 + 24 + 48$), the inner more than twice as long as the outer. Mesenteries in 4—5 cycles, the last cycle only in the proximal part. Monoecious. Embryos developing in an annular invagination around the column in its proximal half. Nematocysts of the column 10—12 × almost 1—1 μ, those of the tentacles 12—18 × 1—1,5 μ, those of the actinopharynx 17—22 × about 2,5 μ and those of the acontia 14—19 × 1,5—2 μ. Spirocysts of the tentacles 13 × 1—26 × 2—2,5 μ.

Colour. Column in general deep brown, sometimes greenish, blue or yellow. Oral disc iridiscent green, but the colour is very variable. Mouth pink or magenta with radial markings. The whole animal is iridescent (Stuckey).

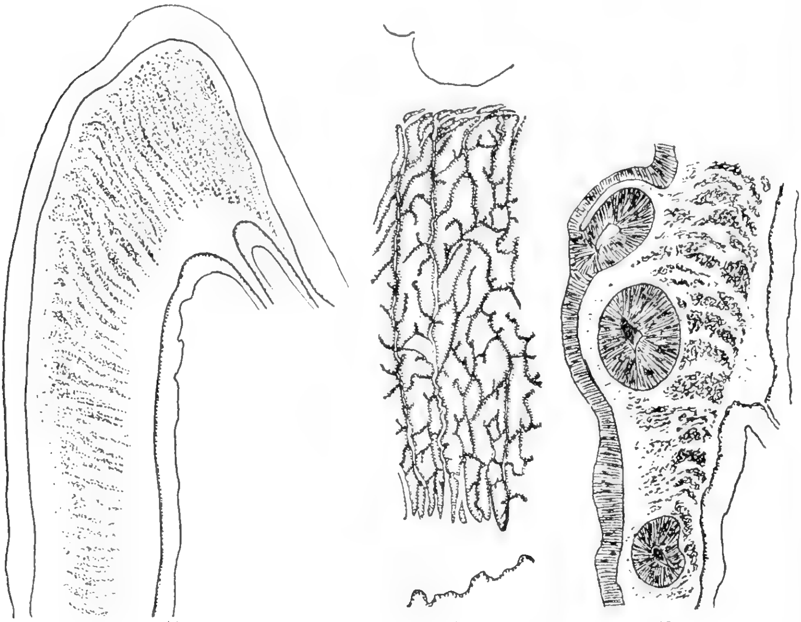
Dimensions. Height and breadth 1,2 cm in extended state? (Stuckey). In preserved state: 1) Height 1, breadth 0,9 cm. 2) Height 0,7, breadth 0,6 cm.

Occurrence. North Cape. 3.1.1915. Several specimens on Fucaceae. Cape Maria v. Diemen; on Fucaceae. 4.1.1915. 3 spec., Island Bay, Wellington. 22.1.1915. 1 spec.

Further distribution in New Zealand. Island Bay, Ohiro Bay (teste Stuckey).

Exterior aspect. The wide pedal disc is provided with a thin cuticle. The column is cylindrical to conical, smooth without cinclides, in certain stadia of contraction somewhat longitudinally folded. In many specimens there is a circular wall in the proximal half (figs. 50, 52; compare below). The margin is distinct. The tentacles are short, fine and smooth, placed at the margin and hexamerously arranged 6 + 6 + 12 + 24 + 48 = 96, in large specimens the inner are more than twice as long as the outer. The greater part of the oral disc is devoid of tentacles. It is provided with radial furrows. The mouth is situated on a conus. The actinopharynx is well developed with longitudinal folds and provided with two rather distinct siphonoglyphes.

Anatomical description. The ectoderm of the pedal disc is high, as is also that of the column. The latter seems to be provided with few gland cells and consists mostly of supporting cells; it contains very small nematocysts 10—12 × about 1 μ in size and is furnished with a very thin cuticle, mostly dropped. The mesogloea is thin, sometimes thicker, sometimes thinner than the ectoderm, according as the column is more or less contracted. It is fibrillous and contains numerous protoplasma-poor cells. In the sphincter region the mesogloea is considerably thickened. The endodermal circular muscles are weak, the sphincter strong, mesogloeal and distinctly stratified (textfig. 44) especially in its under part. In one of three examined specimens the upper part of the sphincter was reticular but with distinct tendency to stratification, the strongest



Figs. 44—46. *Cricophorus nutrix.* Transverse section of parts of the sphincter, in fig. 46 with curious ectodermal canals (compare the text).

mesogloea-balks were namely extended in transverse direction (textfig. 45, part of the sphincter, spec. from Island Bay). The sphincter is wholly separated from the circular muscles of the column. Its muscle meshes are usually rather small but numerous, in the reticular part larger. In the sphincter region of the specimen from Wellington there were curious transverse ectodermal canals (textfig. 46) extended in tangential direction. Their lumen was small also at the communication with the ectoderm of the column, their ectoderm at the beginning of the invagination very high, at the end considerably thinner. The canals end in the mesogloea and do not stand in communication with the endoderm. I cannot confirm their nature, but it is possible that they are caused by a parasite. The ectoderm of the tentacles is high and contains rather numerous nematocysts 12—18 × about 1—1,5 μ and spirocysts 13 × 1—26 × 2—2,5 μ. The longitudinal muscles of the tentacles and radial muscles of the oral disc are ectodermal, somewhat stronger in the tentacles than in the disc. The ectoderm of the actinopharynx is rather high and contains nematocysts 17—22 × about 2,5 μ, broader in the basal end and with visible basal part to the spiral thread. The longitudinal folds in the actinopharynx are supported by meso-

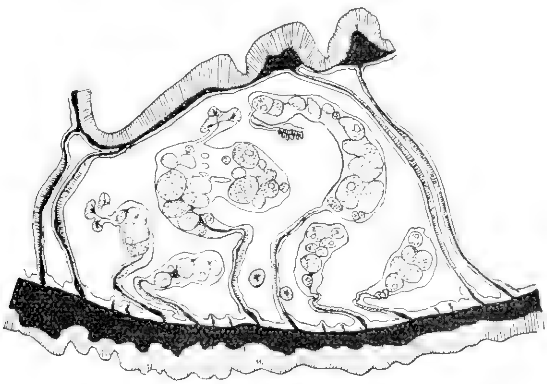
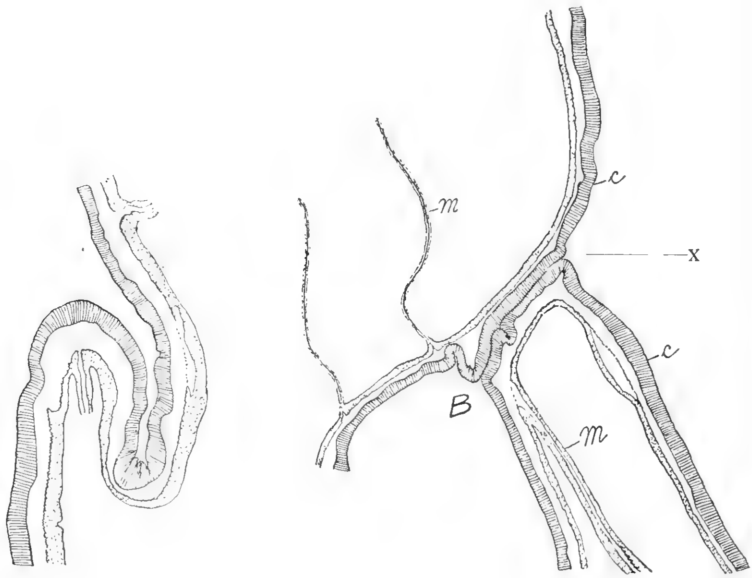


Fig. 47. *Cricophorus nutrix.* Transverse section of about a sixth of the body in the actinopharynx-region.

gloeal ridges. The cilia of the siphonoglyphes are considerably longer than in the other part of the actinopharynx.

The mesenteries are hexamerously arranged in four or five cycles (textfig. 47). In smaller specimens there are probably not more than four, in larger specimens five. The last cycle, consisting of very weak mesenteries, is present only in the undermost part of the body and not provided with filaments and acontia. Only 6 pairs are perfect, of which two directives. The mesenteries of the second order reach however almost to the actinopharynx. Stuckey states "that there are 24 pairs, every second pair is perfect." He has thus neither observed the fourth cycle in smaller specimens nor the fifth in larger ones in the undermost part of the body, and his statement of 12 perfect pairs is incorrect. The mesenteries are rather weak, their longitudinal muscles are extended over the greater part of one side of the mesentery and form only low folds but no distinct pennons. They are somewhat stronger on the directives. The parietobasilar and basilar muscles are weak. The filaments are of usual structure as also the acontia, the nematocysts of which are small and only 14—19 $\times$ 1,5—almost 2 μ in size. The six first pairs of mesenteries are



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Figs. 48, 49. *Cricophorus nutrix.* Fig. 48. Longitudinal section through a part of the column with a beginning brood-room. Fig. 49. Longitudinal section through the upper part of the brood-pouch (compare the text).

sterile as also the fifth cycle, if present. The species is monoecious, ovaries and testes are present in one and the same mesentery (4 specimens examined). Sometimes the ovaries, sometimes the testes are more numerous. In a specimen from Cape Maria van Diemen the testes were extraordinarily sparse. The reproductive organs are developed in the second, third and, in larger specimens at least, in part of the fourth cycle.

This species is very interesting as provided with a *circular* brood-pouch in such a simple form as not before observed in

Actiniaria[1]). Stuckey writes: “Presumably the young of this species are retained in the body till fully formed, for I found one specimen, which had twelwe young ones attached to the outside of the body-wall in a regular transverse circle about one-third of the height of the wall from the foot. If the young are not retained till they are considerably advanced, it is difficult to see how they

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Figs. 50—53. ***Cricophorus nutrix.*** Figs. 50. 51. Specimen with young immigrated (in fig. 50 partly) from the brood-room. Fig. 52. Specimen with a distinct annular fold bordering the invaginated brood-room. Fig. 53. Transverse section of the body through the brood-room (b). The embryos are removed. Figs. 50, 52, 53. Specimens from North Cape, fig. 51. Specimen from Island Bay. Magnif. $^{3}/_{1}$ (figs. 50, 51). $^{5 \cdot 5}/_{1}$ (fig. 52).

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[1]) The circular brood-pouch here recalls that described by Clubb 1902 in *Urticina* (= *Bunodactis,* compare p. 196) *sulcata* and *carlgreni.* As far as I can see from Clubb's paper and figures there is from the beginning a similar circular invagination in the column as in *Cricophorus*, but from this invagination brood-pouches have sunk in between the mesenteries, thus a more advanced stadium of the brood-pouches than in *Cricophorus*,

can become attached in this manner unless there are external brood-pouches. I have seen no evidence in support of the latter view." As we see from the description above, Stuckey has only observed one specimen the young of which had already left their brood-pouch. In fact this species has formed only a single brood-pouch consisting of a circular invagination around the column in its lower half. Already in younger individuals there are sometimes a distinct circular wall in the above named place (textfig. 52). A longitudinal section of the column wall in this place shows that we have to do with a circular, though as yet rather shallow, invagination (textfig. 48). The invagination contains no embryos. In a more advanced state the circular brood-pouch is considerably enlarged and reaches below the actinopharynx. In the sectioned specimen the brood-pouch contained several embryos not having developed their tentacles. In textfigure 53 I have reproduced a transversal hand-section of the animal showing the under part of the brood-pouch (b). The section is somewhat oblique as the brood-pouch seems narrower on the left side. The embryos are taken away. The textfigure 49 shows a longitudinal section through the upper part of the brood-pouch in this specimen (B: brood-pouch, c: column, m: mesenteries, x: communication between the outer medium and the brood-pouch). As long as the embryos are small, both rims of the brood-pouch are closely pressed together, when the embryos grow they emigrate from the brood-pouch and attach themselves in the expanded outer part of the brood-pouch. In this stadium the embryos seem to stand in a circular furrow around the animal (textfig. 50). From here they emigrate to the column wall (textfig. 51).

The occurrence of an outer brood-pouch here from a locality about 34° 25' S may somewhat modify our apprehension of the causes to the origin of brood-pouches. I cannot here discuss this question.

It is this species which is mentioned by Dr. Mortensen in his paper "Observations on protective adaptions and habits, mainly in marine animals" (Vid. Medd. D. Naturh. Foren. Bd. 69. p. 83) as an instance of protective resemblance in an Actinian. It is stated to resemble the peculiar branches of the alga, on which it lives, to such a degree that it was very hard to distinguish.

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4—8—1924.

Postscript.

After describing the above named Actiniaria I have had the opportunity of studying a small collection of Actiniaria made by Sten Wallin 1924 at the Stewart and Campbell Islands. From Stewart Island, Paterson Inlet, the occurrence of *Actinia tenebrosa* and *Cricophorus nutrix* is to be noted, from Campbell Island, Perseverance Bay, numerous specimens of *Parantheopsis cruentata* and the species here called *Epiactis mortenseni*. As to the latter species I have stated (p. 217) that the "column is, as far I can see, without sucking warts". In several of Wallin's specimens, which were mostly not so much contracted as those collected by Mortensen, there are, however, distinct verrucae arranged in longitudinal rows, but there are not many verrucae in each row and they are the most distinct in the middle of the column. A closer examination of these verrucae, which are invaginated, shows that their ectoderm is structured as that of the *Urticina*-verrucae. There is, however, here no evagination from the endoderm into the verrucae, though the mesogloea is thinner than in other parts of the column. Such warts I have observed also in other Actiniaria, for inst. in the genus *Sagartia*. No doubt the specimens collected by Mortensen and Wallin belong to one and the same species. Both agree in the characteristic arrangement of mesenteries, in the presence of a parasitic Trematod in the sphincter and in other characters. Also the size of the nematocysts shows good agreement, only the nematocysts with perspicuous basal part to the spiral thread in the actinopharynx were somewhat longer in Wallin's specimens; further the breadth of the nematocysts was a little larger, possibly caused by a difference in the preservation. The colour was still distinct in several of Wallin's specimens which had been preserved in formaline-alcohol. The column was red-brown, crimson or orange with more or less irregular vertical pale (white?) lines and pale verrucae, the tentacles greenish, sometimes with reddish tips (possibly banded), the oral disc greenish, the actinopharynx and inner parts reddish. On account of the presence of verrucae on the column this species must be named *Bunodactis* (*Cribrina*) *mortenseni*.

Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XXII.

Ascidiae Krikobranchiae von Neuseeland, den Chatham- und den Auckland-Inseln.

Von
W. Michaelsen, Hamburg.

(Mit 30 Textfiguren).

Die vorliegende Arbeit schliesst sich an meine Abhandlung über die Ptychobranchen und Diktyobranchen Ascidien Neuseelands und der Chatham-Inseln [1]) an und bildet zusammen mit dieser und mit Bovien's Arbeit über die Holosomen Ascidien der Auckland- und Campbell-Inseln [2]) eine vollständige Übersicht über die Ascidienfauna des Neuseeland-Gebietes im weiteren Sinne, d. h. einschliesslich der Three-Kings-Inseln, der Chatham-Inseln, sowie der Auckland- und Campbell-Inseln.

Die Untersuchung des reichen Materials krikobrancher Neuseeland-Ascidien zeitigte einige bemerkenswerte morphologische Ergebnisse.

Die interessante *Polycitorella mariae* n. sp., n. gen. zeigte, dass nicht nur bei Didemniden, sondern auch bei Polycitoriden morgensternförmige Kalkkörper im Zellulosemantel und als deren Matrizien die charakteristischen Seitenorgane auftreten können,

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1) W. Michaelsen, 1921, Ascidiae Ptychobranchiae und Diktyobranchiae von Neuseeland und den Chatham-Inseln. Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16. XI. In: Vid. Medd. naturh. Foren., Kjøbenhavn, LXXIII.

2) P. Bovien, 1921, Ascidiae from the Auckland and Campbell Islands, (Holosomatous forms). Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16. IV. In: Vid. Medd. naturh. Foren.. Kjøbenhavn, LXXIII.

diese Seitenorgane zwar nicht am Thorax, wie bei den Didemniden, sondern am Abdomen.

Macroclinum hypurgon n. sp. stellt eine Synoicide mit dem Beginn eines Hypurgon-Zustandes dar, wie er bisher nur bei Didemniden und Polycitoriden gefunden wurde.

Wie diese Befunde das Auftreten gewisser bisher nur von einzelnen Familien bekannter Charaktere auch bei anderen Familien krikobrancher Ascidien darlegen, also die bisher angenommenen scharfen Grenzen zwischen diesen Familien in einzelnen Punkten etwas verwischen, so werfen andere Befunde an einigen Synoiciden der *Amaroucium appendiculatum*-Gruppe ein eigentümliches Licht auf die bisher stark überschätzte Bedeutung des Hauptcharakters der Fam. *Synoicidae*, nämlich der Bildung eines als Postabdomen bezeichneten Anhanges am Abdomen. In gleichem Sinne spricht das mit Polycitoriden-Charakteren ausgestattete *Pseudodistoma cereum* n. sp., n. gen., das vielleicht als eine Polycitoride mit typischem Postabdomen anzusprechen wäre.

Wie in meiner Arbeit über die ptychobranchen und diktyobranchen Ascidien des Neuseeland-Gebietes stelle ich auch in dieser Bearbeitung der krikobranchen Ascidien eine Erörterung der geographischen Beziehungen dieser Fauna dem beschreibenden Teil voran. Was die faunistisch-geographischen Verhältnisse der neuseeländischen Fauna krikobrancher Ascidien anbetrifft, so gehen unsere Kenntnisse bei dieser Abteilung bis auf die Veröffentlichung Nott's im Jahre 1892[1]) zurück und beschränken sich auf diese Arbeit und auf Sluiter's Bearbeitung der Sammlung Schauinsland's.[2]) Eine kritiklose Zusammenstellung der bisherigen Angaben über die krikobranchen Ascidien dieses Gebietes würde die stattliche Zahl von 22 Arten ergeben. Eine kritische Sichtung verringert aber diese Zahl etwas und würde sie mutmasslich noch weiter verringern, wenn eine vollständige Nachprüfung der Originale möglich wäre. Die Zahl der von mir durch eigene Untersuchung sicher gestellten krikobranchen Ascidien des Neuseeland-

[1]) J. T. Nott, On the Composite Ascidians of the North Shore Reef; in: Tr. N. Zealand Inst., XXIV.

[2]) C. Ph. Sluiter, 1900, Tunicaten aus dem Stillen Ocean. Ergebnisse einer Reise nach dem Pacific. (Schauinsland 1896—1897). In: Zool. Jahrb., Syst., XIII.

Gebietes beträgt 23 Arten samt 3 Varietäten. Dazu kommen noch 8 mehr oder weniger gut charakterisierte Arten, für die ich die Verantwortung den betreffenden Autoren überlassen muss. Die folgende Liste führt demnach im ganzen 31 Arten samt 3 Varietäten auf, eine Zahl, die die der bekannten ptychobranchen und diktyobranchen Ascidien dieses Gebietes (zusammen 29) um ein geringes übertrifft. Zweifellos ist aber hiermit dieser Teil der Neuseeland-Fauna auch nicht annähernd erschöpft, mutmasslich noch viel weniger vollständig, als die früher von mir charakterisierte Abteilung der ptychobranchen und diktyobranchen Ascidien dieses Gebietes. Schon das mir vorliegende Material enthielt manche Stücke, die sicherlich noch anderen Arten angehörten, aber der Spärlichkeit oder sonstiger Ungunst des Materials wegen nicht bestimmt oder beschrieben werden konnten.

Was die Verteilung der Arten im Gebiet anbelangt, so ist wie bei den übrigen Ascidien-Familien ein charakteristischer Unterschied zwischen der West- und Ostseite Neuseelands auch bei den krikobranchen Ascidien keineswegs zu erkennen. Übrigens wissen wir von denen der Westseite so wenig, dass wir ein Urteil darüber kaum fällen dürfen. Auch charakteristische Unterschiede zwischen dem Norden und Süden treten nur in spärlichen Fällen deutlicher auf. Als Warmwasser-Gattungen, die auf den nördlichen Teil des Gebietes beschränkt sind, müssen wohl *Clavelina* und *Cystodytes* angesehen werden, während *Didemnum studeri* Hartmr. und *Trididemnum cerebriforme* Hartmr., die auf den Süden beschränkt und hier anscheinend häufig und weit verbreitet sind, wohl als Kaltwasserformen angesehen werden müssen.

Als anscheinend im Neuseeland-Gebiet endemische Gattungen können höchstens die neuen Gattungen *Polycitorella* und *Pseudodistoma* bezeichnet werden, deren bis jetzt einzige Arten nur im Neuseeland-Gebiet gefunden worden sind.

Auch die bis jetzt erkennbaren auswärtigen Beziehungen der krikobranchen Ascidien des Neuseeland-Gebietes zeigen nicht ein so ausgeprägtes, an charakteristischen Zügen so reiches Bild wie die der ptychobranchen und diktyobranchen Ascidien. Das liegt nur zum Teil an der kosmopolitischen Natur gewisser in unserem Gebiet vertretenen Gattungen. In hohem Masse beruht es darauf, dass die Verwandtschaftsverhältnisse der in

Tabelle der krikobranchen Ascidien des Neuseeland-Gebietes

(einschliesslich der Chatham-, Auckland-, Campbell- und Three Kings Inseln).[1])

Clavelina sigillaria n. sp.	N. n.	V.: Australien.
Polycitorella mariae n. sp., n. gen	N. n.	Gattung endemisch im Neuseeland-Gebiet.
Eudistoma circumvallata (Sluit.)	S. no.	
Cystodytes draschei Herdm.	N. n., S. no.	Brasilien.
Sycozoa sigillinoides Less.	N, **Chath.**	Tasmanien, Victoria, Südwest-Austral Kerguelen, Heard Isl., Südpolar-M Süd Georgien, Falkland-Ins., O.-P gonien, Magalhaens. Geb., Pazif. vor Peru.
Distaplia fasmeriana n. sp.	**Stew.**	
Leptoclinides diemenensis n. sp.	N. n.	V.: Nw.-Australien, Sulu-See, O.-E neo, Brasilien.
L. sparsus n. sp.	N. w.	
Trididemnum cerebriforme Hartmr.	**Stew.**	Kapländ. Geb.
Didemnum psammatodes Sluit var. *maculatum* Nott	N. no.	Moçambique.
D. ps. var. *intermedium* Mich.	S. no.	Sansibar.
D. studeri Hartmr. f. *typicum*	**Chath.**, **Stew.**, **Auckl.**	Kerguelen, Magalhaens. Geb.
D. st. f. *africanum* Mich.	**Stew.**	Südwest-Afrika, Magalhaens. Geb.
D. paradoxum (Nott)	N. no.	V.: ? Seychellen.
D. chondrilla n. sp.	N. n., no., **Stew.**	V.: Westl. Indisch. Ozean.
D. lambitum (Sluit.)	**Chath.**	
D. albidum (Verr.)	N. w., n., no.	N.-Atlant. Oz. von Neu-England u. Norwegen bis Grønland, Spitzber u. Weissem Meer.
D. tuberatum (Nott.)	N. no., S. no., **Stew.**	
D candidum Sav.	N. no, S. no., **Stew.**	Westl. Indisch. Oz., Rotes Meer, O v. N - u S.-Amerika.
D mortenseni n. sp.	**Stew.**	
Pseudodistoma cereum n. sp.	**Stew.**	? Westlich. Indisch. Ozean.
Amaroucium scabellum n. sp.	N. n., no.	V.: Azoren.
A. circumvolutum Sluit.	N. no., **Chath.**	
A. stelliferum (Sluit.)		
A constrictum Sluit.		
A. variabile Herdm.	**Chath.**	Kerguelen.
A. phortax n. sp. f. *typica*	N., S. no., **Chath.**	V.: Rotes Meer.
A. phortax var. n. *ptychodes*	**Stew.**	
A. vel *Aplidium foliaceum* (Sluit.)	S. no., **Chath.**	
Macroclinum hypurgon n. sp.	N. no.	V.?: Beringsmeer, Skandinavien, N fundland.
M. arenaceum n. sp.	N. n., **Stew.**	V ?: Kerguelen.
M stewartense n sp	**Stew.**	
M. ? fungosum (Herdm.)	**Chath.**	? New South Wales.
Polyclinum cerebrale n. sp	N. w., **Stew.**	V.?: Westl Indisch. Ozean.

[1]) **Auckl** = Auckland-Inseln, **Stew.** = Stewart-Insel, **Chath.** = Chatham-Inseln, **N.** = Nord-I von Neuseeland, S. = Süd-Insel von Neuseeland, n. = Nord-Ende, no. = Nordost-Seite be -Ende, w. = West-seite, V. = Verwandte Arten.

Frage kommenden Gattungen, zumal der Synoiciden-Gattungen, noch nicht genügend aufgeklärt sind. Erschwerend wirkt auch der Umstand, dass von dem benachbarten australischen Gebiet, abgesehen von der durch Hartmeyer behandelten entfernten Nordwest-Ecke, nur wenige krikobranche Ascidien so genau beschrieben sind, dass eine sichere Wiedererkennung möglich wäre. Auch von dem artenreichen, sich weiterhin nordwärts anschliessenden malayischen Gebiet sind nur verhältnismässig wenige Arten ausreichend beschrieben. Die Folge ist, dass wir in einer der hauptsächlichsten Beziehungslinien, der süd-nördlichen, fast ganz im unklaren bleiben. Das wenige, was wir an auswärtigen Beziehungen der Neuseeland-Fauna krikobrancher Ascidien sicher erkennen können, hauptsächlich beruhend auf der weiteren Verbreitung einzelner Arten, weniger der von Gattungen, deckt sich ziemlich genau mit gewissen Zügen der Beziehungen ptychobrancher und diktyobrancher Ascidien.

Die wahrscheinlich mit der Westwind-Trift zusammenhängenden, mehr oder weniger vollkommen circumpolaren west-östlichen Beziehungen sind am deutlichsten ausgesprochen in der Verbreitung von *Sycozoa sigillinoides* Less., *Didemnum studeri* Hartmr. und *Trididemnum cerebriforme* Hartmr. Vielleicht sind hier noch anzufügen *Amaroucium variabile* Herdman, falls nämlich Sluiter's Bestimmung des Materials von den Chatham-Inseln richtig ist, sowie *Macroclinum arenaceum* n. sp. und *M. stewartense* n. sp.

Süd-nördliche Beziehungen der Neuseeland-Fauna krikobrancher Ascidien sind aus den oben angeführten Gründen wohl weniger reichlich erkennbar als vielleicht tatsächlich vorhanden. Eine deutliche süd-nördliche Beziehung weist die Gattung *Sycozoa* auf, die in antarktisch-subantarktischen Breiten circummundan, im Neuseeland-Australien-Sektor nordwärts über Australien bis ins Malayische Tropengebiet verbreitet ist. Ähnliche Beziehungen bieten vielleicht auch die *Clavelina*-Arten der Gruppe *C. sigillaria* n. sp. auf, die früher als Gattung *Synclavella* Caull. zusammengefasst wurden.

Noch fragliche Beziehungen zum westlichen Indischen Ozean gründen sich vielleicht auf das Vorkommen verwandter oder identischer Formen von *Didemnum psammatodes* (Sluit.), *D. chondrilla* n. sp., *D. lambitum* (Sluit.), *Polyclinum cerebrale* n. sp. und *Amaroucium phortax* n. sp.

Eine auffallende Beziehung scheinen *Amaroucium circumvolutum* (Sluit.) und *A. scabellum* n. sp. aufzuweisen, nämlich zu *A. appendiculatum* (Mich.) von den Azoren im Atlantischen Ozean.

Auch ein typisches Beispiel für bipolare Verbreitung bietet eine Neuseeland-Art dar, und zwar *Didemnum albidum* (Verr.), eine gut bekannte und nicht zu verkennende Art. Den Neuseeland-Vorkomnissen derselben stehen nämlich die Vorkomnisse aus dem nördlichen Atlantischen Ozean, nördlich bis ins nördliche Eismeer vorgeschoben, südwärts einerseits bis Nord-Norwegen, andererseits bis Neu-England reichend, gegenüber. Bei der guten Durchforschung der Europäischen Westküste und der Nordamerikanischen Ostküste kann kaum ein Zweifel darüber bestehen, dass diese Art hier tatsächlich nur bis zu den angegebenen Distrikten südwärts reicht, also eine Unterbrechung ihrer Verbreitung aufweist. Vielleicht stellt auch die Gattung *Leptoclinides* eine bipolare Verbreitung dar, doch ist zu beachten, dass die nördliche Art, *L. färörensis* Bjerk. (mit einfachen *Didemnum*-Hoden) den südlichen Formen von Neuseeland, Australien, dem Malayischen Gebiet und dem südlich tropischen Atlantischen Ozean (mit mehrfältigen *Polysyncraton*-Hoden) auch morphologisch gegenüber steht.

Krikobranchia.

Fam. **Polycitoridae.**

Gen. **Clavelina** Sav.

Nachdem sich die Verschmelzung der Familien *Clavelinidae* und *Polycitoridae* als notwendig erwiesen hat, bedarf es einer Neuregelung der Gattungen, deren Diagnosen bisher nur in Rücksicht auf den engeren Sonderkreis, dem sie früher angehörten, festgestellt wurden. So sind die bislang massgebend gewesenen Diagnosen der Fam. *Clavelinidae* (im alten, engeren Sinne) fast ganz auf die Besonderheit der Kolonie-Form, einen für die Gattung durchaus unmassgeblichen Charakter, beschränkt. Nach der Verschmelzung der Claveliniden und Polycitoriden würden die beiden Claveliniden-Gattungen *Archiascidia* und *Clavelina* neben *Archidistoma* bezw. neben *Polycitor* (*Polycitor*) zu stehen kommen. Van Name wirft die Frage auf, ob nun nicht etwa *Clavelina* mit *Polycitor* (*Polycitor*) vereint werden müsse?[1]) Er lässt aber diese Frage offen und hält die Gattung *Clavelina* einstweilen von *Polycitor* gesondert. Ich folge ihm hierin, und zwar auf Grund des Umstandes, dass sich diese früheren Claveliniden durch die Gestaltung der Körperöffnungen (Branchial- und Atrialsiphonen nicht deutlich 6-lappig) von den Arten der Gattung *Polycitor* (Körperöffnungen regelmässig 6-lappig) unterscheiden. Ich folge Van Name auch darin, dass ich in der Gattung *Clavelina* alle Gattungen der früheren Familie *Clavelinidae* (s. s.) mit Ausnahme der Gattung *Archiascidia* zusammenfasse, dazu auch die Gattung *Synclavella* Caull., die von Van Name nicht erwähnt wird, aber zweifellos nur versehentlich, denn eine der von ihm neuerdings zu *Clavelina* gestellten Arten (*C. gigantea*) zeigt den typischen *Synclavella*-Charakter.

Die Gattung *Clavelina* (emend.) kann wie folgt festgesetzt werden.

Diagnose: Zellulosemantel ohne Kalkkörper.

Branchial- und Atrialöffnung nicht deutlich 6-lappig, ganzrandig oder undeutlich und unregelmässig lappig.

Kiemensack mit vielen (mehr als 5) Kiemenspalten-Zonen.

Magenwandung nicht faltenlos (stets?).

Geschlechtsapparat zwittrig; Brutsäcke nicht vorhanden.

Clavelina sigillaria n. sp.

?? 1900, *Synclavella lessoni*, sp. inqu., Caullery, S. l. Clavelines nouv. (Synclavella, n. g.), p. 3, Textfig.

?? 1900, *Synclavella australis*, sp. inqu., Caullery, ebendas. p. 3.

Fundangabe: Neuseeland, Nordinsel, 10 Ml. Nordwest von Kap Maria van Diemen, 50 Fd.; 5. Jan. 1915.

Vorliegend 2 Kolonien einer Polycitoride, die durchaus eine von Caullery für die Gattung *Synclavella* angegebene Koloniegestaltung aufweist. Ob die neue Art mit einer der beiden Caullery'schen Arten identisch sei, lässt sich nicht feststellen, da über die Organisation der Personen jener Arten, deren Namen fast als „nomina nuda" anzusehen sind, kaum eine Angabe gemacht ist. In der Gestaltung der Kolonie weicht *Clavelina sigillaria* von den Originalen jener Arten ab, insofern sich ihre Kolonie scharf in einen

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[1]) Van Name, 1921. Ascid. West Indian Reg., p. 353.

dickeren Kopfteil und einen weniger als halb so dicken Stielteil sondert; doch mag hierin lediglich ein Wachstums- bezw. Altersunterschied liegen. Von Claveliniden der *Synclavella*-Form ist meines Wissens nur noch *Clavelina gigantea* (Sluit.)[1] beschrieben worden, die ebenfalls gestielte Kolonien bildet, wenngleich bei ihr der Stiel nicht so scharf ausgeprägt ist. *C. sigillaria* weicht, abgesehen von der beträchtlichen Grösse der Personen, von jener westindischen Form hauptsächlich in der Bildung der Siphonen und des Magens ab (siehe unten).

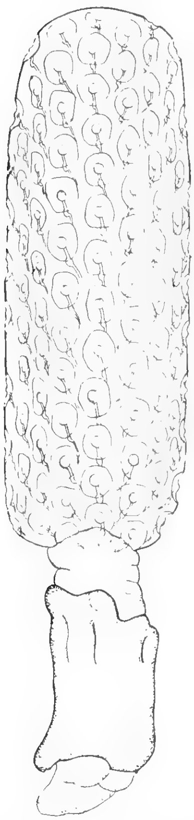

Fig. 1. *Clavelina sigillaria* n. sp., ganze Kolonie; $^3/_4$.

Beschreibung: Koloniegestaltung (Fig. 1) bei beiden Stücken gleichartig. Ein länglicher cylindrischer personenhaltiger Kopf ist ziemlich scharf abgesetzt von einem $^1/_2$ bis $^2/_3$ so langen und weniger als halb so dicken (bei einer Kolonie ca. $^2/_5$ so dicken) cylindrischen personenlosen Stiel.

Die Grössenverhältnisse der beiden Kolonien sind nur wenig verschieden. Die kleinere ist im ganzen 135 mm lang, wovon 90 mm auf den ca. 30 mm dicken Kopf, 45 mm auf den ca. 12 mm dicken Stiel entfallen; die andere ist 150 mm lang, wovon 90 mm auf den 36 mm dicken Kopf und 60 mm auf den etwa 14 mm dicken Stiel entfallen.

Aussehen der Kolonien sowohl im Kopfteil wie im Stielteil durchscheinend hellgelblich grau, im Kopfteil mit dunkleren durchschimmernden Personen.

Oberfläche der Kolonie (Fig. 1) am Kopf durch mässig starke Einsenkung der Personen-Aussenflächen uneben, im feineren glatt, ganz nackt, ohne Fremdkörper-Bewuchs, am Stiel durch unregelmässig und weitläufig gestellte Ringelfurchen uneben gemacht, bei beiden Kolonien fast ganz von einer krusten-

[1] 1919, *Polycitor* (*Paradistoma* Caull) *gigantea* Sluiter, Über alte und neue Ascid., Zool. Mus. Amsterdam, p. 10, Taf. I Fig. 18—20.
1920, *Clavelina gigantea*, Van Name, Ascid. West Indian Reg. Southeast. Unit. St., p. 350, Textf. 40.

förmigen Didemnide umwachsen, bei einer ausserdem mit einigen Hydrozoen Kolonien besetzt.

Anordnung der Personen, die abgesehen von den Gefässanhängen auf den Kopfteil der Kolonie beschränkt sind, ziemlich regelmässig in Quincunxstellung, so dass die Personen-Aussenflächen in Längslinien und zugleich in sich kreuzenden Systemen von Schräglinien stehen; der Abstand zwischen den Branchialöffnungen benachbarter Personen einer Schräglinie mag durchschnittlich etwa 6 mm betragen. Die Personen-Aussenflächen liegen als unregelmässig fältelige schwache Erhabenheiten im Grunde scharf umrandeter seichter Einsenkungen von fast kreisförmigem Umriss, die einander fast bis zu gegenseitiger Berührung nahe kommen. Der ganze Kopf erhält dadurch ein *Sigillaria*-artiges Aussehen, wenngleich die Regelmässigkeit dieser Narbenornamentierung die des Siegelbaumes nicht ganz erreicht. Ich halte es nicht für ausgeschlossen, dass die Personen-Aussenflächen am lebenden oder gut ausgestreckt konservierten Objekt derartige Erhabenheiten bildeten, wie sie Caullery bei seiner *C.* (*Synclavella*) *australis* sah („un bombement assez marqué à la surface“, l. c., p. 3).

Personensysteme sind nicht gebildet und Kloakalöffnungen fehlen. Atrialöffnungen wie die Branchialöffnungen unmittelbar an der Oberfläche der Kolonie gelegen, Branchial- und Atrialöffnungen einfach lochförmig.

Zellulosemantel weich knorpelig, ziemlich fest elastisch, mit etwas zäherer Oberflächenschicht, im allgemeinen fast wasserhell. Oberhaut schwach getrübt. Blasenzellen fehlen, Sternchen- und Spindelzellen sehr zart, farblose, annähernd kugelige Rundzellen (graue Pigmentzellen?) von ca. 20 μ Dicke im Innern spärlich, in der Oberflächenschicht etwas dichter, hier eine schwache Trübung hervorrufend.

Personen ziemlich regelmässig schräg nach innen und basalwärts gerichtet, mit Ausnahme der fester an der zäheren Oberhaut des Zellulosemantels haftenden Siphonen-Ränder leicht aus dem Zellulosemantel herauszulösen, unter Ausschluss des Gefässanhanges ca. 12 mm lang, scharf in Thorax und Abdomen gesondert, undurchsichtig gelblich grau.

Thorax (Fig. 2) bei allen untersuchten Personen stark geschrumpft und anscheinend auch verzerrt, in der Seitenansicht mit unregelmässig trapezförmigem Umriss, etwa doppelt so lang wie dorsoventral hoch, seitlich etwas zusammengedrückt; er nimmt ungefähr $^1/_3$ der ganzen Körperlänge ein.

Siphonen (Fig. 2) beide am Vorderende der Person ziemlich dicht hinter einander, gleichweit vorragend, oder Branchialsipho etwas weiter vorragend als der Atrialsipho und meist auch etwas umfangreicher. Sowohl Branchialsipho wie Atrialsipho schräg abgestutzt kegelförmig. Die Abstutzungskante bezw. der Öffnungsrand, der sowohl beim Branchialsipho wie beim Atrialsipho ventralwärts etwas abfällt, ist ganz glatt, wenn auch etwas geschweift, und zeigt keine Spur von Lappenbildung oder Zähnelung. Diese Glattrandigkeit der Siphonenränder bezw. das Fehlen jeglicher Lappenbildung an den Siphonen hängt offenbar mit dem Umstand zusammen, dass bei *C. sigillaria* die Längsmuskelbündel der Leibeswand des Thorax nicht auf die Siphonen hinaufreichen, sondern dicht vor der Basis der Siphonen enden. Bedeutsam ist, dass nach Sluiter die bei seiner *C. gigantea* (*Polycitor giganteus* l. c. p. 11) undeutliche Zähnelung mit dem Auftreten von 6 kräftigeren Längsmuskelbündeln in der Siphonenwand zusammenhängt. Es ist wohl anzunehmen, dass auch bei anderen Clavelinen mit 6-strahligen Siphonen wie *C. oblonga*[1]) jene 6 Längsmuskelbündel in der Siphonenwand auftreten, im Gegensatz zu dem Verhalten der thorakalen Längsmuskelbündel bei *C. sigillaria* und anderen Clavelinen mit ganz glattrandigen Siphonen. Die Ringmuskulatur bildet an den Siphonen der *C. sigillaria* keine geschlossene Schicht, sondern ungleichmässig getrennte, mässig starke Bündel. Das äusserste Ringmuskelbündel liegt unmittelbar am freien Rande des Siphos.

Abdomen mit Ausschluss des Gefässanhanges bei stark geschrumpften Personen ungefähr doppelt so lang wie der Thorax, von diesem sehr scharf abgesetzt, mit langem und schlankem, ungefähr die Hälfte seiner Länge einnehmenden Taillenteil. Die Taille ist kaum $^1/_3$ so dick wie der Thorax dorsoventral hoch. Das Hinterende des Abdomens ist unregelmässig gerundet und trägt an seiner Kuppe einen scharf abgesetzten, ungemein langen Gefässanhang, der in der Achsenpartie der Kolonie basalwärts verläuft. Wenigstens eine Anzahl Gefässanhänge der verschiedenen Personen (vielleicht

[1]) Van Name, l. c. 1921, p. 356.

sämtliche?) treten in den Stiel der Kolonie ein. (Ich verzichtete auf Zerschneidung des Stieles und weitere Verfolgung der Gefässanhänge).

Leibeswand im allgemeinen zart, mit mässig kräftiger, sehr charakteristisch angeordneter Muskulatur (Fig. 2). Eine einigermassen kräftige Ringmuskulatur ist nur an den Siphonen ausgebildet; im übrigen beschränkt sie sich am Thorax und am Anfangsteil des Abdomens auf sehr zarte, locker angeordnete Stränge. Am Abdomen konnte ich im übrigen überhaupt keine Ringmuskeln erkennen. Viel kräftiger ist die Längsmuskulatur ausgebildet. Diese bildet am Thorax jederseits ungefähr 12 kräftige, ca. 20 μ breite Bündel, die durch weite Zwischenräume von einander getrennt sind. Am Hinterende des Thorax lösen sich diese Längsmuskelbündel auf und bilden dann schon beim Übertritt auf das Abdomen eine am ganzen Umfange des Abdomens gleichmässig verteilte, fast geschlossene Lage feinerer Längsmuskeln, die nun das ganze Abdomen bis an sein Hinterende durchziehen. Ganz anders gestaltet sich das Vorderende der Längsmuskelbündel. Auch dieses löst sich auf, aber nicht in eine gleichmässige Schicht annähernd parallel verlaufender feinerer Muskeln, sondern fächerförmig in eine geringe Zahl kurzer Strahlen. Diese enden meist einfach. Die äussersten Strahlen gehen aber manchmal bogenförmig in die ihnen zugebogenen Strahlen eines benachbarten Bündels über. Sehr charakteristisch ist die Anordnung und der Verlauf der Längsmuskelbündel am Thorax. Wie oben erwähnt, tritt keines dieser Längsmuskelbündel auf die Siphonen hinauf. Ja nur der kleinere dorsale Teil der Längsmuskelbündel verläuft überhaupt in der Richtung auf die Siphonen zu, um sich vor deren Basis aufzulösen und so zu enden. Nur die beiden am weitesten

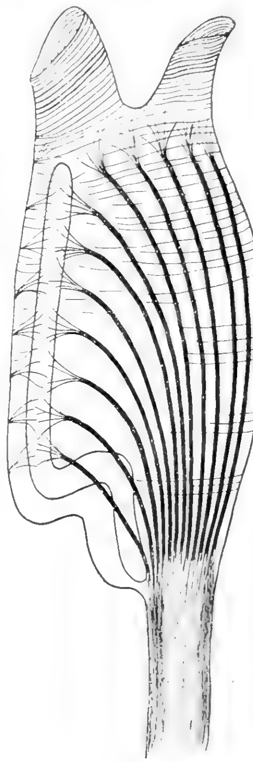

Fig. 2. *Clavelina sigillaria* n. sp., Leibeswand-Muskulatur am Thorax und am Vorderende des Abdomens; $\times$ 15.

dorsal gelegenen Bündel verlaufen annähernd parallel der Rückenlinie des Thorax. Die übrigen zeigen eine allmählich stärker werdende Abbiegung ventralwärts und enden, sich fächerförmig auflösend, zum geringen Teil noch vor der Basis des Branchialsiphos, zum grösseren Teil neben dem vorderen und dem mittleren Teil der ventralen Medianlinie über dem Endostyl. Bei dem näher untersuchten Stück endete nur das am weitesten dorsal gelegene Bündel ganz an der Basis des Atrialsiphos, das zweite Bündel sandte seinen ventralen Strahl schon zur Basis des Branchialsiphos. Das fünfte Bündel endete nur noch zum grössten Teil vor der Basis des Branchialsiphos und sandte seinen am weitesten ventral liegenden Endstrahl schon gegen das Vorderende des Endostyls. Die 7 weiteren Bündel endeten ganz über dem Endostyl. Zu bemerken ist noch, dass einzelne dieser ventralen Endstrahlen, die ventrale Medianlinie überquerend, in den Endstrahl eines Bündels der Gegenseite übergingen. Erwähnt muss noch werden, dass manchmal auch Gabelung eines Bündels in der Seitenfläche des Thorax vorkommt, so dass eine Zählung der Bündel in verschiedenen Zonen des Thorax verschiedene Ergebnisse hat. Es ist hieraus wohl zu schliessen, dass die Zahl der Längsmuskelbündel an einer Thoraxseite nicht ganz konstant ist. Die oben geschilderte Anordnung der Längsmuskulatur scheint mir für die Art sehr charakteristisch zu sein; doch fehlt leider die Möglichkeit eines durchgehenden Vergleiches mit anderen Arten, da nur in den wenigsten Fällen etwas über diese Bildung angegeben ist. Oben erwähnte ich schon eine abweichende Bildung wenigstens der Vorderenden der Längsmuskelbündel bei *C. gigantea* (Sluit.) und *C. oblonga* Herdman, bei denen diese Bündel auf die Siphonen übertreten. Eine Abweichung der Zahl lässt sich für *C. australis* Herdm.[1]) feststellen, bei der sich am Thorax jederseits 6 Bündel finden. Am interessantesten ist der Vergleich mit der Anordnung der Muskulatur am Thorax von *C.? cylindrica* (Qu. & Gaim.), wie sie von Caullery[2]) geschildert und abgebildet wird. Auch hier liegen die fächerartig aufgelösten Vorderenden der anscheinend viel

[1]) *Stereoclavella australis* Herdman, 1899, Descr. Cat. Tunic. Austral. Mus., p. 6.

[2]) *Chondrostachys ? cylindrica*, Caullery, 1908, Rech. Synascid. Colella et Considér. Distomidae, p. 53, Textfig. XV, A. B.

feineren und zahlreicheren Längsmuskelbündel nur zum Teil unter der Basis des Branchialsiphos und grösstenteils über dem Vorder- und Mittelteil des Endostyls. (An der Basis des Atrialsiphos endet anscheinend keines dieser Bündel, oder doch nur das zu äusserst dorsal liegende mit einem Teil seiner Fächer-Endstrahlen). Die morphologischen Hinterenden dieser Bündel gehen jedoch nicht abwärts zum Abdomen und auf dieses hinauf, sondern verlaufen geradezu quer, anscheinend die dorsale Medianlinie überspannend, sich also hier ganz wie Ringmuskeln gebärdend. Das Abdomen aber scheint ganz frei von einer Leibeswand-Muskulatur zu sein. Es wäre wünschenswert, auch andere *Clavelina*-Arten auf diese Muskulaturverhältnisse hin zu untersuchen.

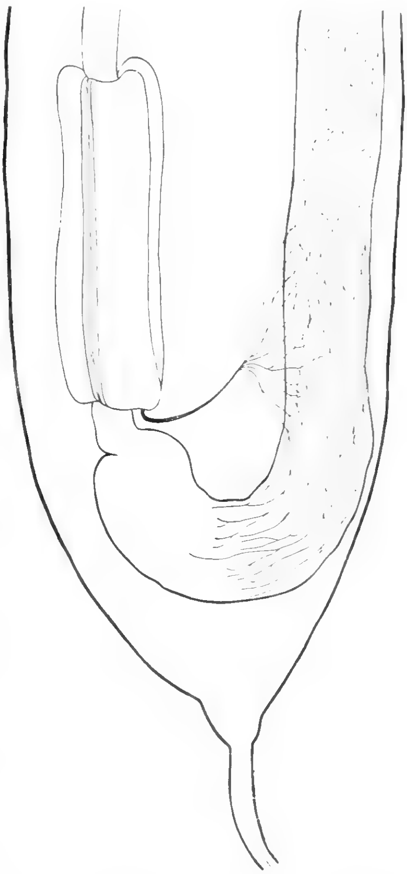

Fig. 3. *Clavelina sigillaria* n. sp., hinterer Teil des Abdomens mit der Darmschleife und dem Vorderende des Gefässanhanges: × 45.

B r a n c h i a l t e n t a k e l (normalerweise 32?) bei einer näher untersuchten Person 28, nicht ganz regelmässig nach dem Schema 1, 3, 2, 3, 1, verschieden lang, je nach der Grösse in besonderen Kreisen stehend, die grössten in dem untersten Kreise. Gestalt der Branchialtentakel fast fadenförmig, basal verdickt, apikal langsam dünner werdend.

F l i m m e r o r g a n nicht erkannt.

K i e m e n s a c k bei allen untersuchten Personen stark geschrumpft. Zahl der K i e m e n s p a l t e n-Z o n e n mässig gross (etwa 12 bis 14?). K i e m e n s p a l t e n sehr lang und schmal, parallelrandig, mehr als 50 in einer Halbzone. Endostyl bei allen untersuchten Personen stark gebogen (infolge von starker Kontraktion?), V-förmig oder W-förmig mit langen End-Ästen. Dorsalfalten-Züngelchen nicht genau erkannt.

Darm eine lange, einfache, nicht ganz bis an das Hinterende des Abdomens gerade nach hinten gehende Schleife bildend, die im Bereiche der Taille eng geschlossen ist, im angeschwollenen Abdomen-Teil dagegen etwas klafft. Ösophagus sehr lang und schlank, den grösseren Teil des hinlaufenden Darmschleifen-Astes bildend. Magen (Fig. 3 u. 4) ungefähr das fünfte Sechstel des hinlaufenden Darmschleifen-Astes einnehmend, gerade in der Längsrichtung des Abdomens liegend, länger als breit und breiter als dick, vorn und hinten scharf abgesetzt, ungleichmässig prismatisch, mit flach trapezförmigem Querschnitt (Fig. 4), dessen breiteste Seite dem gegenüberliegenden Enddarm zugewendet ist. Die vier Kanten sind durch eine deutliche Strukturbesonderheit des Wandungsepithels, im allgemeinen eine Verkürzung der Cylinderzellen bezw. eine Verdünnung der Wandung ausgezeichnet. Die Vierkantigkeit des Magens ist also offenbar keine zufällige Kollabierungserscheinung, sondern ein Charakter der Art, durch den sie sich scharf von *C. gigantea* (Sluit.) unterscheidet. Sowohl am Cardia-Ende wie am Pylorus-Ende treten die Kanten-Enden etwas schulterartig vor. Eine der beiden Kanten der der Leibeswand zugewendeten zweitbreitesten Fläche ist durch eine Doppelrinne ersetzt, die als Doppeltyphlosolis bezw. Typhlosolis mit einer Leitrinne auf der Kante die ganze Länge des Magens durchzieht. Mitteldarm anscheinend sehr kurz, nicht deutlich weiter geteilt. Enddarm (Fig. 3) den ganzen rücklaufenden Darmschleifen-Ast samt dem Wendepol einnehmend, ziemlich gleichmässig dick, im Querschnitt oval, eine Breitseite dem hinlaufenden Darmschleifen-Ast zugewendet. After zweilippig (?). Die darmumspinnende Drüse (Fig. 3) bildet am Enddarm vom Wendepol an nach vorn hin ein den ganzen Umfang einnehmendes, von zarten Schläuchen gebildetes, ziemlich regelmässiges Netzwerk, dessen Maschen sehr in die Länge gezogen sind, sodass die Schläuche grösstenteils in der Längsrichtung des Darmes verlaufen. Ein Querschnitt zeigt

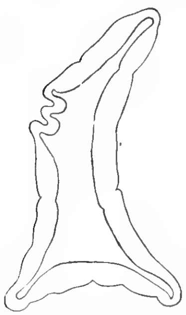

Fig. 4. *Clavelina sigillaria* n. sp., Querschnitt durch den Magen; × 60.

daher den Querschnitt des Darmes ziemlich dicht und regelmässig umstellt von etwa 24 bis 30 Querschnitten feiner Schläuche. Ampullen sind nicht erkannt worden. In der Region gegenüber dem hinteren Teil des Magens und dem Mitteldarm lösen sich einige derartige Schläuche vom Netzwerk ab, um sich nach und nach zu vereinen und schliesslich sämtlich zu einem gemeinsamen Ausführgang zu verschmelzen. Dieser anfangs noch sehr zarte Ausführgang überspannt das Lumen der Darmschleife und mündet schliesslich durch die schmale Hinterwand des Magens in geringer Entfernung vom Pylorus in den Magen ein. Das Einmündungsende des Ausführganges ist ziemlich stark verdickt und derbwandig.

Geschlechtsorgane: Personen zwittrig. Gonaden im Bereich des hinteren Teils der Darmschleife, ungefähr vom Hinterende des Magens bis zum Wendepol der Darmschleife im Abdomen liegend. Ovarium als langgestreckter, hinten tütenförmig zugespitzter Schlauch an der Leibeswand sitzend. Eizellen im Ovarium nach vorn hin an Grösse zunehmend, die grössten etwa 100 μ dick. Die Hode ist ziemlich eng an die Darmschleife angelegt. Sie wird von zahlreichen kleinen birnförmigen, durchschnittlich etwa 60 μ dicken Hodenbläschen gebildet, die zu einer länglich ovalen Rosette locker zusammengestellt sind, und deren feine, schlanke Sonderausfürgänge sich nach und nach vereinen und schliesslich im Mittelpunkt der Rosette zu einem verhältnismässig weiten, zartwandigen Samenleiter zusammenfliessen. Samenleiter und Eileiter scheinen dicht neben einander gerade nach vorn hin zu verlaufen.

Brutvorrichtungen, Embryonen und Larven sind an der näher untersuchten Kolonie nicht gefunden worden.

Gen. **Polycitor** Ren. s. s.

Ich halte es für richtiger, die Gattung *Polycitor,* die im Neuseeland-Gebiet anscheinend durch keine Art vertreten ist, ganz auf den kleinen Artenkreis zu beschränken, den Hartmeyer[1]) bisher als Untergattung *Polycitor* der Untergattung *Eudistoma* gegenübergestellt hat. Zur Sonderung von der Gattung *Clavelina,* wie ich sie jetzt auffasse (siehe oben!), ist das Merkmal der Sechs-

[1]) Hartmeyer, 1909, Tunic., in Bronn, Kl. Ordn. Tier-R., p. 1931.

lappigkeit der Körperöffnungen in die Diagnose von *Polycitor* (und von *Eudistoma*) aufzunehmen:

Diagnose: Zellulosemantel ohne Kalkkörper.
Branchial- und Atrialöffnung regelmässig 6-lappig.
Kiemensack mit vielen (mehr als 5) Kiemenspalten-Zonen.
Magenwandung nicht faltenlos.
Geschlechtsapparat zwittrig; Brutsäcke nicht vorhanden.

Gen. Polycitorella nov. gen.

Diagnose: Zellulosemantel mit morgensternförmigen Kalkkörpern, deren Matrizien abdominale Seitenorgane sind.
Branchial- und Atrialsipho röhrenförmig, regelmässig 6-lappig.
Kiemensack mit vielen (mehr als 5) Kiemenspalten-Zonen. Magenwandung nicht faltenlos.
Geschlechtsapparat zwittrig; Brutsäcke nicht vorhanden.

Typus: *Polycitorella mariae* n. sp.

Ich stelle diese neue Gattung für einen Polycitoriden auf, der sich von den Arten der Gattung *Polycitor* anscheinend lediglich durch den Besitz von charakteristisch gestalteten, morgensternförmigen Kalkkörpern im Zellulosemantel und den Matrizien dieser Kalkkörper, „abdominalen Seitenorganen", unterscheidet. Kalkkörper sind in der Fam. *Polycitoridae* bisher nur bei der Gattung *Cystodytes* nachgewiesen (die angeblichen Kalkkörper der daraufhin von *Polycitor* gesonderten Gattung *Paessleria* Mich. haben sich später als Fremdorganismen erwiesen); doch ähneln die *Cystodytes*-Kalkkörper in keinem Falle den typischen, morgensternförmigen Didemniden-Kalkkörpern. Auffallend ist die Lage der Kalkkörper-Matrizien bei *Polycitorella mariae.* Diese Organe, bei den Didemniden seitlich am Thorax gelegen und deshalb von mir als „thorakale Seitenorgane" bezeichnet, sitzen bei *P. mariae* seitlich am Abdomen, eine nicht sehr grosse, aber immerhin noch beträchtliche Strecke hinter dem Hinterende des Thorax, und können füglich hier nur „abdominale Seitenorgane" genannt werden. Ich sehe in dieser verschiedenen Stellung der Kalkkörper-Matrizien eine weitere Stütze für die von Hartmeyer vertretene und von mir adoptierte Anschauung, dass ein grundsätzlicher Unterschied zwischen den Körperabschnitten krikobrancher Ascidien, zwischen Thorax, Abdomen und Postabdomen, nicht besteht.

Auffallend ist die Ähnlichkeit der *Polycitorella*-Kalkkörper mit den typischen Didemniden-Kalkkörpern; doch glaube ich nicht, dass wir aus diesem Umstand eine besondere verwandtschaftliche Annäherung von *Polycitorella* an die Didemniden annehmen müssen. Diese besondere Gestalt der Kalkkörper, die morgensternförmige, ist ja auch für die Didemniden nicht die ausschliessliche. (Beachte die Gattung *Echinoclinum* sowie *Didemnum cerebrale*). Meiner Ansicht nach steht die Polycitoriden-Gattung *Cystodytes* den Didemniden näher. Erwähnt mag noch werden, dass ich kürzlich morgensternförmige Kalkkörper auch im Zellulosemantel einer Pyuride gefunden habe, nämlich bei *Pyura australis* (Qu. & Gaim.) von Südwest-Australien.

Polycitorella mariae n. sp.

Fundangabe: Neuseeland, Nord-Insel, 10 Sml. NW. von Cape Maria v. Diemen, 50 Fd., harter Grund; 5. Jan. 1915.

Beschreibung: Koloniegestaltung und Bodenständigkeit (Fig. 5): Die Kolonien bezw. Kormidien sehen aus wie längliche Seerosen, die bis auf den verbreiterten Apikalteil von einem fest zusammen gebackenen Panzer von meist kalkigen Fremdkörpern, Muschelschalen und Kalkbryozoen-Fragmenten, zum Teil mehrere Millimeter breit, Kieskörnern, Foraminiferenschalen und dergl., eng umhüllt sind. Man könnte sie auch bezeichnen als hinten geschlossene kurze Konglomeratröhren, aus deren vorderer Öffnung der etwas verbreiterte Apikalteil des Weichkörpers der Kolonie herausquillt. Die Kolonien bezw. Kormidien sassen offenbar nur mit ihrem Hinterende am Untergrunde, von dem sie frei aufragten, fest. Zwei Röhren waren ursprünglich an ihrem Hinterende verwachsen, brachen aber bei geringer Zerrung auseinander. Ob sie lediglich mit einander aggregiert waren und zwei einfache Kolonien darstellen, oder ob die Weichkörper stoloartig aus einer Röhre in die andere übergingen, die beiden Röhren also nur 2 Kormidien einer einzigen zusammengesetzten Kolonie sind, liess sich nicht feststellen.

Grössenverhältnisse der Kolonie: das grösste vollständige Kormidium ist 20 mm lang und etwa 5—7 mm dick. Der vorn hervorquellende Kopfteil des Weichteils des Kormidium ist 6 mm dick.

Aussehen des Weichteiles undurchsichtig schneeweiss.

Oberfläche des nackten Weichteiles der Kolonie nur stellenweise eben, an anderen Stellen sehr uneben, zumal durch das Vorragen der Branchialöffnungen (und der Atrialöffnungen?) auf warzenförmigen Papillen.

Kloakalöffnungen sind nicht deutlich nachgewiesen worden. Vielleicht ist eine unregelmässig grubenförmige Einsenkung oder eine quere Einkerbung im Mittelraum der Apikalfläche des Weichteiles des Kormidiums als Kloakalöffnung anzusehen.

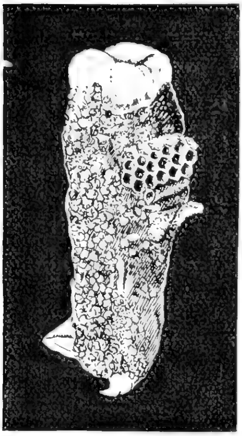

Fig. 5. *Polycitorella mariae* n. sp., ganzes Kormidium; × 2¼.

Personenaussenflächen ganz auf die Apikalfläche des Weichteiles des Kormidiums beschränkt, vielleicht sogar nur auf die peripheren Teile dieser Apikalfläche. Hier liessen sich kleine, scharf abgesetzte Warzen erkennen, die auf ihrer Kuppe eine regelmässig sechsstrahlige Öffnung aufweisen. Diese Öffnungen sind zweifellos Branchialöffnungen, falls nicht teils Branchialöffnungen und teils Atrialöffnungen. Ob die Atrialöffnungen wie die Branchialöffnungen an der Oberfläche des Weichteils des Kormidiums liegen oder im Innern an Kloakalräumen, konnte ich nicht feststellen, da ich weiteres Material nicht opfern wollte.

Zellulosemantel mässig weich und mässig leicht zerreissbar, durchaus undurchsichtig schneeweiss, rein und ohne Einlagerung von Fremdkörpern. Die oberflächliche Inkrustierung an den Seitenteilen des Kormidiums beschränkt sich auf eine allerdings sehr feste Auflagerung von Fremdkörpern, eine Einbettung unter vollständiger Umschliessung der Fremdkörper findet nicht statt. Blasenzellen und Pigmentzellen fehlen im Zellulosemantel. Das schneeige Aussehen der Zellulosemantel-Masse beruht auf einer gleichmässigen und dichten Einlagerung charakteristisch gestalteter Kalkkörper in dem Zellulosemantel. Diese Kalkkörper ähneln durchaus den typischen Didemniden-Kalkkörpern, wenngleich sie nicht durchweg ganz so regelmässig gestaltet sind wie die der Didemniden. Auch ihre Herkunft von charakteristischen Hautorganen (siehe unten!) ist die gleiche wie bei jenen. Sie sind bei regelmässiger normaler Ausbildung morgensternförmig, mit spitzbogenförmigen Stacheln, die etwas länger als am Grunde breit sind, etwa 8 bis 16 im Umkreis des optischen Querschnittes. Vielfach sind die Kalkkörper jedoch weniger regelmässig gestaltet. Die Stacheln erscheinen zum Teil an der Spitze gespalten oder gar mehrspitzig, oder nehmen eine ganz unregelmässige Gestalt an. Einzelne Kalkkörper sehen aus wie ein mehr oder weniger unregelmässiges Aggregat unregelmässig polyedrischer Körner. Die Kalkkörper sind meist etwa 18—20 μ dick, zum geringen Teil kleiner, im Maximum etwa 25 μ dick.

Jedes Kormidium enthält nur eine geringe Zahl von Personen, ein eingehend untersuchtes deren 9. Die ausgewachsenen Personen münden an der Apikalfläche des Weichteiles des Kormidiums aus, und zwar anscheinend an den peripherischen Teilen, vielleicht im Umkreis einer zentral gelegenen Kloakalöffnung. Die Personen, die sich ziemlich leicht aus dem Zellulosemantel herauslösen lassen, erstrecken sich im ausgewachsenen Zustand und bei normaler Ausmündung an der Oberfläche der Kolonie mehr oder weniger regelmässig parallel mit einander durch die ganze Länge des Kormidiums, in dessen Basalteil die Hinterenden einen etwas unregelmässigen Verlauf, manchmal eine Art Schleifenbildung, zeigen. Eine in ganzer Länge frei gelegte ausgewachsene Person erwies sich als 20 mm lang, wovon etwa 3,2 mm auf den Thorax, 16,8 mm auf das Abdomen entfielen. Der Thorax (Fig. 6), bei der zur Messung ausgewählten sehr schlanken Person etwa $^1/_2$ mm dick, verengt sich hinten ziemlich schnell und ist dadurch deutlich von dem im allgemeinen dünneren, bei jener schlanken Person im allgemeinen 0,3—0,4 mm dicken Abdomen abgesetzt. Das Hinterende des Abdomens ist anscheinend stets

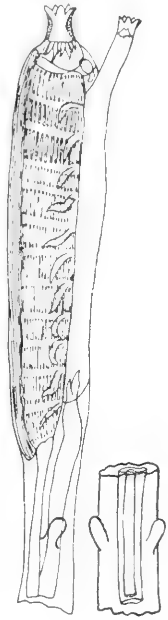

Fig 6. *Polycitorella mariae* n. sp., Thorax samt Vorderende des Abdomens von der Seite, das letztere daneben auch von vorn; × 20.

stark verbreitert, etwa bis auf die doppelte allgemeine Breite des Abdomens. Gefässanhänge sind nicht beobachtet worden.

Branchialsipho (Fig. 6) gerade am Vorderende des Thorax, mehr oder weniger scharf abgesetzt, kronenförmig, ungefähr so lang wie breit, apikal in 6 regelmässige, fast zungenförmige Lappen auslaufend. Der Branchialsipho ist mit ziemlich kräftiger, eine mehrfache Lage bildender, einen deutlich abgesetzten Sphinkter bildender Ringmuskulatur ausgestattet. Dieser Branchialsphinkter erscheint im Längsschnitt durch den Branchialsipho bei mässiger Kontraktion etwa 160 μ breit und 30 μ dick.

Atrialsipho (Fig. 6) eine kurze Strecke hinter dem Branchialsipho an der Rückenseite des Thorax angesetzt, röhrenförmig, ungefähr doppelt so lang wie dick, in dem basalen und mittleren Teil meist etwas aufgebläht, sodass sich das Apikalende, das in 6 regelmässige, fast zungenförmige Lappen ausläuft, kronenförmig von den übrigen Teilen absetzt. Dieses Apikalende ist ungefähr ebenso gestaltet wie der Branchialsipho, wenn auch ein sehr geringes kleiner. Der Atrialsipho ragt fast gerade nach vorn, nahezu parallel dem Branchialsipho und meist fast ebenso weit reichend. Seine Ringmuskulatur ist nicht besonders stark entwickelt, nicht deutlich sphinkterartig. Eine kurze Strecke innerhalb der äusseren Öffnung trägt der Atrialsipho ein dünnhäutiges, aber ziemlich breites, ringförmiges Atrialvelum, das den Atrialsipho bis auf eine kleine zentrale Öffnung verschliessen kann.

Wie bei vielen Kalkkörper bildenden Didemniden so konnte ich auch bei dieser Kalkkörper bildenden Polycitoride Kalkkörper-Matrizien nachweisen. Während die Matrizien bei jenen Didemniden jedoch dem Thorax angehören, sitzen sie bei *Polycitorella mariae* am Abdomen, eine weitere Stütze für die von Hartmeyer und mir vertretene Anschauung, dass kein grundsätzlicher Gegensatz zwischen den als Thorax, Abdomen und Postabdomen bezeichneten Körperabschnitten merosomer Ascidien bestehe. Diese Kalkkörper-Matrizien bezw. „abdominalen Seitenorgane“ (Fig. 6) sind bei *P. mariae* rein äusserlich; es sind dünnhäutige, an der Innenseite löffelartig ausgebauchte Lappen, die etwa 1 bis 2 Abdomenbreiten hinter dem Hinterende des Thorax jederseits vom Abdomen schräg nach vorn hin abragen. Ein solches sich im Ganzpräparat besonders gut darstellendes Seitenorgan erwies sich als ca. 150 μ lang und

120 μ breit. An Längsschnitten durch die Leibeswand mit einem Seitenorgan zeigte sich, dass die Längsmuskulatur der Leibeswand nicht an der Bildung der Lappen beteiligt ist, sondern ungestört unterhalb dieser Organe geradenwegs weiter läuft. Auch die ungemein zarte Ringmuskulatur der Leibeswand geht wenigstens grösstenteils ununterbrochen und nicht aus ihrer Richtung herausgebracht unterhalb der Lappen fort. Bei einigen wenigen Personen konnte ich abdominale Seitenorgane gar nicht oder nur einseitig nachweisen. Bei der ungemein zarten Beschaffenheit dieser Organe mag dies auf Zerstörung bei der Präparation beruhen. Vielleicht aber sind auch bei dieser Polycitoride, wie anscheinend bei Didemniden, diese Organe nicht an allen Personen oder nicht stets vorhanden.

Leibeswand mässig dick, mit im allgemeinen kräftiger Längsmuskulatur und zarter Ringmuskulatur. Die von den Apikal-Enden der beiden Siphonen ausgehenden Längsmuskeln überziehen den Thorax in ziemlich gleichmässiger, einfacher, nicht ganz geschlossener Lage, und gehen auch in dieser Form über den Vorderteil des Abdomens hin. Im weiteren Verlauf schliessen sie sich dann jederseits zu einem breiten, enggeschlossenen und schliesslich bei weiterer Verschmälerung eine mehrfache Schichtung annehmenden Längsbande zusammen. Gegen das Hinterende des Abdomens rücken diese beiden Längsmuskelbänder ventral näher aneinander, um schliesslich am Hinterende des Abdomens ohne zu verschmelzen aneinander zu stossen. Sie enden dann plötzlich in leicht konvexer Rundung am einfachen Hinterende des Abdomens. Die Ringmuskulatur bildet nur am Branchialsipho, als Branchialsphinkter, eine dichtere dicke Lage, im übrigen am Thorax eine lockere, zarte, wenn auch nicht ganz einfache Lage, die am Abdomen noch zarter und spärlicher wird, aber selbst am Hinterende des Abdomens noch nachweisbar ist.

Branchialtentakel schlank fingerförmig, in 3 sehr verschiedenen Grössen ausgebildet, in engem, einfachem Kreise stehend, jedoch die grösseren Grundflächen der grösseren entsprechend weiter vorragend, bei einer näher untersuchten Person an Zahl 24, ganz regelmässig nach dem Schema 1, 3, 2, 3, 1 angeordnet.

Flimmerorgan anscheinend ein Polster mit einfacher Durchbohrung.

Kiemensack (Fig. 6) bei einer gut gestreckten näher untersuchten Person mit 12 Kiemenspalten-Zonen. Kiemenspalten schmal und lang, in einer Halbzone etwa 15, wenn nicht mehr. Quergefässe sämtlich gleich stark. Parastigmatische Quergefässe sind nicht vorhanden. Dorsalfalten-Züngelchen gross, säbelförmig, länger als eine Kiemenspalten-Zone.

Darm eine lange, bis in das Hinterende des Abdomens reichende, im allgemeinen einfache, nur am Beginn des rücklaufenden Darmschleifen-Astes durch geringe Schleifenbildung etwas umgebildete Schleife bildend. Ösophagus ungemein lang, den grössten Teil des hinlaufenden Darmschleifen-Astes bildend, anfangs dünn und zart, hinten etwas erweitert und mit spiraligem Lumen (Spiralfalte oder unwesentliche Kontraktionserscheinung?). Magen infolge der Länge des Ösophagus ungemein weit nach hinten verlagert, nur eine kurze Strecke vor dem Wendepol der Darmschleife liegend, verhältnismässig sehr breit und kurz, scharf vom Ösophagus und Mitteldarm abgesetzt, deren dünne Enden als Cardiawulst bezw. als Pyloruswulst etwas in das Lumen des Magens eingedrückt erscheinen. Der Magen ist nicht ausgesprochen glattwandig; doch ist auch eine regelmässige Wulst- bezw. Faltenbildung nicht ganz klar erkennbar. Die näher untersuchten Magen machten mehr den Eindruck, als seien sie unregelmässig und stark kollabiert. Meist schienen 4 stark erhabene Längswülste aufzutreten; doch machte ein Magen mehr den Eindruck einer Querfalten-Bildung. Der Mitteldarm bildet mit dem hintersten Teil des hinlaufenden Darmschleifen-Astes ein kurzes, enges, manchmal stellenweise auch aufgeblähtes Stück von gewöhnlichem Aussehen, an das sich dann gerade am Wendepol ein stark umgebildeter, beidenendes scharf abgesetzter, kurz- und dick-ovaler Teil mit auffallend dicker, anscheinend drüsiger Wandung, offenbar ein Drüsendarm, anschliesst. Der den ganzen rücklaufenden Darmschleifen-Ast bildende Enddarm ist in seinem Beginn, in der Strecke hinter der Region des Magens, etwas aus der einfachen Schleifenrichtung herausgebogen, ob normalerweise oder nur durch schiefe Kontraktion, muss dahin gestellt bleiben. Er ist im allgemeinen nur mässig dick oder eng und mündet durch ein lang-zweilippiges Afterstück im hinteren Teil des Thorax, im Bereich der vorletzten, also der 11. Kiemenspalten-Zone aus. Die das Afterstück tragende Hinterwand des Atrialraumes liegt ungemein weit hinten, gerade in der Zone des hintersten Kiemensack-Quergefässes.

Geschlechtsapparat: Personen zwittrig. Hode dem Hinterteil der Darmschleife in der kurzen Region zwischen Magen und Wendepol angelagert, bestehend aus etwa 12 birnförmigen, locker und unregelmässig rosettenförmig angeordneten Hodenblasen, deren lange Sonderausführgänge sich in unregelmässiger schneller dichotomischer Aufeinanderfolge im Mittelpunkt der Rosette zu einem Samenleiter vereinen, der beträchtlich dicker als die Sonderausführgänge der Hodenblasen, jedoch nicht zu einem Samenmagazin angeschwollen ist. Ovarium verbogen birnförmig, nach vorn anscheinend in einen röhrenförmigen Eileiter auslaufend, in der Region dicht hinter dem Magen an die Leibeswand angeschmiegt, so zwar, dass es zwischen der Hode und der Leibeswand liegt, sein dicker hinterer Pol ungefähr neben dem Mittelpunkt der Hodenrosette bezw. dem proximalen Ende des Samenleiters. Besondere Brutsäcke sind nicht ausgebildet. Bei mehreren Personen fand sich eine einzige, anscheinend ausgewachsene, ziemlich grosse, verhältnismässig lange und schmale geschwänzte Larve dorsal im Vorderende des Abdomens, das hier infolgedessen etwas aufgebläht erschien. Knospung nicht beobachtet.

Gen. **Eudistoma** Caull.

Nach der Absonderung der früheren Untergattung *Eudistoma* von der Gattung *Polycitor* hat ihre Diagnose folgende Fassung zu erhalten:

Diagnose: Zellulosemantel ohne Kalkkörper.
Branchial- und Atrialöffnung regelmässig 6-lappig.
Kiemensack mit geringer Zahl, 3 oder 4 (selten 5?) Kiemenspalten Zonen.
Magenwandung faltenlos.
Geschlechtsapparat zwittrig; Brutsäcke nicht vorhanden.

Eudistoma circumvallatum (Sluit.).

1900. *Distoma circumvallata* Sluiter. Tunic. Stillen Ocean, p. 8, Taf. I Fig. 4, Taf. II Fig. 6.

1909. *Polycitor (Eudistoma) circumvallatum*, Hartmeyer, Tunic.; in: Bronn, Kl. Ordn. Tier-R., p. 1431.

Vorkommen im Gebiet: Neuseeland, Süd-Insel, d'Urville-Insel (Sluiter 1900).

In den vorliegenden Sammlungen nicht enthalten.

Gen. Cystodytes Drasche.

Cystodytes draschei Herdm.

? 1877. *C. aucklandicus* und *C. perspicuus* Nott, Comp. Asc. N. Shore reef, p. 323 bezw. p. 326, Taf. XXX.

1886. *C. draschii* Herdman, Rep. Tunic. Challenger II, p. 137, Taf. XIX.

1902. *C. draschii*, Van Name, Asc. Bermuda Isl., p. 347.

Fundangabe: Neuseeland, Süd-Insel, Queen Charlotte-Sund, 3—10 Fd.; 1.—2. Jan. 1915.

Neuseeland, Nord-Insel, Hauraki-Golf; H. Suter (Mus. Berlin).

Ältere Fundangaben: Brasilien (Herdman 1886); ? Neuseeland, Nord-Insel, vor Auckland (Nott. 1877).

Erörterung: Die mir vorliegenden Kolonien, die von zwei ziemlich weit entfernt voneinander liegenden Fundstellen stammen, gehören zweifellos zu einer und derselben Art, die ich nach Massgabe der scheibenförmigen Kalkkörper nur mit *C. draschii* identifizieren kann. Bei der Einförmigkeit in der Organisation der Personen bleibt uns bei der Gattung *Cystodytes* kaum ein anderes Organsystem, das zur Sonderung der Formen benutzt werden könnte. Dabei ist die systematische Wertigkeit der Kalkkörper-Verschiedenheit bei *Cystodytes* ebenso fraglich wie bei den Didemniden. Eine Aufklärung über diese Wertigkeit muss aber der Zukunft vorbehalten bleiben.

Die scheibenförmigen Kalkkörper der Personen-Schutzhülle erreichen bei meinem Material vereinzelt einen Durchmesser von $0{,}_{55}$ mm, die meisten sind jedoch kleiner, viele sehr klein (nach Herdman "on an average $0{,}_{4}$ mm in diameter"). Sie sind meist regelmässig kreisförmig, nur die grössten, deren Durchmesser $0{,}_{45}$ mm überschreitet, nehmen in der Regel eine etwas ovale Gestalt an, die jedoch nicht sehr stark von der Kreisform abweicht. Sie sind in den Mittelpartien verhältnismässig wenig verdickt, mehr oder weniger stark schildförmig gebogen, an der der Person zugewendeten Seite konkav oder geschweift konkav. Das Zentrum ist nicht eigentlich knopfförmig verdickt, wie bei manchen anderen *Cystodytes*-Formen, dagegen manchmal etwas nach aussen vorgetrieben. Eine radiäre Struktur ist an den kleinen und mittelgrossen Kalkscheiben sehr deutlich erkennbar, an den grösseren wird sie undeutlich, manchmal ganz unsichtbar. Dieser radiären Struktur entspricht bei vielen kleinen und manchmal auch bei mittelgrossen Kalkscheiben eine sehr feine Zähnelung des Randes, die aber meist wie abgeschliffen erscheint; in der Regel sind die Kalkscheiben, zumal die grösseren, glattrandig. Sehr charakteristisch und meist scharf ausgesprochen ist andererseits eine Zirkulärstruktur, die den Eindruck konzentrischer Wachstumsstreifen macht, vergleichbar den Jahresringen am Querschnitt eines Baumstammes. Meist erscheint besonders eine gleichmässig breite Randpartie scharf abgesetzt. Bei sehr grossen Scheiben ist auch die Zirkulärstruktur meist schwerer erkennbar; doch tritt auch bei diesen der Randabsatz manchmal deutlich hervor. Die Oberfläche der Kalkscheiben ist glatt und im allgemeinen ohne Buckeln und grobkörnige Schuppenaufsätze, dagegen mit einer ungemein feinen Körnelung, die ihr einen eigenartigen Atlasglanz verleiht. Die Schilderung und die Abbildung von den Kalkscheiben von *C. draschei* (Herdman, l. c. 1886, p. 139, Taf. XIX, Fig. 3, 6, 7) entsprechen im wesentlichen diesem Befunde; dagegen stimmt die Schilderung Nott's von den entsprechenden Kalkkörpern bei *C. aucklandicus* und *C. perspicuus* nicht ganz überein. Bei diesen Formen sollen die Kalkscheiben dick linsenförmig sein (Nott, l. c. 1877, Taf. XXX Fig. 9), eine grobwarzige Oberfläche haben, am Rande unregelmässig gekerbt sein und keine Radiärstruktur aufweisen. Dagegen zeigen sie die zirkuläre Struktur, wie sie für die Kalkscheiben des *C. draschei* charakteristisch ist. Wenn auch eine meiner Kolonien von annähernd dem gleichen Fundort wie die Nott'schen Stücke stammt, so ist es doch zweifelhaft, ob ich sie der Nott'schen Art zuordnen darf.

Im Aussehen entsprechen meine Stücke dem Nott'schen Material, insofern zwei verschiedene Färbungsformen vorkommen. Die meisten Kolonien vom Queen Charlotte-Sund sind hell violettrot, während eine Kolonie von diesem Fundort rein weiss ist. Die einzige Kolonie vom Hauraki-Golf bildet gewissermassen eine Zwischenstufe, insofern sie fast weiss erscheint, nur stellenweise mit schwach rötlichem, stellenweise mehr gelblichem Schimmer behaftet. Auf diese Farbunterschiede, die nicht auf dem Vorhandensein oder Fehlen von Pigmentzellen, sondern auf der verschiedenen Färbung der Zellulosemantel-Masse beruhen, ist sicher kein besonderer systematischer Wert zu legen. Sie finden sich in gleicher Weise bei anderen Arten (*C. dellechiajei* f. *typica* und f. *cretacea*).

Bei dem farblosen, weissen Exemplar von Queen Charlotte-Sund fand ich im Zellulosemantel die gleichen verzweigten krystallinischen Körper, die Nott von seinem *C. perspicuus* schildert und wie sie auch bei anderen Arten angetroffen wurden (so z. B. bei *C. tetrascelifer* Mich.) Bei den übrigen Kolonien vom Queen Charlotte-Sund und vom Hauraki-Golf konnte ich derartige Körper nicht deutlich erkennen, höchstens gewisse Spuren, die wie zerfallene oder halb aufgelöste Körper aussahen. Ich glaube, dass dem Auftreten dieser Körper eine systematische Wertigkeit nicht zukommt. Es sind wohl immer zeitweilig auftretende Körper, etwa Reservesubstanzen aufspeichernd (?), wenn es sich nicht gar um postmortale, mit der Konservierung zusammenhängende Gebilde handelt.

Gen. **Sycozoa** Less., emend.

Diagnose: Kolonie mit längerem, hartem Überwinterungsstiel.

Branchialöffnung 6-lappig; Atrialöffnung mit Atrialzunge.

Kiemensack mit 4 Kiemenspalten-Zonen; parastigmatische Quergefässe fehlen.

Magenwand glatt; darmumspinnende Drüse ohne Sammelblase.

Geschlechtsverhältnisse: Kolonien getrennt geschlechtlich; Brutsack vorhanden, mehrere Embryonen enthaltend.

Eine Begründung dieser geänderten Diagnose siehe unten, im Abschnitt: „Gen. *Sycozoa* und *Distaplia*.“

Sycozoa sigillinoides Lesson.

1830, *Sycozoa sigillinoides* Lesson, Voy. Coquille, Zool., p. 436, Taf. Moll. XIII Fig. 15, 15b.
1834, *Aplidium pedunculatum* Quoy & Gaimard, Voy. Astrolabe, Zool. III, p. 626, Taf. Moll. XCII Fig. 18, 19.
1871, — — Cunningham, Notes, Voy. Nassau, p. 490.
1886, *Colella pedunculata*, Herdman, Rep. Tunic. Challenger II, p. 74, Taf. V—IX.

1889, *Colella pedunculata*, Pfeffer, Z. Fauna Süd-Georgien, p. 4.
1896, — — Caullery, Rech. Synascid. Colella Distomid.
1900, — — (part.?) Sluiter, Tunic. Stillen Ocean, p, 5 (? non Taf. I Fig. 1).
1906, — — Sluiter, Tunic.; in: Exp. antarct. franç., p. 6, Taf. IV Fig. 46.
1907, *Colella sigillinoides* + *C. umbellata* f. *kophameli*, Michaelsen, Tunic., in: Erg. Hamburg. Magalh. Sammelreise, p. 43, Taf. II Fig. 14, p. 59, Taf. I Fig. 8, 9.
1908, *Colella pedunculata* (part. ?) + *C. p. robustipes* + *C. perrieri* + *C. umbellata*, Caullery, Rech. Synascid. Colella Distomid., p. 30, Textfig. 11, p. 32, Textfig. 11 D, p. 33, Textfig. 12, p. 35, Textfig. 13.
1909, *Sycozoa pedunculata* (? = *sigillinoides* Less.) + *S. pedunculata* f. *robustipes* + *S. perrieri* + *S. sigillinoides* + *S. umbellata* var. *kophameli*, Hartmeyer, Tunic.; in: Bronn, Kl. Ordn. Tier-R., p. 1439.
1911, *Sycozoa sigillinoides*, Hartmeyer, Ascid. Deutsch. Südpol.-Exp., p. 534, Textfig. 4—11.
1912, — — (part.?) Hartmeyer, Ascid. Deutsch. Tiefsee-Exp., p. 315.
1915, — — Hartmeyer, Ascid. nom. conserv., p. 256.

Fundangabe: Neuseeland ohne nähere Angabe; Gray (Mus. Berlin).

Weiterer Fundort im Gebiet: Chatham-Inseln (Sluiter 1907).

Neue Fundangaben: Tasmanien, Hobart; Arthur M. Lea (Mus. Hamburg): 4 weibliche Kormidien, deren Stiele dichotomisch zusammenhängen, in verschieden weiter geschlechtlicher Ausbildung, z. T. mit Brutsäcken.

Bass-Strasse; Mus. Godeffroy (Mus. Hamburg): 1 einfache weibliche Kolonie mit Brutsäcken.

Victoria, Port Western, 5—10 Fd.; Th. Mortensen (Pacific-Expedition, Mus. Kopenhagen): 1 einfache weibliche Kolonie mit Brutsäcken.

Westaustralien, Albany, Princess Royal Harbour, $5^1/_2$—9 m, und Oyster Harbour, $^3/_5$—$5^1/_2$ m, Hartmeyer und Michaelsen, 21. Aug. 1905 (Mus. Berlin u. Hamburg): 2 einfache männliche Kolonien und eine einfache weibliche Kolonie mit unausgewachsenen Personen ohne Brutsäcke, mit kleinen Ovarien. — Fremantle-Bezirk, Port Royal im Cockburn Sound,

$14^1/_2$—18 m; Michaelsen, 30. Sept. 1905 (Mus. Hamburg): 1 Kolonie mit grossen ungeschlechtlichen Personen, mit stummelförmigem Auswuchs mitten am Stiel (abgerissenes Nebenkormidium?) und eine einfache weibliche Kolonie mit kleinen, sehr jungen, unausgewachsenen Personen. — Garden Island, Mus. Perth (Mus. Hamburg): 1 weibliche Kolonie mit vielen verschieden weit entwickelten Kormidien (typische Gestalt der f. *kophameli*).

Pacifischer Ozean vor Peru, 20° S. 78° W.; Ringe (Mus. Hamburg).

Weitere Verbreitung: Victoria, Port Western, und Westaustralien, Port du Roi Georges (Quoy et Gaimard). — Kerguelen and Heard-Insel (Herdman 1886). — Süd-polar-Meer, Kaiser Wilhelm II-Land (Hartmeyer 1912). — Port Charkow bei Grahamsland (Sluiter 1906). — Süd-Georgien (Pfeffer 1889 und Michaelsen 1907). — Falkland-Inseln und zwischen Falkland-Inseln und der Magalhaens-Strasse (Herdman 1886). — S. von Staaten-Insel, 53° S. (planktonisch gefundener losgerissener Kopf, Lesson 1830). — Süd-Feuerland, Magalhaens-Strasse (Michaelsen 1907 und Caullery 1908). — Süd-Atlantischer Ozean O. von Süd-Patagonien, 43° S. 60° W. (Michaelsen 1907), zwischen Magalhaens-Strasse und dem La Plata (planktonisch gefundene losgerissene Köpfe, Cunningham 1871). — Tropischer Atlantischer Ozean vor Rio Grande del Norte, 5° S. 54° W. (planktonisch gefundener losgerissener Kopf, Michaelsen 1807).

Erörterung: In der obigen Liste habe ich die Synonymie von *Sycozoa sigillinoides* Less., wie sie sich aus meinen neueren Untersuchungen ergibt, zusammengestellt.

Was zunächst die Gattungsbezeichnung anbetrifft, so habe ich mich nach reiflicher Ueberlegung Hartmeyer angeschlossen, der den damals allerdings gebräuchlichen Namen *Colella* Herdm. durch den älteren *Sycozoa* Less. ersetzte (l. c. 1909, p. 1437), gegen meine von Caullery (l. c. 1907, p. 41) unterstützte frühere Anschauung (l. c. 1907, p. 42), nach der ein solcher Ersatz lediglich aus Prioritätsgründen besser vermieden würde. Hartmeyer begründet sein Vorgehen (l. c. 1915, p. 256) mit dem Hinweis, dass der Name *Sycozoa* ganz eindeutig ist, der Typus von *Colella* dagegen nicht ausschliesslich von echten *Colella*-Arten gebildet wird, und der Name auch sonst mehrfach in falschen Sinne gebraucht worden ist. Wie ich die Sache jetzt ansehe, wäre die Bezeichnung *Colella* für die später darunter verstandenen Formen geradezu falsch. Herdman sagt (l. c. 1886, p. 73) im unmittelbaren Anschluss an die Diagnose der neuen Gattung *Colella:* "This genus is formed for a very striking and remarkable new species, *Colella thomsoni*, obtained near the Philippine Islands and some allied species from other parts of the world, but, as will be shown below, a species (*Colella pedunculata*) described fifty years ago by Quoy and Gaimard under the name of *Aplidium pedunculatum* also finds its place here." Demnach ist also *C. thomsoni* der ausgesprochene Typus der Gattung *Colella.* Diese Art gehört aber zur älteren Gattung *Oxycorynia* v. Drasche (1882)[1]) bezw. *Nephtheis* Gould (1852)[2]). Die Gattung *Colella* war also im statu nascendi ein reines Synonym von *Oxycorynia* bezw. *Nephtheis* und wurde erst durch Einfügung generisch vom Typus zu scheidender Arten zu der Mischgattung, deren endgültige Löschung nur willkommen geheissen werden kann.

Bei der Synonymie-Feststellung des hier zu erörternden Typus der Gattung *Sycozoa* ist vor allem bedeutsam der Nachweis, dass das australische *Aplidium pedunculatum* Quoy & Gaim. mit der subantarktisch-amerikanischen *Sycozoa sigillinoides* Less. identisch ist. Diese Identität, von Herdman (l. c. 1886, p. 74) lediglich nach der äusseren Tracht der australischen Form angenommen, musste von mir (l. c. 1907, p. 43) in Frage gestellt werden und wurde später von Caullery (l. c. 1908, p. 31), der die Typen von *Aplidium pedunculatum* nachuntersuchen konnte, angezweifelt. Caullery wies darauf hin, dass die nach ihm für *Sycozoa sigillinoides* mutmasslich charakteristischen Kappen weisslichen, in den gebräuchlichen Konservierungsflüssigkeiten unlöslichen Pigments über dem Gehirn und dem Vorderende des Endostyls bei den australischen Typen von *Aplidium pedunculatum* fehlen. Ich meinerseits kann dieser Bildung eine wesentliche Bedeutung nicht beimessen, ebenso wenig wie der allgemeinen Färbung der Kolonien. Diese Färbungen und Pigmentierungszeichnungen pflegen, wie bei den *Botryllus*-Arten und anderen Ascidien nachgewiesen werden konnte, ungemein variabel zu sein. Wenigstens jene Pigmentkappen,

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1) R. v. Drasche, 1882, Oxycorynia, e. n. Ascid.-Gattung, p. 177.

2) A. Gould, 1856, Moll. a. Shells; in: U. S. Expl. Exp. Wilkes, Atlas p. 16.

wie sie *Sycozoa sigillinoides* vielfach aufweist, sind offenbar Schutzeinrichtungen gegen zu starke Bestrahlung und als solche abhängig vom Standort bezw. von der Wassertiefe, und mögen auch jahreszeitlichen Veränderungen unterworfen sein. Dass sie bei allen ausgewachsenen Personen einer Kolonie in gleicher Weise ausgebildet erscheinen, will nichts besagen, unterliegen doch all diese Personen den gleichen örtlichen und jahreszeitlichen Verhältnissen. Diese Anschauung wird bestärkt durch die Untersuchung einer zweifellos der *S. sigillinoides* zuzuordnenden Kolonie von Neuseeland, die, im Gegensatz zu den fraglichen australischen Typen, die weissen Pigmentkappen über den anscheinend lichtempfindlichen Organen des Thorax-Vorderendes in sehr starker Ausbildung aufweist. Auch einige lokaltypische Kolonien von Südwestaustralien zeigen Pigmentflecke am Vorderende der Personen; allerdings ist bei diesen eine Sonderung in je 2 Pigmentflecke über dem Gehirn und dem Vorderende des Endostyls nicht so deutlich ausgeprägt. Was die Bestimmung der neuseeländischen Kolonie als *S. sigillinoides* meiner Ansicht nach durchaus sichert, wird durch einen anderen Charakter dargeboten, nämlich durch den der Brutsäcke. Diese Brutsäcke, deren Gestaltung von Caullery auffallenderweise gar nicht berücksichtigt wurde, zeigen meiner Ansicht nach für die Art sehr charakteristische Merkmale. Bei *S. sigillinoides* sind sie nach Herdman — und ich kann dies nach Untersuchung vieler weiblicher Kolonien von verschiedenen Fundorten im magalhaensischen Gebiet bestätigen — anfangs sehr breit, um sich gegen das stark eingebogene bis fast spiralig eingerollte blinde Ende zu verschmälern, und die Larven bezw. Embryonen sind in ihnen stets in einer einfachen Reihe angeordnet, selbst die jüngeren und entsprechend kleineren im Blind-Ende sind einreihig gelagert, was auch dem hier engeren Raum des Brutsackes entspricht. Bei keiner anderen Art, deren Brutsäcke zur Beobachtung gelangten, ist ein solcher Charakter gefunden worden, und diesen Charakter weist die neuseeländische Kolonie auf. Die Zahl der Larven im Brutsack ist zwar bei dieser neuseeländischen Kolonie durchschnittlich viel geringer als bei den untersuchten magalhaensischen. Dies beruht aber offenbar auf einem besonderen Lebensstadium. Die Larven, vielfach nur zwei oder gar nur eine im Brutsack, füllten dies Organ bei weitem nicht ganz aus. Meist erschien die grössere Strecke am dünneren Blind-Ende ganz leer. Offenbar waren die meisten früher zur Entwicklung gekommenen Larven bereits ausgeschlüpft, ohne dass ein Nachschub von jüngeren Eiern die dadurch geschaffenen Lücken ausfüllte. Da wir diese neuseeländische Kolonie der *S. sigillinoides* angliedern müssen, so spricht nichts mehr gegen die gleiche Zuordnung auch der Stücke vom nahen australischen Gebiet sowie der Sluiter'schen von den Chatham-Inseln.

Die weite geographische Verbreitung, der beträchtliche Zwischenraum zwischen den neuseeländisch-australischen Vorkommnissen und den magalhaensischen bezw. denen von den Kerguelen, spricht nicht gegen die artliche Zusammengehörigkeit der verschiedenen Materialien. Die südlich circumpolare Meeresströmung, die Westwindtrift, hat auch vielen anderen Tieren des Litorals zu einer circumpolaren Verbreitung verholfen. Was die Sluiter'schen Stücke seiner *Colella pedunculata* von den Chatham-Inseln anbetrifft, so erweckt mir das abgebildete dick- und kurz-stielige Exemplar (l. c. 1906, Taf. I Fig. 1) gewisse Zweifel. Die besondere äussere Tracht dieses Stückes — der kurze dicke Stiel macht zumal in der oberen Hälfte durch eine gewisse, bei *S. sigillinoides* sonst nicht gefundene Tranzparenz den Eindruck einer weichlichen Konsistenz — erinnert mich weniger an *Sycozoa sigillinoides* als an *Distaplia fasmeriana* n. sp. (siehe unten!), wenngleich das Originalmaterial dieser Art, vielleicht aber nur infolge anderer Konservierung, viel dunkler aussieht. Hier kann wohl nur eine Nachuntersuchung des Sluiter'schen Stückes Klarheit schaffen. Während die von Hartmeyer nur fraglicherweise zu *S. sigillinoides* gestellten Kolonien vom antarktischen Kaiser Wilhelm II-Land (l. c. 1911, p. 489, Taf. XLVI Fig. 1, 2, Taf. LIII Fig. 1—5 und Textfig. 1, 2) meiner Ansicht nach zweifellos zu dieser Art gehören — der charakteristisch gestaltete Brutsack mit der einzeiligen Embryonenreihe ist überzeugend —, ist mir die Zugehörigkeit gewisser kurzstieliger Kolonien Hartmeyer's von den Kerguelen (l. c. 1912, p. 315) sehr zweifelhaft. Hat man es hier vielleicht mit Exemplaren der *S. quoyi* Herdm. (l. c. 1886, p. 113, Taf. XIV und W. Michaelsen, 1907, p. 47) zu tun? Diese Art, deren Brutsäcke noch unbekannt sind, und deren Berechtigung Hartmeyer anzweifelt, bedarf dringend einer Nachuntersuchung an besserem, zumal auch an weiblichem Material. Einer Erörterung bedarf auch noch das von

Caullery (l. c. 1908, p. 30) zu *Colella pedunculata* gestellte Material. Caullery giebt an, dass er ausser vielen Kolonien mit einfachem Stiel auch solche mit gegabeltem oder dreifach geteiltem Stiel beobachtet habe. Ich meinerseits habe bisher als feststehend angenommen, dass *Sycozoa sigillinoides* nur einfache Kolonien mit einem einzigen Kopf auf ungeteiltem Stiel hervorbringe, und dass zusammengesetzte Kolonien anderen Arten wie *S. umbellata* Mich. samt f. *kophameli* (l. c. 1907, p. 53, 55) und *S. ramulosa* Herdm. (l. c. 1886, p. 120) angehörten. Meine neueren Untersuchungen führen mich dahin, diese ältere Anschauung aufzugeben. Es liegen mir nämlich von Südwestaustralien (Garden Island) und von Tasmanien (Hobart) zusammengesetzte *Sycozoa*-Kolonien vor, die ich zu *S. sigillinoides* stellen muss. Die tasmanische Kolonie besteht aus 4 weiblichen Kormidien, einem Hauptkormidium, aus dessen Stiel in ziemlich gleichmässigen Abständen 3 Nebenkormidien von annähernd gleicher Grösse und mit fast gleich grossen Stielen hervorgehen. Im Hauptkopf haben sich in der apikalen Region bereits Brutsäcke ausgebildet, die durchaus denen der *S. sigillinoides* entsprechen. Die grössten zur Beobachtung gelangten Brutsäcke enthalten in einfacher Reihe 6 Embryonen bezw. geschwänzte Larven. Andere Brutsäcke sind kleiner und enthalten weniger Larven, vielfach nur 2, manchmal sogar nur eine einzige. Niemals ist aber die Regel, dass die Embryonen einzeilig liegen, gestört. Ganz die gleichen Brutsackverhältnisse (Höchstzahl 6 Embryonen in einem Brutsack) fand ich bei einer weiblichen Kolonie von Garden Island (Südwestaustralien), die ebenfalls zusammengesetzt ist, aber doch einen ganz anderen Anblick gewährt als jene von Tasmanien. Sie zeigt durchaus den Charakter der *S. umbellata* f. *kophameli* Mich. (l. c. 1907, p. 35). Aus einem dicken, geknickten, wie zerknitterten, offenbar vorjährigen Stiel sprossen an verschiedenen Stellen verschieden grosse Kormidien, die grösseren z. T. selbst schon wieder mit Knickungsstellen. Am plumpen, augenscheinlich abgebrochenen und wieder verheilten apikalen Ende des vorjährigen Stieles sprossen dicht neben einander zwei ganz kleine Kormidien, die zusammen einer Dolde der f. *kophameli* entsprechen dürften. Wenn mich dieser Fund veranlasst, *S. umbellata* f. *kophameli* der *S. sigillinoides* einzuverleiben, so erscheint es mir doch fraglich, ob auch die typische Form der *S. umbellata*, die eine ganz andere, mehr cylindrische

Kopfform aufweist, mit dieser Art zu verschmelzen sei. Eine Entscheidung hierüber kann erst nach Aufklärung über die Verhältnisse des Brutsackes bei *S. umbellata* f. *typica* getroffen werden. Fraglich ist ferner, ob sämtliche zusammengesetzte Kolonien, die Caullery vorgelegen haben, tatsächlich der *S. sigillinoides* angehören; vielleicht mögen auch Exemplare der durch die Gestalt des Brutsackes ausgezeichneten *S. ramulosa* dazwischen gewesen sein. Leider hat Caullery der Gestaltung dieses Organs gar keine Beachtung geschenkt.

Zur Organisation der *S. sigillinoides* mag nach neueren Untersuchungen noch mitgeteilt werden, dass die darmumspinnende Drüse einer Blase vollständig entbehrt, insofern ihr (das Darmlumen überspannender) Ausführgang in ganzer Länge einfach dünn-schlauchförmig ist, und dass die von mir an jungen Personen gefundene Zentralblase der Hode, der Basalteil des Samenleiters, bei ausgewachsenen Personen mit entsprechend grösserer Hode nicht mehr ausgeprägt ist und höchstens als schwache Erweiterung des basalen Samenleiter-Endes in die Erscheinung tritt.

Geographische Verbreitung: Die geographische Verbreitung der *S. sigillinoides* ist, wie sie sich uns jetzt darstellt, insofern besonders interessant, als sie nicht auf den circumpolaren eigentlichen Bereich der Westwindtrift beschränkt ist, sondern an verschiedenen Stellen recht weit auch den sich von dieser Meeresströmung nordwärts abzweigenden Strömen folgt, westlich von Südamerika dem kalten Perustrom bis zum 20^0 S. B., östlich von Südamerika dem kalten Falklandstrom bis zum Bereich des La Plata; abgerissene planktonische Köpfe, die allerdings für die feste Gebietsbestimmung nicht massgebend sind, fanden sich sogar noch weiter getrieben, geradezu im tropischen Warmwassergebiet, auf dem 5^0 S. Br. vor Brasilien.

Biologisches: Für die Ausbreitung der Art ist das häufige, vielleicht sogar ordnungsmässige, auf Selbstamputation beruhende Loslösen der Köpfe und ihre planktonische Wanderung mutmasslich von grosser Bedeutung. Während die von Knospen und Nährmaterialien beladenen Überwinterungsstiele für das Fortdauern der Art in dem einmal eingenommenen Gebiet sorgen, verursachen die fortgetriebenen Köpfe weiblicher Kolonien, die noch lange nach dem Absterben der Mutterpersonen überdauernde Brutsäcke mit Larven enthalten, eine Ausbreitung des Gebietes durch Besiedelung neuer Distrikte.

Diese Art der Ausbreitung ist übrigens nicht auf die Gattung *Sycozoa* beschränkt; zweifellos spielt sie auch in der Biologie von *Distaplia cylindrica* (Less.) eine bedeutsame Rolle. Auch von dieser Art wurden häufig losgerissene Kolonie-Teile planktonisch angetroffen. Vielfach waren es Stücke, deren Personenkörper schon ganz geschwunden, und die noch zahlreiche Brutsäcke mit Larven enthielten. Auch bei dieser Art müssen wir die Losreissung von Köpfen oder von Teilen derselben nicht als einen Verlust für die Art ansehen, sondern für einen Vorteil, der im Charakter der Kolonie vorbereitet sein mag. Unter diesem Gesichtspunkte betrachtet, bedarf auch die zwischen Sluiter und Hartmeyer schwebende Streitfrage nach der Länge der sehr zarten, lang cylindrischen Koloniekopfe einer besonderen Beurteilung. Sluiter gab an, dass Charcow planktonische Bruchstücke[1]) dieser Art von 43 m Länge gemessen habe. Hartmeyer (l. c. 1911, p. 476) bezweifelte die Richtigkeit dieser Charcow'schen Beobachtung und sprach die Vermutung aus, dass hier eine Verwechslung mit den langen, häufig losgerissenen und planktonisch angetroffenen Tentakeln von Medusen der Gattung *Desmonema* vorläge. Nach seiner Ansicht könnten sich derartig lange zarte Kolonien nicht flottierend im Wasser halten. Ihr eigenes Gewicht müsse sie herunterdrücken, wie auch ein von Herdman (l. c. 1886, p. 252) untersuchtes, mit Sand besetztes Stück, das offenbar dem Seegrunde aufgelegen hat, beweise. In einer späteren Arbeit widerspricht Sluiter[2]) dieser Auffassung. Er selbst habe ein an beiden Enden abgerissenes Bruchstück vor sich, das im lebenden Zustande 5,60 m gemessen habe, und mutmasslich im ganzen noch viel länger gewesen sei, und dass in den Tiefen von 300 m und mehr, aus denen einzelne Stücke stammen, die Bewegung des Wassers durch Stürme gleich null sei. Ich meinerseits schliesse mich der Sluiter'schen Auffassung an. Es ist nicht einzusehen, warum in dem höchstens durch eine ganz langsame und zumal ganz gleichmässige Strömung bewegten Wasser dieser grösseren Tiefen selbst die zartesten und ungemein lang gestreckten Organismen sich nicht flottierend halten können. Das Beispiel des von Herdman erwähnten sandigen, schon ganz zer-

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[1]) C. Ph. Sluiter, 1906, Tunic., in: Exp. antarct. franç. p. 29.
[2]) C. Ph. Sluiter, 1912, Tunic., in: Deux. Exp. anarct. franç. p. 29.

fallenen Stückes ist durchaus nicht beweisend. Dagegen spricht der Umstand, dass so häufig gut erhaltene planktonische Bruchstücke gefunden werden, dass also das spezifische Gewicht, wenigstens bei den noch frischen Stöcken, nicht höher als das des Seewassers ist. Schon dieses geringere spezifische Gewicht muss Stöcke von unbeschränkter Länge flottierend halten. Übrigens lag nach meiner Ansicht eine Einrichtung zur Festigung der Kolonie gar nicht in dem Organisationsplan, wie er in der Biologie der Art zum Ausdruck kommt. Höchstens könnte man in Frage stellen, ob nicht die Aussicht auf Besiedelung eines noch jungfräulichen Gebietes durch fortgetriebene Bruchstücke um so grösser sei, je grösser die angetriebenen Bruchstücke sind.

Weitere Erörterungen über *Sycozoa sigillinoides* und andere *Sycozoa*-Arten siehe unten, hinter *Distaplia fasmeriana*, im Abschnitt „Gen. *Sycozoa* und *Distaplia.*“

Gen. Distaplia D. V., emend.

Diagnose: Kolonie ungestielt oder mit kurzem, weichem Stiel. Branchialöffnung 6-lappig; Atrialöffnung mit Atrialzunge.

Kiemensack mit 4 Kiemenspalten-Zonen; parastigmatische Quergefässe vorhanden oder fehlend.

Magenwand gefurcht oder glatt; darmumspinnende Drüse mit Sammelblase.

Geschlechtsverhältnisse: Personen zwittrig oder Kolonien getrennt geschlechtlich; ein enggestielter Brutsack vorhanden, 1 Embryo oder deren mehrere enthaltend.

Eine Begründung dieser geänderten Diagnose siehe unten, im Abschnitt: „Gen. *Sycozoa* und *Distaplia.*“

Distaplia fasmeriana n. sp.[1])

Fundangaben: Vor Stewart-Insel, ca. 35 Fd., Sandgrund; 20. Nov. 1914. Stewart-Insel, Paterson Inlet, 5—15 Fd., weicher Grund; 17. Nov. 1914.

Beschreibung. Koloniegestalt und Bodenständigkeit (Fig. 7): Die Kolonien sind einfach oder zusammengesetzt. Die einfachen Kolonien und die Kormidien zusammengesetzter Kolonien

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1) Nach dem alten Familiennamen des Sammlers: Fasmer.

sind lang gestreckt und deutlich gestielt. Der Stiel ist schlank- oder plump-walzenförmig, etwas kürzer oder länger als der sogenannte Kopf der Kolonie (an dem die Personen ausmünden) und etwa $^1/_2$—$^2/_3$ so dick. Der Stiel scheint durch dick-plattenförmige oder kurz- und undeutlich-ästige Verbreiterungen im Sande verankert gewesen zu sein, wenigstens zeichnen diese nur an 2 Kolonien beobachteten basalen Endbildungen des Stieles sich durch eine dichte Inkrustierung mit grobem Sand aus. Der Kopf ist stets ziemlich scharf vom Stiel abgesetzt, dicker als dieser, viel länger als dick, walzenförmig, länglich ellipsoidisch oder birnförmig, drehrund oder seitlich abgeplattet, apikal gerundet. Das vorliegende Material besteht aus einer zusammengesetzten Kolonie, 2 sicher einfachen und 4 anscheinend einfachen Kolonien; die letzteren mögen sämtlich oder zum teil nur abgerissene Kormidien von zusammengesetzten Kolonien sein. Die zusammengesetze zeigt zwei verschiedene Stadien der Koloniespaltung: Der gemeinsame dicke Basalstiel gabelt sich sehr bald in zwei verschieden dicke Äste. Der dünnere Ast stellt ein einfaches Kormidium mit walzenförmigem Kopf dar, während der dickere Ast den Beginn einer weiteren Teilung aufweist. Der Stielteil dieses dickeren Astes zeigt einseitig eine Längsfurche, die sich auf den Kopfteil fortsetzt. Dieser Kopfteil ist stark verbreitert (im ganzen etwas breiter als lang) und apikal durch einen tiefen, breiten Einschnitt zweigeteilt. Die vom Stiel herkommende Längsfurche geht über den Innenwinkel dieses apikalen Einschnittes noch etwas auf die andere, im übrigen ungeteilte Breitseite des Kopfes über. Das Ganze macht den Eindruck einer in ganzer Länge von einem Meridian ausgehenden nicht durchgeführten Teilung.

Fig. 7. *Distaplia fasmeriana*, n. sp., ganze Kolonie; $\times 1^1/_3$.

Grössenverhältnisse der Kolonie: Eine der grossen, einfachen Kolonien (bezw. ein Kormidium) ist 50 mm lang, der Stiel etwa 7—9 mm dick, der walzenförmige Kopf ca. 11 mm dick.

Aussehen und Beschaffenheit der Kolonie: Die Kolonie ist dunkel bräunlich grau, mit etwas helleren Personen-Aussenflächen am Kopfteil, sehr schwach wächsern durchscheinend, im ganzen fleischig weich, besonders weich der Kopfteil, der Stiel im allgemeinen aber nur wenig fester, nur am Basalteil durch die Inkrustierung mit Sand erhärtet.

Oberfläche der Kolonie im gröberen uneben, im feineren glatt, schlüpfrig, am Stielteil vielfach (nicht überall) mit unregelmässigen feinen Querfurchen, die fast als Ringelfurchen bezeichnet werden könnten. Abgesehen von der Inkrustation der Stielbasis ist die Oberfläche der Kolonie im allgemeinen ganz rein; nur haben sich bei einigen Kolonien kalkig-weisse krustenförmige bezw. breit polsterförmige Didemniden-Kolonien an den Stiel angesetzt, und zwar in der Regel an den oberen Teil desselben, dicht unterhalb des Kopfes. Drei *Distaplia*-Kolonien trugen eine solche Didemniden-Kolonie, eine *Distaplia*-Kolonie deren drei.

Anordnung der Personen in Systemen sehr charakteristisch, *Sycozoa*-artig, wenn gleich nicht überall ganz regelmässig. Im allgemeinen liegen die Personen-Aussenflächen in gleichmässig dichten Längsreihen, deren je zwei zusammen gehören und ein gesondertes System darstellen. Die Entfernung zwischen zwei solchen, zusammen ein System bildenden Längsreihen ist in der Regel deutlich grösser, wenn auch nur wenig grösser, als die Entfernung zwischen zwei neben einander verlaufenden Längsreihen zweier benachbarter Systeme. An einigen wenigen Systemen erkannte ich deutlich, dass die beiden Längsreihen eines Systemes sich apikal unter geringer Erweiterung des Zwischenraumes bogenförmig zusammenschliessen, auf diese Weise hier eine fast kreisförmige Öse bildend. Im Mittelpunkt dieser Öse liegt eine Kloakenöffnung, ein ovales oder unregelmässiges Loch, dessen Rand in eine Anzahl unregelmässige, verschieden breite und lange, zum Teil durch Kerbschnitte am apikalen Rande in drei (?) Läppchen geteilte Lappen zerschlitzt ist. Der grösste Durchmesser einer mässig stark zusammengezogenen Kloakenöffnung beträgt ungefähr $^3/_4$ mm. Die Anordnung der Personen und der Verlauf der Systeme zeigt viele Unregelmässigkeiten. Vielfach sind die Systeme verkürzt und verlaufen nicht bis an das apikale Ende der Kolonie. Die Kloakenöffnungen, eine mässig grosse Zahl an einer Kolonie bezw. an einem Kormidium, liegen zwar meist nahe dem apikalen Pol der Kolonie, zum Teil aber auch seitlich in weiterer Entfernung von diesem Pol. Zum Teil verlaufen die Systeme auch in schräger Richtung oder in geknickter und gebogener Linie. Stellenweise erscheint auch die Anordnung der Personen-Aussenflächen, zumal am apikalen Ende des Kormidiums, ganz unregelmässig. Meist ist die Anordnung an einer Seite des Kormidiums deutlicher und regelmässiger als an der anderen Seite. Bei einzelnen Kolonien ist eine Doppelreihen-Anordnung überhaupt kaum zu erkennen. Die Personen-Aussenflächen stellen sich als verwaschene hellere Kreisflecke mit dunklerem Mittelpunkt dar. Dieser dunklere Mittelpunkt enthält die mehr oder minder regelmässig 6-strahlige Branchialöffnung.

Zellulosemantel sehr weich knorpelig, fast gallertig, mit festerer, zäher, feiner Oberhaut. Der Zellulosemantel wird der Hauptsache nach von dicht gedrängt stehenden, sich gegenseitig mehr oder weniger stark abplattenden Blasenzellen von durchschnittlich etwa 30 μ Dicke gebildet. Zarte Sternchenzellen und mehr oder weniger regelmässig kugelige, hell olivgelbe, fast wie Öltropfen aussehende Pigmentzellen von etwa 8—9 μ Dicke finden sich besonders zahlreich in der Oberhaut.

Lage der Personen: Die mässig dicht angeordneten Personen ragen von den an der Oberfläche des Koloniekopfes liegenden Aussenflächen ziemlich regelmässig schräg nach innen und hinten in die Zellulosemantel-Masse der Kolonie hinein, und zwar nicht nur in den Kopfteil der Kolonie, sondern mit ihren Gefässanhängen auch in den Stielteil bis in dessen Basalpartie. Die zu unterst im Kopfteil sitzenden Personen ragen auch mit ihrem eigentlichen Körper mehr oder weniger weit in den Stielteil hinein. Der Stielteil der Kolonie macht durch die enge, parallele Aneinanderlagerung der Gefässanhänge den Eindruck eines mit dichten, parallelverlaufenden Gefässbündeln versehenen Pflanzenstieles und zerreisst auch am leichtesten in der Längsrichtung.

Die Personen (Fig. 8) ausschliesslich des Gefässanhanges sind im ausgewachsenen Zustand bei anscheinend ziemlich starker Kontraktion, hauptsächlich des Thorax, ungefähr $1^3/_4$ bis $2^3/_4$ mm lang, wovon ungefähr je die Hälfte auf den Thorax und auf das Abdomen samt Taille entfällt. Einschliesslich des Gefässanhanges, der in keinem Falle unverletzt beobachtet und gemessen werden konnte, kommt die Länge mancher am Apikalpol des Kormidiums sitzender Personen fast der Länge des Kormidiums gleich, während die weiter unten sitzenden Personen mindestens fast so lang wie der Stiel der Kolonie sind.

Der Thorax ist seitlich etwas abgeplattet, in ziemlich stark kontrahiertem Zustand ungefähr so lang wie hoch oder etwas länger als breit (im ausgestreckten Zustande nicht beobachtet, mutmasslich viel länger als hoch), vorn und hinten wenig verschmälert, ziemlich grade abgestutzt. Die Taille, dorsal aus der Hinterseite des Thorax hervorgehend, ist ziemlich schlank, beidenendes scharf abgesetzt, ungefähr $^{1}/_{3}$ so lang und so dick wie das eigentliche Abdomen. Das Abdomen ist seitlich abgeplattet beutelförmig, etwas länger als hoch und etwa doppelt so hoch wie breit. Aus der Mitte des Hinterendes geht aus dem Abdomen ein ungemein langer, dünner, ziemlich scharf abgesetzter Gefässanhang hervor, eine durch Längsscheidewand geteilte dünnwandige Doppelröhre. Der Gefässanhang, dessen Länge ein Mehrfaches der Körperlänge beträgt, verläuft bei ausgewachsenen Personen anscheinend bis in die Basalregion des Stieles. Ich habe keinen solchen Gefässanhang in ganzer Länge frei präparieren können. Bei jüngeren, unausgewachsenen Personen ist der Gefässanhang kürzer, bei einer Person mit 0,64 mm langem Körper ca. 6 mm lang; das längste zur Beobachtung gelangte Bruchstück mass ca. 12 mm. Am blinden Ende zeigt ein Gefässanhang nach geringer Verdünnung eine schwache birnförmige Anschwellung mit dickerer, stärker gefärbter Wandung (und einfachem Lumen?). Eine Gabelung oder Verzweigung ist bei keinem der zahlreichen zur Beobachtung gelangten Gefässanhänge beobachtet worden.

Fig. 8. *Distaplia fasmerorum* n. sp., ganze Person samt Brutsack; Gefässanhang abgerissen; × 20.

B r a n c h i a l s i p h o (Fig. 8) mitten an der Vorderfläche des Thorax stehend, ziemlich scharf abgesetzt, cylindrisch oder in der Mitte etwas verengt, kronenförmig, etwas kürzer als b eit, apikal in 6 regelmässige, an der Spitze schmal gerundete Lappen auslaufend; Randlinie zwischen diesen Lappen bogenförmig, fast halbkreisförmig. R i n g m u s k u l a t u r des Branchialsiphos mässig stark, eine einfache, nicht ganz geschlossene Lage mässig dicker Muskelbündel.

A t r i a l s i p h o (Fig. 8 u. 9) am vorderen Teil des Thoraxrückens stehend, sehr umfangreich, aber abgesehen von den Zungenbildungen meist sehr kurz, manchmal als eigentliche Röhre kaum hervortretend. Der vordere Teil der sehr kurzen Röhre des Atrialsiphos ist stets in eine sehr grosse Lippe ausgezogen, die als A t r i a l z u n g e zu bezeichnen ist. Die Gestalt der Atrialzunge ist sehr verschieden. Im einfachsten Falle ist sie geschweift dreiseitig, etwa um die Hälfte länger als am Grunde breit, apikal schmal gerundet, manchmal fast spitzig. Im anderen Extrem ist sie annähernd rechteckig, apikal fast so breit wie basal, quer abgestutzt. Die apikale Abstutzungskante läuft in verschieden breite und verschieden lange, manchmal ziemlich regelmässig angeordnete Lappen oder Spitzen aus. Die Seitenkanten der Atrialzunge sind meist mehr oder weniger eingebogen, besonders basal, entsprechend der Röhrenform des Atrialsiphos, aus dessen vorderer Hälfte die Atrialzunge hervorgeht. Der die Vorderlippe des Atrialsiphos darstellenden Atrialzunge steht vielfach eine aus der hinteren Hälfte des Atrialsiphos hervorgehende Hinterlippe gegenüber, die viel kleiner als die Atrialzunge ist und nur selten die halbe Länge der Atrialzunge um ein Geringes übertrifft. Auch die Hinterlippe ist nicht immer einfach, sondern manchmal eingeschnitten oder zerschlitzt. Die M u s k u l a t u r des Atrialsiphos und seiner Lippen ist zart. An der

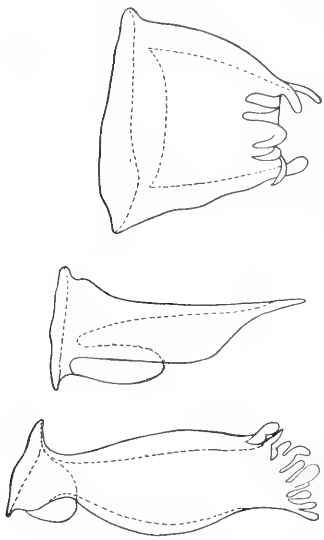

Fig. 9. *Distaplia fasmeriana* n. sp., Atrialsipho dreier verschiedener Personen; × 35.

Atrialzunge erkennt man zarte Längs- und Quermuskeln, die zusammen ein ziemlich weitmaschiges, unregelmässiges Netz mit Rechteckmaschen bilden.

Die Leibeswand ist am Thorax ziemlich zart, am Abdomen sehr zart. Ihre Muskulatur ist ziemlich spärlich. Die Ringmuskulatur scheint ganz auf die Siphonen beschränkt zu sein. Die Längsmuskeln durchziehen die ganze Länge des Thorax in weit getrennten dünnen Bündeln, ca. 20 jederseits. Gegen das Hinterende des Thorax nähern sich die Längsmuskelbündel einer Seite wohl etwas, treten jedoch nicht zu einem geschlossenen Bande zusammen. Sie scheinen hier gesondert zu enden und nicht auf das Abdomen überzutreten.

Branchialtentakel lang fingerförmig, abwechselnd verschieden lang, (stellenweise?) nach dem Schema 1, 3, 2, 3, 1 angeordnet, wobei die der 3. Ordnung sehr klein sind; 24 oder mehr an Zahl.

Flimmerorgan ein kleines Kreispolster mit anscheinend einfacher Durchbohrung.

Kiemensack mit 4 Kiemenspalten-Zonen. Ca. 20 Kiemenspalten in einer Halbzone. Kiemenspalten sehr lang und schmal, parallelrandig, von je einem parastigmatischen Quergefäss überspannt.

Darm (Fig. 8 u. 10) eine einfache, nicht gedrehte (nur anscheinend infolge schiefer Kontraktion ein wenig verzerrte), gerade nach hinten gehende Schleife bildend, die im Bereich der Taille eng geschlossen, im Bereich des eigentlichen Abdomens zu einem Kreis mit mässig weitem Lumen erweitert ist. Ösophagus eng, mässig lang, gerade nach hinten gehend, nur sein Hinterende ventralwärts gegen den Magen hingebogen. Magen (Fig. 8 u. 10m) den vorderen ventralen Viertelkreisbogen der Darmschleifen-Öse bildend, olivenförmig. Nach dem Verlauf der Strukturlinien (der Wülste) ist er ventral stark gestreckt, dorsal stark verkürzt. Der Ösophagus, dessen Hinterende zur Bildung eines scharf ausgeprägten, knopfförmigen Cardiawulstes in das Magenlumen eingedrückt ist, setzt sich unter scharfem Absatz eine beträchtliche Strecke hinter dem Vorderpol dorsal an den Magen an, während der Mitteldarm ebenfalls unter scharfem Absatz gerade aus dem Hinterpol des Magens hervorgeht, ohne dass es dabei zur Bildung eines deutlichen Pyloruswulstes käme. Das Epithel der Magenwandung ist in eine ziemlich grosse Zahl tiefer, ziemlich regelmässiger Längsfalten gelegt, deren Zwischenpartien äusserlich als stark ausgeprägte Längswülste in die Erscheinung treten. Die mittleren ventralen Lângswülste, die über den Vorderpol des Magens auf die Dorsalseite hinüberragen, sind stark verlängert und, zumal in den vorderen Partien, auch verbreitert und vertieft. Gegen die Dorsalseite nehmen die Längswülste an Länge und Stärke ab. Unregelmässigkeiten im Verlauf der Längswülste sind nur geringfügig und meist anscheinend durch postmortale Zerrung verursacht. So erscheinen die Längswülste manchmal aus der geraden Längslinie herausgedreht, fast spiralig verlaufend. (Ein Längsschnitt trifft dann, wie es in Fig. 10*b* gezeichnet ist, mehrere Längswülste). Manchmal sind einzelne Wülste verkürzt oder gegabelt. Die Zahl der Wülste scheint normal 15 zu sein; jedenfalls fand sich in keinem Fall eine starke Abweichung von dieser Zahl. Manchmal erscheinen allerdings zwei Wülste undeutlich, und nur 13 scharf ausgeprägt; doch schien das auf dem schlechten Erhaltungszustand zu beruhen. In einem Querschnitt durch einen Magen zählte ich andererseits 16 Längswülste; in diesem Falle waren aber 2 Wülste verkürzt, der eine nach vorn der andere nach hinten vorzeitig endend, sodass ihnen zusammen nur der Wert eines einzigen Längswulstes zuerkannt werden mag. D i e d a r m u m s p i n n e n d e D r ü s e (Fig. 8, 10*a* u. *b*) mündet ungefähr in der Mitte der Magenlänge dorsal-rechts in den Magen ein, und zwar zwischen zwei Längswülsten auf der First einer Längsfalte. Infolge dieser mehr rechtsseitigen Lage erscheint die Basalpartie des Ausführganges der Drüse bei Betrachtung des Darms von der linken Seite durch den Magen

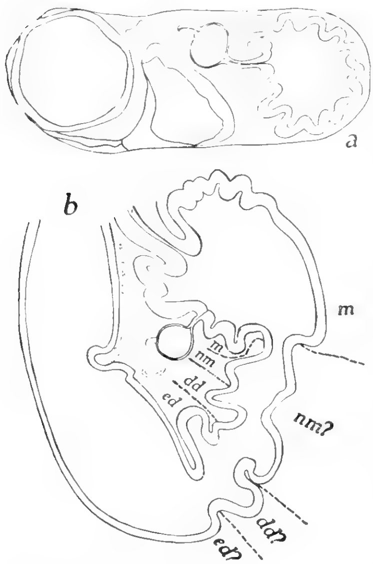

Fig. 10. *Distaplia fasmeriana* n. sp., *a* Querschnitt, *b* Längsschnitt durch die Darmschleife mit dem Ausführgang der darmumspinnenden Drüse; *m* = Magen, *nm* — Nachmagen, *dd* = Drüsendarm, *ed* = Enddarm; × 52.

verdeckt, während sie bei Betrachtung des Darms von der rechten Seite bis auf den äussersten, zwischen den Magenwülsten verlaufenden Teil frei liegend erscheint. Der Einmündungsteil der Drüse ist ein ungefähr 40 μ langer und 10 μ dicker, dickwandiger Schlauch mit engem Lumen. Dieser Schlauch geht proximal in scharfem Absatz in eine dünn- aber derbwandige, regelmässige kugelige Blase von ca. 65 μ Dicke über. (Die regelmässige Kugelgestalt der Blase wurde ausnahmslos bei den annähernd 100 untersuchten Personen gefunden, darf also als durchaus konstant und für die Art sehr charakteristisch angesehen werden). Da der kurze distale Ausmündungsschlauch fast ganz zwischen zwei Magenwülsten verläuft, so ist er in Ganzpräparaten nicht deutlich erkennbar. Bei diesen scheint die kugelige Blase dem Magen eng anzuliegen. Proximal geht die Blase ebenfalls unter scharfem Absatz in den schlauchförmigen Mittelstamm der Drüse über, der zunächst fast eben so dick wie der Ausmündungsteil ist (ca. 8 μ), sich aber proximalwärts bald etwas verengt, bis auf 5 und 4 μ Dicke. In unregelmässigen Windungen geht dieser Mittelstamm über das Darmschleifen-Lumen hinüber zum Enddarm hin. Die Beschaffenheit der proximalen Teile der darmumspinnenden Drüse, ihre Verzweigung und ihre blinden Enden, habe ich nicht deutlich erkennen können. In der Deutung der auf den Magen folgenden Darmteile bin ich nicht ganz ins Klare gekommen. Ich lege der zunächst folgenden Schilderung die Deutung zugrunde, die ich für die richtige annehmen möchte, und die ich in der Abbildung Fig. 10*b* durch einfache Buchstabenbezeichnung an der Innenseite des Darmes (im Lumen der Darmschleife) gekennzeichnet habe. Der Mitteldarm ist sehr kurz und dünn, zugleich sehr dünnwandig. Er zeigt in der Mitte einen mehr oder weniger deutlichen Absatz, durch den anscheinend eine Teilung in Nachmagen (Fig. 10 *nm*) und Drüsendarm (Fig. 10 *dd*) gebildet wird. Vielfach, zumal bei Füllung des Darmes mit Nahrungsmassen, ist diese Bildung kaum oder gar nicht erkennbar. Vielleicht handelt es sich hier nur um eine unwesentliche Kontraktions- oder Stauchungserscheinung. Der Enddarm (Fig. 8 u. 10*ed*) bildet den Wendepol und den ganzen rücklaufenden Darmschleifen-Ast. Er beginnt mit einer plötzlichen Erweiterung, die sich wulstartig um das viel engere Hinterende des Mitteldarmes, das etwas in das Vorderende des Enddarmes eingedrückt ist, herumlegt. Das Epithel des Enddarmes ist zumal anfangs, im Bereich dieses Wulstes, deutlich dicker als das Epithel des Mitteldarmes und färbt sich in Pikrokarmin viel intensiver. Der Darm zeigt hier also einen sehr deutlichen Strukturabsatz. Eine kurze Strecke hinter dem Beginn, ungefähr am Wendepol, zeigt der Enddarm meist eine Einschnürung, die aber mutmasslich keine wesentliche Bildung ist. Manchmal hatte es allerdings den Anschein, als bezeichne diese Einschnürung einen Darmabschnitt. Sollte dies wirklich der Fall sein, so müsste ich die oben dargelegte Deutung der Darmabschnitte als unzutreffend ansehen. Es bliebe dann nur die Deutung, dass erst hier an dieser Wendepol-Einschnürung der Enddarm beginne, und dass folglich der vorhergehende Darmteil mit dem dickeren Epithel und der wulstigen Rückwärtsüberwallung dem Mitteldarm zuzurechnen, also als Drüsendarm (Fig. 10 *dd*?) zu bezeichnen sei. Die undeutliche Teilung des unmittelbar auf den Magen folgenden engen Darmteils, der hiernach als Ganzes einem Nachmagen (Fig. 10 *nm*?) gleichzusetzen wäre, müsste dann als unwesentliche Kontraktions- oder Stauchungserscheinung gedeutet werden. Diese zweite Deutung, die mir jedoch minder wahrscheinlich vorkommt, ist in der Abbildung Fig. 10 durch Buchstaben mit Fragezeichen an der Aussenseite der Abbildung gekennzeichnet. Der Enddarm (Fig. 8 u. 10 *ed*) erstreckt sich als rücklaufender Darmschleifen-Ast gerade nach vorn, dorsal vom Mitteldarm, Magen, Ösophagus und Kiemensack bis in die vordere Partie des Thorax hinein. In der Höhe der Atrialöffnung mündet er durch einen glattrandig zweilippigen After aus. Die beiden Afterlippen sind kurz und breit, flügelförmig abgesetzt.

Geschlechtsorgane: Bei fünf näher untersuchten Kolonien fand sich keine Spur von Geschlechtsorganen oder Embryonen. Die sechste näher untersuchte Kolonie (weitere Kolonien wurden nicht angeschnitten) enthielt zahlreiche Brutsäcke, ich schätze je einen zu jeder ausgewachsenen Person gehörig. Im übrigen war an den Personen dieser Kolonie keine Spur von Geschlechtsorganen zu finden. Da die untersuchten, dem gleichen Funde angehörenden Kolonien annähernd von gleicher Grösse und anscheinend vom gleichen Entwicklungsstadium sind, so vermute ich, dass die Kolonien dieser *Distaplia* wie die einiger anderer *Distaplia*-Arten und die der nahe verwandten Gattung *Sycozoa* eingeschlechtlich sind, dass die Kolonien ohne jegliche Geschlechtsorgane männlich sind, während die eine mit Brutsäcken offenbar eingeschlechtlich weiblich ist. Wären die geschlechtslosen Kolonien weiblich oder zwittrig, so wäre das Fehlen von Brutsäcken kaum zu erklären. Das vorliegende Material befindet sich offenbar in dem Stadium, in dem die Gonaden vollständig geschwunden, die Geschlechtsprodukte sämtlich ausgestossen sind, während die Embryonen der weiblichen Kolonien in den überdauernden Brutsäcken ihrer Reife entgegen gehen, ein Stadium, das bei den Arten der Gattung *Sycozoa* mehrfach zur Beobachtung gelangte. Die Brutsäcke (Fig. 8) sind sehr gleichmässig und charakteristisch gestaltet. Es sind dick- und zähwandige, dick-birnförmige, am blinden Pol gleichmässig breit gerundete, am Gegenpol kegelförmige (Spitzenwinkel ca. 80^0) Körper von ungefähr $1^1/_2$ mm Länge und $^3/_4$ mm grösster Dicke, deren Spitze in einen langen, dünnen Stiel ausläuft. Der Stiel (in keinem Falle in ganzer Länge zur Beobachtung gelangt) mag ungefähr so lang wie die eigentliche Bruttasche sein. Er ist nur etwa $0{,}08$ mm dick und stellt eine sehr dünnwandige Doppelröhre dar. Jeder Brutsack enthält einen einzigen Embryo. Soweit zu erkennen war, befanden sich die vielen zur Beobachtung gelangten Embryonen der daraufhin untersuchten Kolonie sämtlich annähernd in dem gleichen Entwicklungsstadium, im Stadium der geschwänzten Larve, deren Körper bei eingeschlagenem Schwanzteil eine Länge von ungefähr 1 mm aufweist. Der Brutsack ragt von der Person schräg nach unten in das Innere der Kolonie hinein. Den Zusammenhang des Brutsackes mit der Person habe ich nicht sicher nachweisen können; doch konnte ich in einer Schnittserie den Stiel vom Ursprung aus dem eigentlichen Brutsack bis fast zum Thorax der Person hin verfolgen. Es schien mir, als ob er in die Hinterwand des Thorax übergehe.

Erörterung: *D. fasmeriana* kommt in der Gestaltung der Kolonie und der Anordnung der Personen der *D. cerebriformis* nahe, von der sie sich aber schon durch die Gestalt des Magens scharf unterscheidet. Von anderen *Distaplia*-Arten, die eine ähnliche Kolonie-Bildung zeigen, sind *D. vallei* Herdm.[1]) (part.: Material von den Philippinen, siehe unten: *Distaplia* und *Sycozoa*) und *D. clavata*

1) W. A. Herdman, 1886, Rep. Tunic. Challenger, II, p. 128, Taf. XVII Fig. 1 (non Fig. 2) (*D. vallii*).

(Sars)[1]) durch einen glattwandigen bezw. einen an der Innenseite der Wandung netzartig gefurchten Magen ausgezeichnet, und gleicht nur *D. bursata* Van Name[2]) von Florida und Jamaica in der Längsfaltung des Magenepithels der neuen Art. *D. bursata* hat aber zwittrige Personen und weicht auch in der Gestalt der Blase der darmumspinnenden Drüse weit von *D. fasmeriana* ab. In Hinsicht auf diese letztere Bildung, ebenso wie in der stark ausgeprägten Längsfaltung des Magenepithels, zeigt *D. fasmeriana* eine von der *Distaplia* nahe stehenden Gattung *Sycozoa* weitest abliegende Bildung. In der scharf abgesetzten Kugelform der Blase der darmumspinnenden Drüse scheint ihr nur *D. stylifera* (Kow.)[3]) vom Roten Meer nahe zu kommen. Auffallend ist in der betreffenden Abbildung Kowalevsky's der Umstand, dass mehrere (3) Drüsenschläuche gesondert in die Blase zu münden scheinen, während sich diese Schläuche sonst stets zu einem einzigen Schlauch vereinen bevor sie in die Blase übergehen. Sollte hier etwa eine Ungenauigkeit der Zeichnung vorliegen? *D. stylifera* unterscheidet sich durch die Kolonieform, die Zwittrigkeit der Personen und die Glattwandigkeit des Magens von *D. fasmeriana*. Die Getrenntgeschlechtlichkeit der Kolonien, die auch für die nahe stehende Gattung *Sycozoa* charakteristisch ist, teilt *D. fasmeriana* noch mit *D. magnilarva* D. V.[4]) (siehe auch unten im Abschnitt „*Sycozoa* und *Distaplia*“), *D. cylindrica* (Lesson)[5]) und *D. confusa* Ritter[6]); alle diese Arten unterscheiden sich von *D. fasmeriana*, abgesehen von manchen anderen Charakteren, durch die Struktur der Magenwandung, die bei ihnen nie ein geradezu längsgefaltetes Epithel besitzt. In der Gestaltung des Brutsackes scheint *D. fasmeriana* mit *D. mikropnoa* (Sluit.)[7]) übereinzustimmen, während sie die Einzahl der in einem Brutsack zur Entwicklung kommenden Larven

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1) R. Hartmeyer, 1903, Ascid. d. Arktis, p. 313, Taf. XI Fig. 21.

2) W. G. Van Name, 1921, Ascid. West Indian Reg. Southeast. U. S., p. 366, Textfig. 47.

3) A. Kowalevsky, 1874, Knospung Ascid., p. 445, Taf. XXX Fig. 1 bh (als *Didemnium styliferum*).

4) A. Della Valle, 1881, N. Contr. Ascid. comp. Napoli, p. 3.

5) W. Michaelsen, 1907, Tunic.; in: Erg. Hamburg. Magalh. Sammelr., p. 41 (als *Julinia ignota*).

6) W. E. Ritter, 1901, Pap. Harriman Alaska Exp., Ascid., p. 247.

7) R. Hartmeyer, 1919, Ascid.; in: Res. Sw. sc. Exp. Austral. 1910—13, p. 134.

nicht nur mit dieser malayisch-nordaustralischen Art, sondern auch mit *D. californica* Mich.[1]) von Kalifornien und mit *D. cylindrica* (Lesson) (Michaelsen, l. c. 1907, p. 41) vom antarktisch-subantarktischen Gebiet, sowie mit *D. cerebriformis* (siehe auch unten im Abschnitt Gen. „*Sycozoa* und *Distaplia*") gemein hat.

Im übrigen verweise ich auf die Erörterung auch dieser Art im folgenden Abschnitt.

Gen. Sycozoa und Distaplia.

Die oben beschriebene neue *Distaplia*-Art, *D. fasmeriana*, zeigt in ihrem Äussern, in der Gestaltung der Kolonie und der Anordnung der Personen, solche Charaktere, dass man sie für eine *Sycozoa* halten könnte. *Distaplia* und *Sycozoa* stehen einander offenbar sehr nahe. In der Tat ergeben sich aus den bisher vorliegenden Artbeschreibungen nicht 2 Merkmalsgruppen, deren Kombination beide Gattungen durchgehend zu scheiden gestattet. Um hier Klarheit zu schaffen, habe ich das mir zur Verfügung stehende reiche *Distaplia*- und *Sycozoa*-Material einer Nachprüfung unterzogen. Dieses Material gehört zum grössten Teil dem Hamburger Museum an. Dazu kommt aber noch eine sehr bedeutsame Sammelnummer der Mortensen'schen Pacific-Expedition, die mir Lokaltypen des *Aplidium cerebriforme* und des *A. pedunculatum* Qu. Gaim. von Port Western, dem klassischen Sammelort der Astrolabe-Expedition, in die Hand gibt. Im Folgenden will ich eine vergleichende Übersicht über die verschiedenen in Betracht zu ziehenden Organsysteme geben.

Koloniegestaltung: Während in der Gattung *Distaplia* alle möglichen Kolonieformen von der dünnen Krustenform bis zur deutlich gestielten Keulenform vertreten sind, zeigt *Sycozoa* stets deutlich gestielte Kolonien bezw. Kormidien. Nach Caullery[2]) kann man in der Gattung *Sycozoa* [*Colella*], wie er sie auffasst, nach der Art des Stieles deutlich zwei Gruppen unterscheiden: 1) eine Gruppe der typischen *Sycozoa* [*Colella*], bei denen der meist lange, scharf vom Kopf abgesetzte Stiel durch eine hornartige Aussenschicht hart und zäh gemacht ist und nach Zerfall oder Ablösung des Kopfes als Organ für die Überwinterung der Knospen dient, die in der folgenden Wachstumsperiode neue Köpfe zu bilden be-

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1) W. Michaelsen, 1923, N. u. altbek. Ascid. Reichsmus. Stockholm, p. 27.

2) Caullery, 1908, Synascid. Colella. Distomid., p. 44.

stimmt sind, 2) eine Gruppe des *Aplidium cerebriforme* Quoy & Gaim.[1]) mit kurzem, weichem, fleischigem oder höchstens weich knorpeligem Stiel, der nicht so scharf vom Kopf abgesetzt ist und nicht als Überwinterungsorgan dient. Die gestielten *Distaplia*-Arten, zumal *D. fasmeriana,* schliessen sich in Hinsicht auf diese Verhältnisse eng an diese zweite Gruppe an. Ich sprach in der Erörterung über die zu dieser Gruppe gehörende *Sycozoa arborescens*[1 u. 2]) die Vermutung aus, dass die Knospengruppen im apikalen Teil des Stieles von *S. arborescens* bestimmt sein mögen, „nach dem Ableben und Abfallen des Kopfes zu überwintern, um im nächsten Frühjahr neue Köpfe zu bilden." Eine reiflichere Überlegung bringt mich dazu, diese Anschauung fallen zu lassen. Es handelt sich hier wohl nicht um eine Einrichtung zum Überwintern, wie bei typischen *Sycozoa, S. sigillinoides* Less. und Verwandten, sondern um einen ununterbrochenen Ersatz der absterbenden Personen des ausdauernden Kopfes. Beim Überwinterungsstiel der typischen *Sycozoa* findet sich meines Wissens nicht die Grössenzunahme der Knospen in der Richtung nach dem apikalen Ende des Stieles und die Ansammlung der grössten Knospen an der Basis des Kopfes. Die Formen der *cerebriforme*-Gruppe sind auch nicht Tiere der Kaltwasser-Zone, sondern auf die gemässigten und warmen Gebiete beschränkt (Ost-, Süd- und Nordaustralien, Kapland). Die typischen *Sycozoa* um *S. sigillinoides* dagegen sind vorwiegend Kaltwasserformen, circummundan im antarktisch-subantarktischen Gebiet, nur stellenweise nordwärts in wärmere Gewässer vordringend, meist deutlich dem Laufe der kalten Meeresströme folgend, wie die *S. sigillinoides* vom Pazifischen Ozean vor Peru (20° S. 78° W.) und von der Südwestecke Australiens. Die Fänge losgelöster und planktonisch vorkommender Köpfe, wie der von mir erwähnte vom Atlantischen Ozean vor Rio Grande do Sul (5° S., 34° W.)[3]), dürfen für die Gebietsbestimmung dieser Formen natürlich nicht in Rechnung gezogen werden. Die eigentlichen Warmwasser-Vorkommnisse typischer *Sycozoa* gehen allerdings im australischen Sektor bis in das tropische Gebiet des Malayischen Archipels hinein. Nach der

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1) R. Hartmeyer, 1912, Ascid. Deutsch. Tiefsee-Exp., p. 310.

2) W. Michaelsen, 1923, Südafrik. Ascid., p. 22.

3) W. Michaelsen, 1997, Tunic.; in: Erg. Hamburg. Magalh. Sammelr., p. 47.

Gestaltung der Kolonie bezw. der Beschaffenheit des Stieles, ob mit langem harten Überwinterungsstiel oder mit kürzerem weicheren, nicht zur Überwinterung von Personenknospen dienenden Stiel bezw. ohne Stiel, müsste man die Gruppe *Sycozoa-Distaplia* so teilen, dass die Gattung *Sycozoa* auf die erste Gruppe der typischen hartstieligen *Sycozoa* beschränkt würde und die weichstieligen Formen um *Aplidium cerebriforme* zu *Distaplia* gestellt würden. Es fragt sich nun, wie sich die übrigen Charaktere zu dieser bezw. einer anderen Sonderungsweise verhalten.

Systembildung: Die typischen *Sycozoa* um *S. sigillinoides* sowie die der *cerebriforme*-Gruppe zeigen abgesehen von geringfügigen Unregelmässigkeiten meist eine Anordnung der Personen in doppelreihigen, in der Längsrichtung am Kopf verlaufenden Systemen mit einer einzigen, für sämtliche Doppelreihen gemeinsamen Kloakenöffnung am apikalen Ende des Kopfes (so z. B. bei den meisten, wenn nicht allen Kolonien von *S.* [*Colella*] *georgiana* Mich., l. c. 1907, p. 63), oder mit einigen für mehrere Doppelreihen gemeinsamen Kloakenöffnungen am apikalen Ende des Kopfes (so z. B. bei *S.* [*Colella*] *umbellata* Mich., l. c. 1907, p. 55). Selten ist diese charakteristische Systembildung an einzelnen Stöcken oder an Teilen eines Stockes undeutlich oder durch eine ganz unregelmässige Anordnung ersetzt (so bei meinem Material von *S.* [*C.*] *gaimardi* (Herdm.), Mich., l. c. 1907, p. 49, sowie bei manchen Kolonien von *S.* [*C.*] *sigillinoides* Lesson, Mich., l. c. 1907, p. 43). In den meisten Fällen, so bei *S. sigillinoides*, ist diese unregelmässigere Anordnung der Personen nachweislich ein Zustand des Zerfalles. Die bisher zu *Distaplia* gestellten Arten zeigen andererseits zumeist eine ganz unregelmässige Anordnung der Personen, so bei *D. confusa* Ritter,[1]) oder eine mehr oder weniger deutliche Anordnung in kleinen geschlossenen Figuren mit zentral im System gelegener Kloakenöffnung, so bei *D.* [*Holozoa*] *cylindrica* Lesson[2]), seltener eine mehr oder weniger regelmässige Anordnung in Doppelreihen, so bei *D. distomoides* (Herdman),[3]) nur ausnahmsweise eine regelmässige Anordnung in meridional verlaufenden Doppelreihen. Eine Annäherung an diese für *Sycozoa*

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1) W. E. Ritter, 1901, Ascid.; in: Pap. Hariman Alaska Exp., p. 207.

2) W. F. Calman, *Julinia australis*, 1895, On Julinia, p. 1.

3) W. A. Herdman, *Amaroucium d.*, 1909, Descr. Cat. Tunic. Austral. Mus., p. 75.

charakteristische Systembildung findet man bei der westindischen *Distaplia bursata* Van Name[1]) und der arktischen *D. clavata* (Sars),[2]) u. [3]). Eine Anordnung in meridional verlaufenden Reihen mit einer einzigen, allen Reihen gemeinsamen Kloakenöffnung am Apikalende des Kopfes zeigt mehr oder weniger deutlich *D. vallei* Herdm.,[4]) wenigstens das Material von den Philippinen (das Material von Marokko ordne ich der *D. rosea* D. V. zu, siehe unten!). Ich vermute, dass es sich bei diesem Philippinen-Material nicht um einfache Personenreihen handelt, wie es der Herdman'schen Schilderung entspricht, sondern um verkannte Doppelreihen, wie sie für *Sycozoa* charakteristisch sind. Eine solche typische *Sycozoa*-Systembildung weist jedenfalls die oben beschriebene *Distaplia fasmeriana* auf. Da diese sich durchaus an die typischen *Distaplia*-Arten im alten Sinne anschliesst, so ist dem Charakter der Systembildung keine Bedeutung für die Sonderung von *Sycozoa* und *Distaplia* beizumessen.

Atrialsipho: Nach Hartmeyer[5]) sollen sich die Gattungen *Distaplia* und *Sycozoa* dadurch von einander unterscheiden, dass die erstere eine grosse einfache Atrialzunge am Atrialsipho trägt, während der Atrialsipho bei *Sycozoa* mit 6 Lappen versehen sei. Diese Angabe für *Sycozoa* ist zurückzuführen auf Herdman's Diagnose seiner Gattung *Colella* (l. c. 1886, p. 72); suchen wir aber für diese Originalangabe der Diagnose einen Beleg in den Beschreibungen der vielen (8) in jener Arbeit zu *Colella* gestellten Arten, so finden wir nichts, was sie rechtfertigte. Herdman sagt überhaupt kaum etwas Bedeutsames über die Gestaltung des Atrialsiphos seiner *Colella*-Arten aus. Das einzige, was ich in der mehr als 50 Quartseiten umfassenden Erörterung jener 8 Arten finden kann, ist auf Seite 112 die Angabe für *C. elongata*: "The atrial siphon is large and projecting". Auch aus den Abbildungen ist

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1) W. G. Van Name, 1921, Ascid. West-Ind. Reg. Southeast. U. S., p. 306, Textfig.

2) H. Huitfeld-Kaas, 1897, Synascid.; in: N. Nordh.-Exp., p. 10, Taf. I Fig. 3.

3) R. Hartmeyer, 1903, Ascid. Arktis, p. 313, Taf.

4) W. A. Herdman, 1886, Rep. Tunic. Challenger II, p. 128, Taf. XVIII Fig. 1.

5) R. Hartmeyer, 1909, Tunic.; in: Bronn, Kl. Ordn. Tier-R., p. 1437, bezw. 1438.

nichts sicheres zu entnehmen. Die Atrialsiphonen erscheinen hier, wenn überhaupt an den Abbildungen der ganzen Person erkennbar, meist als abgestutzt kegelförmige Hervorragungen mit rauhrandiger Kreisöffnung. Nur bei jener *C. elongata* (l. c. 1886, Taf. XVI Fig. 5) erscheint der Atrialsipho gelappt, aber nicht regelmässig sechslappig, sondern schief zugeschnitten und in eine nicht genau feststellbare Zahl (im Profil der sichtbaren Seite 3 erkennbar) verschieden grosser und durch verschieden tiefe Rand-Einbuchtungen von einander getrennter Lappen auslaufend. Nun bildet zwar Herdman auf Taf. VI in Fig. 1 ein Stück der Kolonie-Oberfläche von *C. pedunculata* "showing the apertures" ab, in der zwei unregelmässig sechslappige, verschieden grosse Öffnungen zu erkennen sind, und man muss aus seiner Figurenerklärung entnehmen, dass er eine derselben als Atrialöffnung angesehen wissen will, wenn er sie auch nicht ausdrücklich als solche bezeichnet. Tatsache ist aber, dass wir es hier nicht mit einer Atrialöffnung zu tun haben. Wie ich nachweisen konnte (l. c. 1907, p. 42, 44) und wie auch Caullery (l. c. 1908, p. 16) fand, münden die Atrialsiphonen bei dieser Gattung überhaupt nicht an der Oberfläche der Kolonie aus, sondern an gemeinsamen Kloakenkanälen. Jene Öffnungen in der Herdman'schen Figur sind zweifellos beide als Branchialöffnungen anzusehen, die grössere als die einer ausgewachsenen, die kleinere als die einer jüngeren Person. Wir können demnach die Herdman'sche Originalangabe über die Sechslappigkeit der Atrialsiphonen als unbegründet bezeichnen. Auch Caullery bezeichnet in der zusammenfassenden Charakteristik der typischen, hartstieligen *Sycozoa* [*Colella*] die Atrialöffnung ("l'orifice cloacal") als sechslappig (l. c. 1900, p. 16: "Il offre six lobes obtus"); doch bemerkt er zugleich, dass sie nicht in sehr gutem Zustande beobachtet werden konnte. Da er die Gestaltung der Atrialöffnung im übrigen, zumal in den Beschreibungen der verschiedenen Arten nicht weiter erwähnt, so glaube ich annehmen zu müssen, dass auch er sich, wie Hartmeyer, in Ermangelung eigener sicherer Beobachtung auf die (unbegründete) Herdman'sche Angabe stützt. Auch ich gebe in den Beschreibungen der verschiedenen von mir untersuchten *Sycozoa*-Arten des Magalhaensischen Gebietes (l. c. 1907, p. 44—65) keine genauere Schilderung der Gestaltung des Atrialsiphos und beschränke mich auf die wenig bedeutenden Angaben

„lang“, „lang gestreckt“ oder dergleichen. Das hatte seinen Grund darin, dass es mir trotz des umfangreichen Materials in keinem Falle geglückt ist, eine Person so herauszupräparieren, dass ihr Vorderende mit dem Atrialsipho unversehrt zur Anschauung gebracht werden konnte. Tatsächlich bin ich bei meinen vielen Untersuchungen an zusammengesetzten Ascidien kaum einmal auf solche Schwierigkeiten bei der Herauslösung möglichst unverletzter Personen gestossen, wie bei diesem *Sycozoa*-Material. Das Vorderende der Personen haftet hierbei ganz ungewöhnlich fest am Zellulosemantel, und hierauf führe ich es zurück, dass uns bisher eine Klarstellung der betreffenden Verhältnisse fehlt. Leider kann ich diese Lücke auch jetzt nicht mit voller Sicherheit ausfüllen. In einem einzigen Falle, bei einer *S. sigillinoides* Lesson vom Pazifischen Ozean vor Peru (20° S. 78° W.), glaube ich einen Atrialsipho unzerfetzt herauspräpariert zu haben; doch war der betreffende Thorax so stark verzerrt, dass ich auch in diesem Falle meiner Sache nicht ganz sicher bin. Ich sah an diesem Thorax am apikalen Ende der Rückenseite einen breiten, kurzen, etwas unregelmässig quer abgestutzten Lappen vorragen, der an seiner Abstutzungskante einige (7 oder 8?) sehr schlanke, in verschiedenen Entfernungen von einander stehende Züngelchen trug. Ich kann diesen Lappen nur für eine in mehrere unregelmässige Züngelchen auslaufende Atrialzunge halten. Man könnte wohl auch hier an einen langen, in Fetzen (jene Züngelchen) zerrissenen Atrialsipho denken; doch hatten die durchaus glattrandigen, von einer dünnen Reihe dunkler gefärbter Zellen umsäumten Züngelchen nicht das Aussehen von Zerfetzungslappen. Ich glaube wenigstens als wahrscheinlich hinstellen zu dürfen, dass auch *Sycozoa*, wenigstens *S. sigillinoides*, mit einer grossen Atrialzunge ausgestattet sei. Für eine Form der *cerebriforme*-Gruppe, nämlich für *Sycozoa arborescens*, kann ich nach eigener Untersuchung an mehreren Personen das Vorhandensein einer verschieden grossen, aber auch im Höchstfalle nur mässig grossen, einfachspitzigen, dreiseitigen Atrialzunge feststellen. Dies entspricht auch den Originalangaben Hartmeyer's (l. c. 1912, p. 317, Taf. XLIII Fig. 6) sowie seinen Angaben über *S. cerebriformis* f. *intermedia*[1]), während Caullery den

[1]) R. Hartmeyer, 1919, Ascid.; in: Sw. Sc. Exp. Australia, Taf. II Fig. 60.

Atrialsipho der *S.* [*Colella*] *cerebriformis* als einen "tube cylindrique sans lobes terminaux nets" bezeichnet. In diesem "nets" sehe ich aber eine gewisse Beschränkung der Angabe. Ich vermute, dass auch hier eine Atrialzunge vorhanden war, die abgerissen oder durch enge Anlagerung an die Körperwand unklar gemacht sein mag. Ich fasse meine Erörterung dahin zusammen, dass in dem Besitz einer Atrialzunge kein Sondercharakter der Gattung *Distaplia* im Gegensatz zu *Sycozoa* liegt, sondern dass wenigstens Formen der *cerebriforme*-Gruppe eine wohlausgebildete Atrialzunge aufweisen, was für die typischen *Sycozoa* der *S. sigillinoides*-Gruppe zum mindesten wahrscheinlich ist.

Kiemensack: Der Kiemensack weist bei allen *Distaplia*- und *Sycozoa*-Arten anscheinend ausnahmslos 4 Kiemenspalten-Zonen auf. Abweichende Angaben Herdman's über verschiedene *Sycozoa*-Arten sind schon von Caullery (l. c. 1908, p. 40), dem ich mich anschliesse, als irrtümlich bezw. ungenau hingestellt worden. Fraglich erscheint mir nur Herdman's Angabe über seine *S.* [*C.*] *concreta* von den Kerguelen (l. c. 1886, p. 123), die "about eight rows" von Kiemenspalten besitzen soll. Es ist nicht die starke Abweichung in der Zahl, als vielmehr die Angabe über die abwechselnd verschiedene Dicke der Quergefässe, die mich bedenklich macht. An und für sich könnte eine gleichmässige Kontraktionsfaltung des Kiemensackes wohl den Irrtum einer doppelt so grossen Zahl von Kiemenspalten-Zonen veranlassen. Jene Erkenntnis der verschiedenen Quergefäss-Dicken, zumal auch die betreffende, ein ganz glattes Stück Kiemensack darstellende Abbildung (l. c. 1886, Taf. XVI Fig. 13), zeugt dafür, dass ein derartig gefältelter Kiemensack nicht vorgelegen haben könne. Meine frühere Deutung der dünneren Quergefässe der *S. concreta* als "sekundäre Quergefässe" (l. c. 1907, p. 66) muss verbessert werden, falls man unter sekundären Quergefässen nur parastigmatische, die Kiemenspalten nicht teilende, sondern überbrückende Quergefässe verstehen will, wie es wohl das Richtige ist. Jene dünneren Quergefässe sind, wie aus der Abbildung deutlich hervorgeht, echte, nur wenig schwächere Kiemenspalten-Zonen trennende Gefässe, also richtiger als primäre Quergefässe zweiter Ordnung zu bezeichnen. Die Herdman'sche Angabe ist auch insofern befremdend, als *S. concreta* offenbar der *S. georgiana* Mich. (l. c. 1907, p. 62 u. f[1]) von Süd-

Georgien mit normaler Vierzahl der Kiemenspalten-Zonen nahe steht. Hier kann wohl nur eine Nachuntersuchung der Herdman'schen Typen oder lokaltypischen Materials Klarheit schaffen. Ein bemerkenswerter durchgehender Unterschied zwischen *Sycozoa* samt der *cerebriforme*-Gruppe einerseits und *Distaplia* andererseits ist vielleicht darin zu sehen, dass bei *Sycozoa* parastigmatische Quergefässe fehlen, während die Kiemenspalten bei *Distaplia* von feinen parastigmatischen Quergefässen überbrückt werden. Für die typischen *Sycozoa* und für die Formen der *cerebriforme*-Gruppe ist das betreffende Merkmal offenbar konstant; für lokaltypische *Aplidium cerebriforme* von Port Western sowie für westaustralische und nordwestaustralische Lokaltypen von f. *intermedia* Hartmr. kann ich das Fehlen parastigmatischer Quergefässe nach eigener Untersuchung bestätigen; in der Gattung *Distaplia* finden sich jedoch manche Arten, in deren Beschreibung parastigmatische Quergefässe nicht erwähnt, bezw. in deren Abbildungen nur primäre Quergefässe eingezeichnet sind. Für manche dieser Arten hat später eine Berichtigung durch den Nachweis parastigmatischer Quergefässe stattgefunden, so durch Caullery[1]) für *D. rosea* D. V. Ebenso glaubt Hartmeyer (l. c. 1919, p. 133) sie bei *D. mikropnoa* (Sluit.) erkannt zu haben, einer Art, in deren Originalbeschreibung[2]) sie nicht erwähnt, und in deren Abbildung die 4 Kiemenspalten-Zonen unüberbrückt dargestellt sind. Hartmeyer erwähnt bei dieser Gelegenheit, dass diese parastigmatischen Quergefässe ein Gattungsmerkmal zu sein scheinen, was sagen will, dass er gegensätzliche Angaben für irrtümlich hält. Ich bin halbwegs geneigt, mich ihm in dieser Auffassung anzuschliessen. Die Gestaltung des Kiemensackes ist an ungünstig konserviertem Material infolge starker Schrumpfung an ausgewachsenen Personen von *Distaplia* meist schwer klarzustellen. Viel besser erhalten sich bei der Konservierung die jungen Personen, die häufig vollständig ausgestreckt erscheinen, während die Thoraces der in gleicher Kolonie befindlichen ausgewachsenen Personen bis zur Unkenntlichkeit der Organisation geschrumpft sind. Es liegt nahe, in diesen Fällen die an jungen Personen gemachten Beobachtungen zu verallgemeinern und in halb schematischen Abbildungen auch auf erwachsene Per-

1) M. Caullery, 1895, Contr. Ét. Ascid. comp., p. 8.

2) C. Ph. Sluiter, 1909, Tunic. Siboga-Exp. II, p. 94, Taf. V Fig. 1 (als *Polyclinum mikropnus*).

sonen zu übertragen, und hierauf mag manche irrtümliche Darstellung des Kiemensackes beruhen. Die parastigmatischen Quergefässe bilden sich nämlich wenigstens bei manchen *Distaplia*-Arten erst in späterem Stadium aus. So fand ich in einer Kolonie von *D. cylindrica* junge Personen von 1 mm Länge — die ausgewachsenen Personen sind etwa 2—3 mm lang —, die 4 Zonen wohl ausgebildeter, aber unüberbrückter Kiemenspalten aufwiesen und keine Spur von parastigmatischen Quergefässen, die bei erwachsenen Personen wohl ausgebildet sind, erkennen liessen. Diese Verhältnisse können allerdings nicht alle Unstimmigkeiten aufklären. So ist kaum anzunehmen, dass z. B. v. Drasche bei der Abbildung der Person von seiner *D. lubrica*[1]) nicht ein gut gestrecktes ausgewachsenes Exemplar vorgelegen haben soll. Es muss also die Frage nach der Beständigkeit des Auftretens parastigmatischer Quergefässe bei *Distaplia* einstweilen offen bleiben.

Magen: Während der Magen bei typischen *Sycozoa* und den Formen der *cerebriforme*-Gruppe aussen und innen glattwandig ist, zeigt er innerhalb der Gattung *Distaplia* die verschiedensten Ausbildungsweisen von der sich an den *Sycozoa*-Zustand anschliessenden Glattwandigkeit bei *Distaplia bermudensis* Van Name (l. c. 1921, p. 365, als *Holozoa b.*) bis zu der wohl ausgebildeten Längsfaltung des Epithels bei der oben beschriebenen *D. fasmeriana*. Zur Sonderung der beiden hier erörterten Gattungen kann demnach der Charakter der Magenwandung nicht verwandt werden.

Darmumspinnende Drüse: Eine die Gattungen *Distaplia* und *Sycozoa* von einander sondernde Merkmalsgruppe liegt vielleicht in der Gestaltung der darmumspinnenden Drüse, insofern dieses leider bisher zu wenig beachtete Organ bei *Sycozoa* mutmasslich stets einen in ganzer Länge einfach schlauchförmigen Ausführgang besitzt, während dieser Ausführgang sich mutmasslich bei allen *Distaplia*-Arten zu einer innerhalb der Darmschleife gelegenen, meist für die Art charakteristisch gestalteten Blase erweitert. Caullery (l. c. 1908, p. 45) führte zuerst den betreffenden Charakter in die Diagnose der Gattung *Distaplia* ein, ohne jedoch nun den gegensätzlichen Charakter bei der Diagnose von *Sycozoa* [*Colella*] zu verwenden. Nur in der Charakteristik der typischen, hartstieligen *Sycozoa* [*Colella*] bemerkt er: "La glande

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[1]) R. v. Drasche, 1883, Synascid. Rovigno, Taf. VIII Fig. 8.

pylorique" — als solche bezeichnet er die darmumspinnende Drüse — "ne m'a pas semblée former d'ampoule avant de se jeter dans l'estomac". Für die typischen, hartstieligen *Sycozoa* kann ich das von Caullery nur fraglicherweise angegebene Fehlen einer Blase am Ausführgang der darmumspinnenden Drüse sicher nachweisen. Bei zwei gut konservierten Kolonien der *S. sigillinoides* Lesson vom Pazifischen Ozean vor Peru (20° S., 78° W.) und von der Magalhaensstrasse bei Punta Arenas, sowie bei einer gut konservierten Kolonie der *S. gaimardi* (Herdm.) von dem gleichen südlichen Fundort konnte ich den Ausführgang der darmumspinnenden Drüse an lückenlosen Schnittserien von seiner Einmündung in den Magen bis zum Enddarm zurückverfolgen. Er stellt sich als gut färbbarer, dünner, aber verhältnismässig dickwandiger einfacher Schlauch von etwa 7bis 10 μ Dicke dar, der sich bei *S. sigillinoides* unmittelbar am Enddarm, bei *S. gaimardi* eine kurze Strecke vor Erreichung des Enddarms verzweigt. Für die typischen *Distaplia*-Arten dürfen wir wohl das ständige Vorkommen dieser Blase annehmen. Dass ihrer in den Beschreibungen, zumal in den älteren, so selten Erwähnung geschieht, liegt wohl daran, dass sie häufig von den Gonaden verdeckt wird und dann schwer zu erkennen ist. Einer eingehenden Erörterung bedarf wohl nur das Verhalten der *D. cylindrica* Lesson (*Julinia australis* Calman, l. c. 1895, p. 14). Caullery war nicht ganz korrekt, als er (l. c. 1908, p. 45) sagte, dass *Julinia* kaum von *Distaplia* zu unterscheiden sei: "Il n'a en propre que la forme allongée de ses colonies." Da er das Vorhandensein einer Blase am Ausführgang der darmumspinnenden Drüse in die Diagnose von *Distaplia* aufnahm, musste er *Julinia* auch in Hinsicht auf dieses Organ von *Distaplia* trennen, denn in der ausführ-

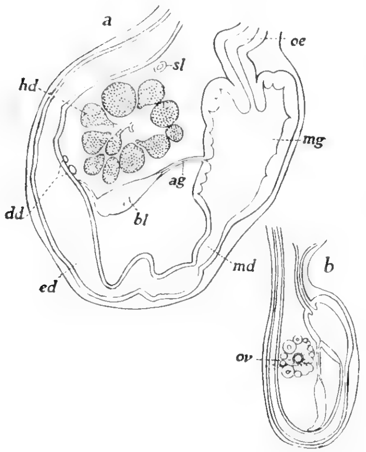

Fig. 11. *Distaplia cylindrica* Less., Längsschnitt durch das Abdomen, *a* einer ausgewachsenen ♂ Person, *b* einer jungen ♀ Person; *ag* = Ausführgang, *bl* = Sammelblase, *dd* = Drüsenschläuche der darmumspinnenden Drüse, *ed* = Enddarm; *hd* = Hode; *md* = Mitteldarm; *mg* = Magen; *oe* = Ösophagus; *ov* = Ovarium; *sl* = Samenleiter; × 52.

lichen Angabe Calman's, der diese Drüse in ihrem ganzen Verlauf schildert, wird nichts von einer Blase erwähnt. "A series of tubules" .... "unite to form a duct which crosses the intestinal loup to open into the stomac at about its middle". Calman's Schilderung ist aber nicht ganz zutreffend. Ich habe sowohl in Ganzpräparaten sowie in lückenlosen Schnittserien von mehreren Personen der *Distaplia cylindrica* — diese Bezeichnung muss als die gültige angesehen werden — das ständige Vorhandensein einer charakteristisch gestalteten Blase am Ausführgang der darmumspinnenden Drüse sicher nachweisen können. Zur Untersuchung dienten mir die etwa 1 mm langen jungen Personen einer weiblichen Kolonie (Fig. 11 *b*) von Süd-Georgien und die ausgewachsenen Personen einer männlichen Kolonie (Fig. 11 *a*) vom Smyth Channel, West-Patagonien. Im Wesentlichen ist der Ausführgang der Drüse bei allen untersuchten Personen, einer ziemlich grossen Zahl, gleich gestaltet, in der Lagerung zeigt er bei den Stücken verschiedener Herkunft insofern einen beträchtlichen Unterschied, als er bei den jungen Personen der süd-georgischen Kolonie gerade von vorn nach hinten verläuft, während er bei den ausgewachsenen Personen von der west-patagonischen Kolonie das Darmschleifen-Lumen in wenig schräger Richtung quer überspannt. Dieser Unterschied beruht offenbar auf einer Verschiebung der verschiedenen Darmabschnitte und damit der Endpunkte des Drüsen-Ausführganges bei dem ungleichen Wachstum des Darmkanals. Der Drüsen-Ausführgang (Fig. 11 *ag*) beginnt in beiden Stadien am Magen mit einem nicht ganz die Hälfte ausmachenden, ungefähr 10 μ dicken, einfachen, dickwandigen Schlauch mit sehr engem Lumen, der sich ziemlich plötzlich zu einer lang gestreckten, ungemein dünnwandigen Blase (Fig. 11 *bl*) erweitert. Bei den jungen Personen ist diese sich distal spitz kegelförmig zu dem dünnen distalen Endschlauch verengende Blase walzenförmig, ungefähr 20 μ dick, bei den ausgewachsenen Personen ist sie eher als schlank-birnförmig zu bezeichnen, etwa 50 μ dick. Der dicke proximale Pol der Blase ist beim Anstossen an den Enddarm etwas rektalwärts umgeknickt und geht in ziemlich scharfem Absatz in den wieder dünn schlauchförmigen proximalen Teil des Ausführganges über, der, an die Wand des Enddarms angeschmiegt, sich bald in die dünnen Drüsenschläuche zu verästeln scheint. (Verästelung nicht genau erkannt, allerdings auch nicht geradezu untersucht). In beiden Fällen streicht der Drüsen-Ausführgang, das Lumen der Darmschleife überspannend, dicht an der Gonade entlang, bei den ausgewachsenen männlichen Personen schräg hinten-ventral an der aus einer grossen Zahl verhältnismässig kleiner Hodenblasen bestehenden rosettenförmigen Hode (Fig. 11 a, *hd*), bei den jungen weiblichen Personen ventral an den noch sehr kleinen Ovarien (Fig. 11 *b ov*), deren Struktur (infolge ungünstiger Konservierung) nicht ganz klargestellt werden konnte, die aber in ihrer Aussenpartie schon einige etwas grössere Eizellen erkennen liessen, während sie im Mittelpunkt einen rundlichen, von einer dünnen, stärker färbbaren Epithelschicht ausgekleideten Hohlraum, offenbar eine in den Eileiter übergehende Ovarialhöhle, aufwiesen. *D. cylindrica* steht nach der Gestaltung des Ausführgangs der darmumspinnenden Drüse mit seiner fast noch schlauchförmigen Blase dem ursprünglichen Zustand, wie ihn *Sycozoa sigillinoides* mit der einfachen Schlauchform des Ausführganges zeigt, noch ziemlich nahe, während *Distaplia fasmeriana* mit der beiderseits scharf abgesetzten Kugelform der Blase das andere Extrem der Bildungsreihe darstellt. Die Spindel- und Ellipsoid-Formen der Blase bei verschiedenen anderen *Distaplia*-Arten bilden vermittelnde Glieder.

Für die Formen der *cerebriforme*-Gruppe finde ich weder bei Caullery noch bei einem anderen Autoren eine Mitteilung über dieses Organ. Meine eigenen Untersuchungen an lokaltypischem Material ergaben, dass bei allen Formen eine Blase am Ausführgang der darmumspinnenden Drüse vorhanden, aber vielfach nur schwer nachweisbar ist; allerdings ist im letzteren Falle die darmumspinnende Drüse, deren Fehlen doch nicht angenommen werden kann, überhaupt nicht klar nachweisbar, sei es nun infolge ungünstiger Konservierung oder infolge von Verzerrung. Auffallend ist, dass die Gestalt der Blase, die doch sonst artlich sehr konstant zu sein scheint, bei verschiedenen Kolonien der *cerebriforme*-Gruppe beträchtliche Verschiedenheiten aufweist (siehe unten!). Gemeinsam ist den verschiedenen Befunden nur der Charakter, dass die Blase verhältnismässig weit vom Magen entfernt liegt und sich meist in ganzer Länge an den Enddarm anlehnt.[1])

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[1]) Anhangsweise mag hier erwähnt werden, dass sich die Bildung einer Blase am Ausführgang der darmumspinnenden Drüse nicht auf die Gat-

Als Schlussfolgerung ergibt sich aus diesen Erörterungen, dass sich die Gattung *Distaplia* durch den Besitz einer artlich charakteristisch gestalteten Blase am Ausführgang der darmumspinnenden Drüse scharf von den typischen, hartstieligen *Sycozoa*, bei denen dieser Ausführgang in ganzer Länge einfach dünn-schlauchförmig ist, unterscheidet, und dass sich die Formen der *cerebriforme*-Gruppe in dieser Hinsicht an *Distaplia* anschliessen.

Geschlechtsverhältnisse: In dieser Hinsicht steht die Gattung *Sycozoa* samt der *cerebriforme*-Gruppe einheitlich da, insofern offenbar bei allen ihren Arten die Kolonien getrenntgeschlechtlich sind, wie schon 1896 Caullery[2]) für die typischen hartstieligen Arten nachwies, und wie es später von Caullery (l. c. 1908, p. 6) und mir (l. c. 1923, p. 23) auch für die *cerebriforme*-Gruppe (*S. cerebriformis* und *S. arborescens*) festgestellt wurde. Ich kann diese Feststellung nun nach der Untersuchung des Materials von Port Western und von Westaustralien bestätigen. In der Gattung *Distaplia* s. s. kommen dagegen sowohl Arten mit getrenntgeschlechtlichen Kolonien vor, sowie solche mit Kolonien, deren Personen zwittrig sind. Diese letztere Form überwiegt bei weitem, und dies setzt *Distaplia* in Gegensatz zu *Sycozoa*, ohne eine scharfe Sonderung zu ermöglichen. Nicht nur die oben beschriebene *Distaplia fasmeriana*, sondern auch einige andere Arten dieser Gattung, so *D. cylindrica* Lesson (siehe *Julinia ignota*, W. Michaelsen, l.c. 1907, p. 41), wahrscheinlich auch *D. confusa* Ritter (l. c. 1901,

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tung *Distaplia*, ja nicht einmal auf die Fam. *Polycitoridae* beschränkt. Eine gleiche Bildung fand ich bei dem Synoiciden *Synoicum haeckeli* (Gottschaldt), von dem ich eine ganz vorzüglich konservierte Kolonie des Originalmaterials untersuchen konnte. Bei dieser Art erweitert sich der ungemein dünne, vom Enddarm her gerade nach vorn zum Magen hin verlaufende Ausführgang der darmumspinnenden Drüse bevor er die Höhe des Pylorus erreicht plötzlich zu einer grossen, ungefähr 260 μ dicken, annähernd kugeligen Blase mit sehr dünner, aber anscheinend zäher Wandung. Je nach der Kontraktion der Person liegt diese Blase ganz hinter dem Magen oder neben dem hinteren Pol des Magens. Diese Bildung war bei allen näher untersuchten Personen durchaus klar und in die Augen fallend; es wundert mich, dass sie weder von Gottschaldt noch von Hartmeyer, der ebenfalls Originalmaterial untersuchen konnte und dessen prachtvollen Erhaltungszustand hervorhebt, erwähnt wird.

[2]) Caullery, 1896, S. l. Synascid. Colella polymorph. bourgeons, p. 1066.

p. 247) und vor allem der Typus der Gattung, *D. magnilarva* D. V.[1]), besitzen getrenntgeschlechtliche Kolonien. Für *D. magnilarva* hat Della Valle dies schon in der Originalbeschreibung von 1881 ausgesprochen. Diese Angabe wurde später von Lahille[2]) als irrtümlich bezeichnet, mit Unrecht. Abgesehen davon, dass jener Befund angesichts des Vorkommens der gleichen Bildung bei der nahe verwandten Gattung *Sycozoa* nichts Befremdendes besitzt, konnte seine Richtigkeit auch an der Hand neuerer Untersuchung von anderen Forschern bestätigt werden, so von Caullery[3]) Ich vermute, dass Lahille's Material der zweiten, durch Zwittrigkeit der Personen charakterisierten Mittelmeer-Art der *D. rosea* D. V. (l. c. 1881, p. 19) zugeordnet werden müsse, deren Originale vielleicht nur weniger üppig entwickelte Kolonien der Lahille'schen *D. magnilarva* (non Della Valle) darstellen; sagt Lahille doch (l. c. 1890, p. 174): "Tous les caractères anatomiques de *D. rosea* se retrouvent chez les jeunes *D. magnilarva*. La taille seule reste toujours très différente." Diese letzte Einschränkung halte ich für bedeutungslos. Meiner Ansicht nach ist *D. rosea* auch von anderen Forschern verkannt worden. So ist dieser Art meiner Ansicht nach auch die von der marokkanischen Küste (Tangier Bay) stammende Kolonie von *D. vallii* Herdm. (l. c. 1886, p. 129, Taf. XVII Fig. 2) zuzuordnen. Ich beschränke deshalb den Begriff *D. vallii* auf das Philippinen-Material, das der speziellen Beschreibung Herdman's zu Grunde lag, also als Typenmaterial anzusehen ist, ausgezeichnet durch eine deutlich ausgesprochene, auch in der Abbildung (l. c. Taf. XVII Fig. 1) erkennbare Bildung von Meridionalreihen-Systemen, von denen in der Abbildung der angeblich der gleichen Art angehörenden marokkanischen Kolonie ($\angle$ *D. rosea*) nichts zu erkennen ist. Van Name stellt zu dieser *D. vallii* eine Anzahl Kolonien aus dem Malayischen Archipel (von der Insel Jolo und den Sulado- und Sirun-Inseln), die eine derartige Reihen-Anordnung der Personen nicht aufweisen, sondern, soweit eine Anordnung überhaupt erkennbar ist, auf leicht eingedrückten Feldern kleine einfache Systeme oder unregelmässig umrissene Systeme verschie-

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1) A Della Valle, 1881, N. Contr. Ascid. comp. Napoli, p. 6? 7.
2) F. Lahille, 1890, Rech. Tunic., p. 157.
3) M. Caullery, 1895, Contr. Et. Ascid. comp., p. 57.

dener Grösse.[1]) Ich bezweifle, dass diese malayischen Kolonien der philippinischen *D. vallei* zugeordnet werden dürfen, halte es sogar für unwahrscheinlich, dass wir es bei diesen Van Name'schen Formen mit einer einzigen Art zu tun haben. Nach meinen Erfahrungen ist die Struktur des Magens im wesentlichen für die Art konstant. Jene malayischen Formen sollen aber zum Teil einen glattwandigen, zum Teil einen an der Innenseite längsgefurchten Magen aufweisen. Darauf, dass auch die Kolonieform bei jenen malayischen Stücken so verschiedenartig ist, möchte ich weniger Gewicht legen, wenn auch bei den von mir untersuchten Materialien die Kolonieform jeder Art charakteristisch erschien, entweder gestielt oder polsterförmig.

Brutsäcke: In dem ausnahmslosen Vorkommen dieser Bildungen stimmen alle Arten der Gattungen *Distaplia* und *Sycozoa* überein. Fraglich ist aber, ob in der Zahl der in einer Bruttasche grossgezogenen Embryonen ein Merkmal für die Unterscheidung gewisser Gruppen liegt. Während wir in der Gattung *Distaplia* sowohl Arten mit mehreren Embryonen, sowie solche mit je einem in einer Bruttasche antreffen, scheinen sich die beiden übrigen Gruppen durch eine Verschiedenheit in dieser Zahl von einander zu unterscheiden. Bei den typischen hartstieligen *Sycozoa* hat man, falls überhaupt weibliche Kolonien mit Brutsäcken zur Beobachtung kamen, stets mehrere Embryonen in einem Brutsack angetroffen; bei der einzigen Form der *cerebriforme*-Gruppe, über die eine diesbezügliche Beobachtung vorliegt, nämlich bei dem Typus dieser Gruppe, fand Caullery nur eine einzige Larve im Brutsack (l. c. 1908, Textfig. II; siehe auch die Unterschrift!).

Als durchgehender Unterschied zwischen *Distaplia* und *Sycozoa* ist vielleicht die Gestaltung der Larven anzusehen. Nach Caullery (l. c. 1908, p. 44, 45) unterscheiden sich die reifen Larven der *Distaplia*-Arten durch frühzeitige Knospenbildung von den reifen Larven der Gattung *Sycozoa*, und zwar sowohl der typischen hartstieligen Formen wie auch der der *cerebriforme*-Gruppe, bei denen die reifen Larven noch keine Spur von Knospen aufweisen. Caullery hat aber nur einzelne Arten auf diese Verhältnisse hin unter-

[1]) *Holozoa vallii*, Van Name, 1918, Ascid. Philippines adj. waters, p. 140, Taf. III Fig 47, 48, Textf. 93.

sucht. Es scheint mir deshalb fraglich, ob wir es hier in der Tat mit einem durchgehenden Unterschiede zu tun haben.

Zum Schluss stelle ich zur besseren Übersicht die in Betracht kommenden Charaktere der 3 hier erörterten Artgruppen in einer Tabelle zusammen:

	Distaplia s. s.	*cerebriforme*-Gruppe	*Sycozoa* s. s.
Kolonie	ungestielt oder mit kurzem, fleischigem Stiel	mit kurzem, fleischigem Stiel	mit längerem, hartem Überwinterungsstiel
Personen-Systeme	kleine geschlossene Figuren oder meridionale Doppelreihen	meridionale Doppelreihen	meridionale Doppelreihen
Parastigmatische Quergefässe am Kiemensack	meist (stets?) vorhanden	fehlen	fehlen
Magen	mit Netz- oder Längsfurchung oder glattwandig	glattwandig	glattwandig
Darmumspinnende Drüse	mit Blase	mit Blase	ohne Blase
Geschlechts-verhältnisse	Personen zwittrig oder Kolonien getrenntgeschlechtlich	Kolonien getrenntgeschlechtlich	Kolonien getrenntgeschlechtlich
Zahl der Embryonen im Brutsack	1 oder mehrere	1	mehrere
Ausgewachsene Larven	(stets?) mit Knospenbildung	ohne Knospenbildung	ohne Knospenbildung

Aus dieser Zusammenstellung ist folgendes ersichtlich.

Distaplia s. s. ist eine vielgestaltige Gruppe, die in einigen Arten auch gewisse Bildungen zeigt, die bisher für *Sycozoa* s. s. und die *cerebriforme*-Gruppe oder für einen Teil derselben charakteristisch erschienen. Die *cerebriforme*-Gruppe schliesst sich unter Ausbildung geringfügiger Sondercharaktere (Fehlen der parastigmatischen Quergefässe am Kiemensack, vielleicht auch Nichteintreten von Knospenbildung an den ausgewachsenen Larven) eng an *Distaplia* s. s. an, während *Sycozoa* s. s. sich als eine Kaltwasserform (Überwinterungsstiel) darstellt, die sich von den typischen *Distaplia* noch weiter entfernt als die *cerebriforme*-Gruppe. Wenngleich die *cerebriforme*-Gruppe in mancher Hinsicht zwischen *Distaplia* s. s. und *Sycozoa* s. s. vermittelt, so scheint sie in anderer Hinsicht (Einzahl der Embryonen im Brutsack) doch auf anderem Wege als *Sycozoa* s. s. aus *Distaplia* hervorgegangen zu sein. Es ist fraglich, an welcher Stelle ein Schnitt durch die ganze Ascidiengruppe zur Sonderung der Gattungen anzusetzen habe. Die Entscheidung wird erschwert durch den Umstand, dass wir von manchen Bildungen nicht wissen, ob sie bei allen Arten einer Sondergruppe auftreten und demgemäss für die Sondergruppe charakteristisch seien. Die Frage geht schliesslich darauf hinaus, ob die *cerebriforme*-Gruppe, die kaum als eigene Gattung angesprochen werden kann, an *Distaplia* oder *Sycozoa* anzuschliessen sei. Meiner Ansicht nach ist das Vorkommen einer Blase am Ausführgang der darmumspinnenden Drüse massgebend für die Angliederung der *cerebriforme*-Gruppe an *Distaplia*. Nach diesem Entscheid würden die Diagnosen der ihrem Inhalt nach veränderten Gattungen *Distaplia* und *Sycozoa* die oben angegebene Fassung erhalten.

Erörterung über Distaplia cerebriformis (Quoy & Gaim.) **und Verwandte**: Anhangsweise mögen hier noch einige Mitteilungen und Überlegungen Platz finden, die auf Untersuchungen neueren Materials der *cerebriforme*-Gruppe beruhen. Hervorragende Bedeutung hat dabei das von Th. Mortensen auf seiner Pacific-Expedition in Port Western[1]) gesammelte Material, das als Lokaltypus für *Aplidium cerebriforme* angesehen werden darf. Dazu kommen noch einige von Hartmeyer und mir gesammelte Kolonien von West-Australien (ohne näheren Fundort) und von Nordwest-Australien[2]), die als Lokaltypen für *Sycozoa cerebriformis* f. *intermedia* Hartmeyer (l. c. 1919, p. 124) gelten können, sowie die schon früher von mir (l. c. 1923, p. 22) besprochenen Kolonien vom Gebiet des Kaplandes, gewissermassen Lokaltypen der *Sycozoa arborescens* Hartmeyer (l. c. 1912, p. 316).

Hartmeyer vereint in seiner neueren Arbeit (l. c. 1919, p. 124)

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1) Genauere Fundangabe: Victoria, Port Western, 5—10 Fd.; Dr. Th. Mortensen, 6. September 1914.

2) Genauere Fundangabe: Nordwest-Australien, Port Hedland, 26° 17' S., 3 340; Gale, Juli 1905.

seine kapländische *S. arborescens* als *f. arborescens* und seine Form von Nordwest-Australien als f. *intermedia* unter gewissem Vorbehalt mit der süd- und südost-australischen *S. cerebriformis* (Quoy & Gaim). Er glaubt diese drei Formen nach der verschiedenen Gestaltung der Kolonie als Lokalformen deuten zu sollen. Die Berechtigung einer Formensonderung nach diesem Gesichtspunkte erscheint mir fraglich. Ich kann in der, meiner Schätzung nach, geringfügigen Verschiedenheit der Kolonieform keinen Grund zur Sonderung von Formen oder gar Arten sehen. Schon die Herdman'schen Abbildungen zahlreicher Kolonien seiner *Colella plicata*[1]), einem Synonym von *Sycozoa cerebriformis*, zeigen eine grosse Variabilität der Koloniegestalt, und Caullery's *Colella incerta* (l. c. 1908, p. 10, Textfig. 2 B), mutmasslich von dem gleichen Fundort wie *Sycozoa cerebriformis*, jedenfalls aber von Süd- oder Südost-Australien, stimmt in der Gestalt des Koloniekopfes ganz mit *S. arborescens* überein. Auch mein lokaltypisches Material von Port Western ähnelt zum Teil mehr der f. *arborescens* als der f. *typica*, und bei dem Material von Port Hedland bin ich im Zweifel, ob ich es der f. *arborescens* oder der f. *intermedia* zuordnen müsste. Es kann also von einer Sonderung in Lokalformen nach der Koloniegestaltung nicht die Rede sein. Mutmasslich hat der Standort, ob mit ruhigem oder mit bewegterem Wasser, einen Einfluss auf die mehr lockere oder mehr geschlossene Bauart der Kolonie.

Färbung: Das in Formalin konservierte Material von Port Western hat seine ursprüngliche Färbung anscheinend unverändert oder wenig verändert erhalten. Die Kolonien verschiedener Lebensstadien sind verschieden gefärbt. Einige Kolonien mit lediglich unausgewachsenen Geschlechtspersonen (teils männliche, teils weibliche Kolonien) sind durchweg lebhaft bräunlich rot. Bei einigen Kolonien mit grösseren, anscheinend ausgewachsenen, aber geschlechtslosen Personen zeigt nur die Stielregion ein solches bräunliches Rot, während die mit den Personensystemen ausgestattete Kopfregion einen bläulich grauen Farbenton aufweist.

Kiemensack konstant mit 4 Kiemenspaltenzonen, ohne parastigmatische Quergefässe.

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[1]) W. A. Herdman, 1899, Descr. Cat. Tun. Austral. Mus., p. 62, Taf. Dist. II Fig. 1—11.

Darm eine einfache, ziemlich stark klaffende Schleife bildend. Darmumspinnende Drüse mit Blase, die verhältnismässig weit von der Einmündung in den Magen entfernt liegt und bei grösseren Personen eine mehr oder weniger dicke, schlauchförmige, bei kleineren, unausgewachsenen Personen eine scharf abgesetzte, ovale oder gerundet kastenförmige bis fast kugelige Erweiterung des eng schlauchförmigen Ausführganges der Drüse darstellt.

Wachstums- und Geschlechtsverhältnisse: In jeder untersuchten Kolonie zeigen die Personen, unter Umständen allerdings mit Ausnahme der an der Basis des Kopfes sitzenden, nur geringe Verschiedenheiten des Wachstums- und Geschlechtszustandes. Diese Personen sind sämtlich klein und unausgewachsen oder sämtlich gross und ausgewachsen, andererseits sämtlich geschlechtslos oder, wenn nicht sämtlich, so doch zum grossen Teil mit Geschlechtsorganen versehen, lediglich mit männlichen oder lediglich mit weiblichen (also Kolonien diöcisch). Die zur Beobachtung gelangten geschlechtslosen Kolonien enthalten nicht etwa kleine Personen, sondern grosse, anscheinend voll ausgewachsene Personen, während sich Geschlechtsorgane andererseits ebensowohl bei kleinen, etwa 1 mm langen unausgewachsenen, wie bei grösseren, anscheinend ausgewachsenen Personen finden. Geschlechtsorgane treten schon bei Personen auf, die noch nicht zur Nahrungsaufnahme befähigt sind, deren Darm noch durchaus leer ist. Diese verschiedenen zur Beobachtung gelangten Zustände lassen sich nur durch Annahme einer Art Generationswechsel der Personen innerhalb einer Kolonie erklären. Eine Generation von Personen (wenn nicht mehrere) befasst sich nur mit der Nahrungsaufnahme und Aufspeicherung von Nahrungsmaterial. Die Personen dieser Generation sind und bleiben geschlechtslos. Die Personen einer später auftretenden Generation bilden schon frühzeitig, lange bevor sie ausgewachsen und zur Nahrungsaufnahme befähigt sind, Geschlechtsorgane aus. Das Wachstum dieser späteren Generation geschieht offenbar wenigstens zeitweilig nur auf Kosten des von der früheren Generation beschafften Reservematerials. Eine Zeitlang, da die Personen der älteren Generation schon sämtlich verschwunden sind und die unausgewachsenen der jüngeren Generation noch keine Nahrung aufnehmen können, ist die Kolonie lediglich auf Reservematerial angewiesen. Dieser Generationswechsel zwischen ungeschlechtlichen und geschlechtlichen Personen scheint von jahreszeitlichen Verhältnissen unabhängig zu sein, was bei einer ausgesprochenen Warmwasserform auch einleuchtend ist, und was dadurch offenbar wird, dass sich in dem Material aus Port Western vom 9. September 1914 neben einander Kolonien mit lediglich sehr jungen geschlechtlichen Personen und Kolonien mit lediglich ausgewachsenen ungeschlechtlichen Personen finden.

Weibliche Geschlechtsorgane: Ovarien nur in frühem Stadium an sehr jungen, unausgewachsenen Personen beobachtet, rechterseits am rücklaufenden Darmschleifen-Ast eine kurze Strecke vor dem Wendepol sitzend, manchmal in das Lumen der Darmschleife hinein gedrängt, in der Regel mit 2 sehr verschieden grossen Eizellen (grösste beobachtete am Ovarium sitzende Eizelle ca. 160 μ dick). Eileiter als sich verschmälernde Röhre vom Ovarium am rücklaufenden Darmschleifen-Ast gerade nach vorn hin verlaufend. Brutsack nur in sehr frühem Stadium und ungefüllt beobachtet, als engstieliger, schlank birnförmiger Anhang von nicht ganz einfachem Bau dorsal am Hinterende des Thorax. An durchsichtig gemachten, mit Pikrokarmin gefärbten Personen sieht er aus wie eine schlank gestaltete elektrische Birne, in deren Lumen vom engen Stiel her ein dunklerer, im breiten Pol der Birne verbreiterter und löffelartig ausgehöhlter Stab (eine Röhre?, offenbar das äussere Ende des Eileiters) hineinragt. Nach Caullery (l. c. 1908, p. 7, Textfig. II, Unterschrift) beherbergt der Brutsack bei dieser Art nur einen einzigen Embryo.

Männliche Geschlechtsorgane: In meiner Erörterung über *S. arborescens* (l. c. 1923, p. 22) behauptete ich, dass diese Art in Hinsicht der männlichen Geschlechtsorgane — in der Regel nur 2 Hodenblasen in einer Hode, ausnahmsweise 3 — von allen übrigen *Sycozoa*-Arten, deren Geschlechtsorgane ich untersuchen konnte, abwiche. Das ist zwar richtig, ich hätte aber hinzufügen müssen, dass die Gestaltung ihrer Hode der von *S. cerebriformis* f. *intermedia* Hartmr. sehr nahe kommt. Bei dieser Form setzt sich die Hode „aus wenigen grossen Follikeln“, nach der Abbildung (l. c. 1912, Taf. 2 Fig. 60) aus 4, zusammen; die Zahl der Hodenblasen ist also nur ein Geringes grösser als nach meinem Befund bei *S. arborescens*. Meine neuere Untersuchung hebt diesen Unterschied ganz auf. Ich fand nämlich an einem anderen Bruchstücke der gleichen Kolonie, wenn nicht einer anderen von dem gleichen Fundort stammenden Kolonie der kapländischen *S. arborescens* (Dublette des nach Stockholm zurückgesandten Hauptmaterials) die Hoden vorwiegend aus 4, seltener aus 3 oder 2, einmal vielleicht sogar aus 5 Hodenblasen (dies nicht ganz sicher erkannt) zusammengesetzt. Nach diesem neuen Befund erscheint mir eine artliche Sonderung von *S. arborescens* und *S. cerebriformis* f. *intermedia* auch auf Grund dieses Organsystems ganz ausgeschlossen, und da ich eine Sonderung nach der Koloniegestaltung aus dem oben angeführten Grunde in diesem Falle auch nicht als berechtigt anerkennen kann, so muss ich mich auch gegen eine Sonderung in verschiedene Lokalformen aussprechen. Ich verschmelze beide Formen. Wie stellen sich nun die süd- und südost-australischen Formen der *cerebriforme*-Gruppe hierzu? Über die männlichen Geschlechtsorgane dieser südlicheren Formen finde ich nur eine wenig besagende Angabe Herdman's über seine *Colella plicata* (l. c. 1899, p. 64), aus der die Zahl der Hodenblasen nicht zu ersehen ist, und eine genauere Angabe Caullery's über seine *C. incerta* (l. c. 1908, p. 12, Textfig. 5). Danach finden sich die Hodenblasen bei dieser Form, wie es auch der Abbildung entspricht, „au nombre d'une dizaine". Während Caullery also bei seiner *S. incerta* eine verhältnismässig grosse Zahl von Hodenblasen fand, stimmt mein Untersuchungsmaterial von Port Western auch in dieser Hinsicht durchaus mit dem kapländischen und dem nordwest-australischen Material überein. Ich fand nämlich bei einer männlichen Kolonie die Hoden einiger weniger näher untersuchter Stücke aus 2 oder 3 Hodenblasen zusammengesetzt. Bei der in eine lückenlose Schnittserie zerlegten Hode war eine Hodenblase einfach, während die beiden anderen Hodenblasen durch einen tiefen Kerbschnitt am breiten Pol zweigeteilt erschienen, eine Andeutung dafür, dass sich die Hode durch weitere Teilung der einzelnen Blasen auch bei dieser Form in eine noch grössere Zahl von Teilstücken spalten mag. Eine beschränkte Variationsweite der Zahl der Hodenblasen ist also bei dieser Art sicher nachweisbar. Fraglich bleibt nur, ob wir die Variationsweite von 2—5 auf 2—10 ausweiten müssen bezw. dürfen? Vielleicht handelt es sich bei jener *S. incerta* gar nicht um 10 völlig gesonderte Hodenblasen, sondern um eine geringere Zahl, deren einige durch Kerbschnitte unvollkommen geteilt sind? Ich kann mir nicht gut vorstellen, dass jene *S. incerta* tatsächlich von dem übrigen australischen Material der *cerebriforme*-Gruppe zu sondern sei, und ich vereine deshalb alle Formen dieser Gruppe: „*Aplidium cerebriforme* Qu. & Gaim., *Colella plicata* Herdm., *C. incerta* Caullery, *Sycozoa arborescens* Hartmr. und *S. cerebriformis* f. *intermedia* Hartmr.“ ohne weitere Varietäten- oder Formenspaltung in der Art *Distaplia cerebriformis* (Qu. & Gaim.).

Erörterung über Distaplia domuncula Hartmr. **und Verwandte**: Im Jahre 1923[1]) beschrieb ich als neue Art eine *Distaplia* aus kapländischen Gewässern unter dem Namen *D. domuncula*. Infolge eines literaturtechnischen Versehens hatte ich hierbei eine Arbeit Hartmeyers, in der er unter dem gleichen Artnamen, als *Holozoa domuncula*[1]), eine *Distaplia* aus dem gleichen Distrikt beschrieb, unberücksichtigt gelassen. Wie sich nun auch meine Art zu der Hartmeyer's stellt, diese letztere hat die Priorität und muss als *Distaplia domuncula* (Hartmr.) bestehen bleiben, wobei das Material Hartmeyer's von der False Bay als typisches anzusehen ist.

Es liegt der Gedanke nahe, dass diese aus dem gleichen Gebiet stammenden, gleicherweise als Dromiden-Schutzhülle verwendeten Formen auch die gleiche Art darstellten. In der Tat zeigen sie, auch abgesehen von der äusseren Form und dem inneren Bau der Kolonie, bedeutsame Übereinstimmungen. Diesen stehen aber einige wesentliche Unterschiede gegenüber, die eine Vereinigung beider Formen nicht angängig erscheinen lassen. Der Magen soll bei Hartmeyer's Form an der Innenseite eine von Pigmentzellen gebildete netzförmige Zeichnung aufweisen, während er bei meiner Form an der Innenseite schmale, niedrige Wälle trägt, die in das Lumen des Magens hineinragen und in der Längsrichtung verlaufen, gleichsam ein bis zum Kollabieren der Maschen in die Länge gestrecktes Netz darstellend. Ferner sollen bei Hartmeyer's Form die Kolonien, wie bei manchen anderen *Distaplia*-Arten, eingeschlechtlich (in den zur Beobachtung gelangten Fällen weiblich) sein, während bei meiner Form die Personen zwittrig sind. Auch ist wohl die Lage der Gonaden bei beiden Formen eine verschiedene. Ich glaube als sicher annehmen zu dürfen, dass Hartmeyer eine so charakteristische Bildung, wie sie

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[1]) W. Michaelsen, 1923, Südafric. Ascid., p. 15, Textfig. 3.

die Lagerung der Gonaden bei meiner Form (in bruchsackartiger Vorwölbung) ist, beobachtet und erwähnt hätte.

Da ich eine Identität beider Formen nicht wohl annehmen kann, so bezeichne ich meine Form von Walker Bay jetzt als *Distaplia skoogi* nom. nov.

Fam. **Didemnidae**.

Gen. **Leptoclinides** Bjerk.

Leptoclinides diemenensis n. sp.

Fundangabe: Neuseeland, Nord-Insel, Cape Maria van Diemen, 50 Fd., harter Boden; 5. Jan. 1915.

Beschreibung: Gestaltung der Kolonie dick krustenförmig bis polsterförmig, etwa 2—9 mm dick, an einzelnen Stellen anscheinend noch dicker, doch handelt es sich hier anscheinend um stengelumwachsende Scheinmassen bezw. Doppellamellen. Die vorliegende Kolonie scheint einem flächenhaften, aber unebenen Untergrunde locker aufgewachsen gewesen zu sein, ist aber von unregelmässig stengeligen Fremdkörpern durchsetzt, die auch als Teil des Untergrundes angesehen werden müssen, und die offenbar den unregelmässigen Hervorragungen und Verdickungen der Kolonie als Stütze dienten.

Aussehen der Kolonie schwach wachsartig durchscheinend, hell rötlich grau.

Oberfläche der Kolonie auch abgesehen von den Unebenheiten, die durch den unregelmässigen Untergrund verursacht sind, ziemlich uneben, nur an kleinen Teilen eben. Unebenheiten hervorgerufen stellenweise durch nicht überall ausgeprägte klein-polsterförmige Erhabenheit der Personen-Aussenflächen und vielfach niedrig-warzenförmige Erhabenheit der Branchialöffnungen. Oberfläche der Kolonie im feineren etwas rauh.

Branchialöffnungen unregelmässig über die Oberseite der Kolonie zerstreut, stellenweise ziemlich dichte Gruppen bildend, stellenweise spärlich, an manchen ziemlich umfangreichen Stellen sowie an der Unterseite der Kolonie ganz fehlend. Die Branchialöffnungen (Fig. 12 *b, c, d*) erscheinen als winzige sternförmige Spaltöffnungen, die bei regelmässiger Ausbildnng einen Dreistrahler mit gegabelten Strahlen, also eine Umbildung des Sechsstrahlers, darstellen. Es zeigen sich jedoch vielfache Unregelmässigkeiten in der Strahlenfigur, wenngleich die Sechszahl der Strahlen-Enden anscheinend stets beibehalten ist. Die Branchialöffnungen liegen häufig auf niedrig-warzenförmigen Erhabenheiten, manchmal aber auch unmittelbar auf der Personen-Aussenfläche, die ihrerseits schwach konvex vorspringt oder nicht erhaben ist.

Kloakalöffnungen nicht sicher nachgewiesen.

Zellulosemantel weich knorpelig, ziemlich zäh, mit etwas festerer Oberflächenschicht. Blasenzellen an der Oberfläche in etwa 3- bis 5-facher dicht gedrängter Lage eine ziemlich scharf begrenzte Rindenschicht bildend. Die Wandungen dieser Rindenschicht-Blasenzellen sind allseitig zart. Gegen die Branchialöffnungen nimmt diese Rindenschicht an Dicke ab. Im Umkreis der Branchialöffnungen von etwa 3-facher Branchialsipho-Breite ist die Rindenschicht unterbrochen. In den inneren Teilen des Zellulosemantels finden sich im allgemeinen nur spärliche zerstreute Blasenzellen; zu dichteren, wenn auch nicht gedrängten Schwärmen vermehren sich die Blasenzellen wieder in den tieferen Schichten des Zellulosemantels, unterhalb der Schicht der Kloakalräume. Kalkkörper ziemlich regelmässig morgensternförmig, etwa bis 48 μ dick, meist etwas oder viel kleiner, mit kegelförmigen, spitzwinkligen (Spitzwinkel ca. 45^{0}), ziemlich scharf spitzigen Stacheln, etwa 8 bis 10 im Umkreis des optischen Äquatorialdurchschnittes. Die Kalkkörper sind, abgesehen von den dichten Klumpen an den Seitenorganen und in den Branchialsiphonen, sehr locker zerstreut, am dichtesten in der Schicht unterhalb der Rinde, im übrigen meist spärlich, nur in den tieferen Schichten stellenweise wieder deutliche Schwärme bildend. Sehr spärlich treten sie in der Rindenschicht auf, etwas häufiger noch an der Aussenseite der Rindenschicht. Hier bilden die einzelnen Kalkkörper winzige warzenförmige Hervorragungen, durch die die Rauheit der Kolonie-Oberfläche hervorgerufen wird. Pigmentzellen sind nicht aufgefunden worden.

Kloakalsystem ein unregelmässiges Labyrinth von weiten Höhlungen und engeren Kanälen in der Horizontalschicht dicht unterhalb der Thoraces.

Personen (Fig. 12 *a*) mehr oder weniger genau senkrecht zur Oberfläche der Kolonie gestellt, bei gerader Streckung etwa bis $2^1/_2$ mm lang.

Thorax infolge der eigentümlichen Gestaltung des Atrialsiphos im Profil annähernd rechtwinklig dreiseitig.

Branchialsipho gerade am Vorderende des Thorax, lang und schlank, in der Mitte etwas verengt, gegen die Enden etwas erweitert, mit nur mässig starker Ringmuskulatur, am apikalen Rande mit 6 häufig sehr undeutlichen, höchstens sehr schwach vorspringenden, sehr stumpfen Zähnen, nicht eigentlich gelappt. Die deutlicher ausgeprägten Lappen, auf denen die charakteristische strahlige Gestalt der Branchialöffnungen beruht, sind Bildungen des Zellulosemantels.

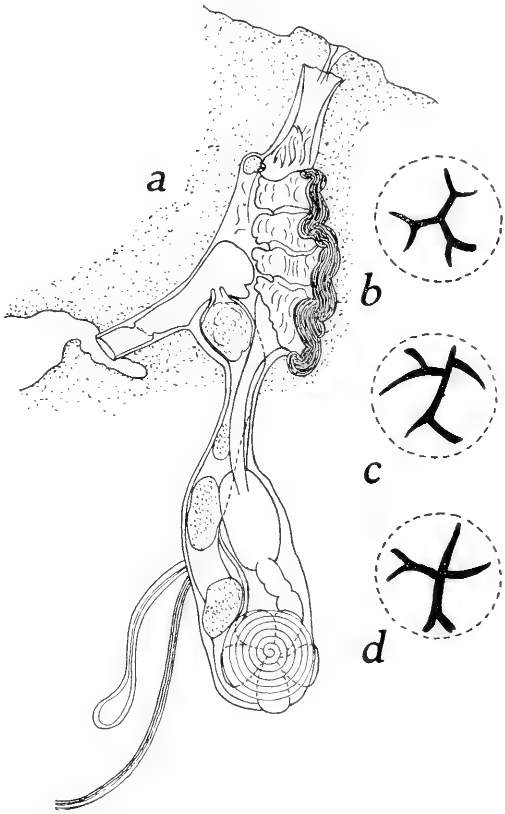

Fig. 12. *Leptoclinides diemenensis* n. sp. *a* = ganze Person von der rechten Seite, *b—c* = Aussenflächen dreier Personen mit Branchialöffnung, halb schematisch; × 50.

Atrialsipho mit seiner Basis die hintere Hälfte oder mehr von der Rückenseite des Thorax einnehmend, auf kegelförmig verjüngter Basalpartie mehr oder weniger lang röhrenförmig schräg nach hinten-unten ragend, wie ein Rüssel aussehend, der seine Mündung in eine der ziemlich tief liegenden Kloakalräume taucht, mit seinem ganzrandigen oder höchstens schwach und unregelmässig gekerbten Mündungsrande etwas in den Kloakalraum vorragend. Ringmuskulatur des Atrialsiphos schwach ausgeprägt. In mässig weiter Entfernung von der Mündung weist der Atrialsipho eine mässig breite Ringfalte, ein Atrialvelum, auf.

Von einem Zurückzieher am Hinterende des Thorax fehlt jegliche Spur.

T h o r a k a l e S e i t e n o r g a n e bei allen in günstiger Lage sich darstellenden Personen (fast 100) erkannt, ungemein gross. Es sind scharf abgesetzte, annähernd kreisrunde napfförmige bezw. halbkugelige Einsenkungen der Leibeswand in die Peribranchialräume hinein, jederseits in der Höhe der dritten Kiemenspalten-Zone etwas näher dem Endostyl als der Rückenmittellinie gelegen. Die Höhlung dieses napfförmigen Organs öffnet sich fast in ganzer Ausdehnung nach aussen; ihre Mündung ist nur durch einen schmalen, nicht allseitig ausgebildeten Saum eingeengt. Diese Seitenorgane müssen als innerliche bezeichnet werden, wenngleich sie von den typischen „inneren" Seitenorganen, wie sie z. B. *Didemnum bistratum* S l u i t. [1]) aufweist (flaschenförmig, durch eine sehr enge Öffnung ausmündend), stark abweichen. Der Flächendurchmesser eines solchen Seitenorgans beträgt ungefähr $0{,}_{18}$ bis $0{,}_{24}$ mm. Die thorakalen Seitenorgane sind prall mit unausgewachsenen, kleinen und kleinsten Kalkkörpern gefüllt, die sich als breiter Schwarm aus der Öffnung heraus zu ergiessen scheinen.

T a i l l e lang und schlank, vom Thorax scharf, vom eigentlichen Abdomen nicht ganz so scharf abgesetzt, ohne Einschnürung.

A b d o m e n abgeplattet beutelförmig, bei geschlechtsreifen Personen durch die Gonaden hinten-rechts mehr oder weniger aufgebeult. Ungefähr in der Mitte der linken Seite entspringen aus dem Abdomen in der Regel zwei G e f ä s s a n h ä n g e, deren einer manchmal gegabelt oder gar büschelig verzweigt ist. Die Gefässanhänge sind kürzer oder länger; der längste gemessene war ca. 8 mm lang. Es sind zarte Doppelröhren, die am Ende in eine stärker färbbare birnförmige Anschwellung auslaufen. Die Gefässanhänge ragen zum Teil weit in den personenlosen Basalteil der Kolonie hinein.

L e i b e s w a n d zart, am Thorax jederseits mit etwa 9 zarten, weitläufig gestellten Längsmuskeln.

B r a n c h i a l t e n t a k e l abwechselnd verschieden gross, an Zahl anscheinend gering (etwa 16?).

K i e m e n s a c k mit 4 Kiemenspalten-Zonen. Nach ziemlich unsicherer Schätzung am stark verschrumpften Objekt mindestens 12

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[1]) W. M i c h a e l s e n, 1920, Krikobranche Ascid. westl. Ind. Oz.: Didemn., p. 52, Textfig. 5.

(mutmasslich noch einige mehr) Kiemenspalten in einer Halbzone. Kiemenspalten lang und schmal.

Darm (Fig. 12*a*) eine einfache, hinten etwas klaffende, in der Regel am Taillenteil um ungefähr 90° gedrehte Schleife bildend. Ösophagus lang und dünn, gerade gestreckt. Magen je nach Streckung länglich oval oder mehr gerundet tonnenförmig. Cardia nicht gerade am vorderen Pol des Magens, sondern eine kurze Strecke nach hinten verschoben, mit Cardiawulst. Mitteldarm kurz, vom Enddarm scharf abgesetzt, mehr oder weniger deutlich in Nachmagen und Drüsendarm gesondert. Bei Aufblähung durch Nahrungsmassen sind diese Verhältnisse des Mitteldarms nicht deutlich erkennbar. Enddarm nicht besonders dick. After zweilippig, hinten im erweiterten Basalteil des Atrialsiphos gelegen.

Geschlechtsapparat: Personen zwittrig. Ovarien rechts am Wendepol der Darmschleife gelegen. Ausgewachsene Eizelle am Ovarium ca. 1/3 mm dick. Hode dicht hinter dem Ovarium an der Hinterseite des Abdomens gelegen, aus 4 oder 5 rosettenförmig angeordneten, unregelmässig birnförmigen Hodenblasen bestehend. Samenleiter in 6 oder 7 eng aneinander gelegten Spiralwindungen den kurzen Stielteil der Hodenblasenrosette umkreisend und als Kappe die Hodenblasenrosette aussen locker überdeckend. Samenleiter nicht besonders angeschwollen.

Pylorische Knospung konnte nicht nachgewiesen werden; dagegen sind vielleicht gewisse anscheinende Knospenbildungen im personenlosen Basalteil des Zellulosemantels als stoloniale Knospung anzusprechen.

Erörterung: *L. diemenensis* gehört wie der unten als neu beschriebene *L. sparsus* zur Gruppe des *L. brasiliensis* Mich.[1]), zu der ausserdem noch *L. dubius* (Sluit.)[2]) zu stellen ist. Diese Gruppe verhält sich zu dem arktisch-atlantischen Typus der Gattung, zu *L. faeroerensis* Bjerkan[3]), wie die Gattung *Polysyncraton*

[1]) W. Michaelsen, 1923, Neue u. altbek. Ascid. Reichsm. Stockholm, p. 34, Textfig. 6.

[2]) *Polysyncraton dubium*, C. Ph. Sluiter, 1909, Tunic. Siboga-Exp. II, p. 69, Taf. IV Fig. 3, Taf. VII Fig. 10. — W. G. van Name, 1918, Ascid. Philippines adj. wat., p. 155, Taf. XXXI Fig. 30, Taf. XXXII Fig. 47, Taf. XXXIII Fig. 49, Textfig. 107, 108. — R. Hartmeyer, 1919, Ascid.; in Res. Sw. Exp. Austral. 1910—13, p. 136.

[3]) P. Bjerkan, 1905, Ascid. „Michael Sars", p. 20, Taf. III Fig. 4—8.

Nott zur Gattung *Didemnum* Sav. Schon Hartmeyer[1]) wies auf die Unhaltbarkeit der Gattung *Polysyncraton* hin. Das Auftreten der gleichen Bildung, die zur Sonderung der Gattung *Polysyncraton* von *Didemnum* führte, bei Arten einer ganz anderen Didemniden-Gruppe, gibt der Anschauung von der systematischen Minderwertigkeit dieser Sonderbildung eine weitere Stütze.

L. diemenensis unterscheidet sich von allen anderen Arten seiner Gattung durch die Grösse der thorakalen Seitenorgane, die übrigens bei allen *Leptoclinides*-Arten, bei denen sie nachgewiesen wurden, den gleichen Bildungscharakter aufweisen. Es sind bei *Leptoclinides* stets breite, aber kurze, in die Peribranchialräume hineinragende Säcke, die durch eine mehr oder weniger weite Öffnung nach aussen münden, im Gegensatz zu den *Didemnum*-Arten mit innerlichen thorakalen Seitenorganen, bei denen diese Organe birnförmig sind, weit und frei in die Peribranchialräume hineinragen und durch eine engröhrenförmige Öffnung ausmünden.

Im übrigen unterscheidet sich *L. diemenensis* von den Arten seiner Gruppe durch die aus gleichmässig zartwandigen Blasenzellen bestehende Rindenschicht des Zellulosemantels, durch das Fehlen jeglicher Pigmentzellen im Zellulosemantel und andere mehr oder weniger bedeutsame Charaktere, wie Grösse der Kalkkörper, Zahl der Hodenblasen und Zahl der Samenleiter-Windungen.

Leptoclinides sparsus n. sp.

Fundangabe: Neuseeland, Nord-Insel, vor New-Plymouth, 8 Fd., an *Pyura pulla* (Sluit.); 12. Jan. 1915.

Beschreibung: Koloniegestaltung und Bodenständigkeit: Die einzige vorliegende Kolonie (Fig. 13) ist ziemlich locker auf der sehr unebenen, sandigen Oberfläche einer *Pyura pulla* (Sluit.) aufgewachsen und lässt es zweifelhaft, ob wir es hier im wesentlichen mit einer Krustenform oder mit bandförmig lang gestreckten, stellenweise verästelten Polstern zu tun haben. Sie besteht der Hauptmasse nach aus etwa 2—3 mm breiten, in der Mittellinie etwa 1—$1\frac{1}{2}$ mm hohen polsterartig gewölbten Bändern, die mit ihrer flachen oder gar etwas ausgehöhlten, scharfrandigen Grundfläche über die *Pyura*-Oberfläche hinzukriechen scheinen.

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[1]) R. Hartmeyer, 1912, Ascid. Deutsch. Tiefsee-Exp., p. 325.

Vielfach zeigen diese Bänder Verästelungen. Ihre freien Enden sind gerundet. Während manchmal derartige Bänder unverschmolzen dicht nebeneinander herlaufen, sind andere in ihrer Grundpartie mit einander verwachsen oder durch eine deutlich krustenförmige niedrigere Zwischenpartie miteinander verbunden; auch zeigen die Bänder an den Verästelungsstellen manchmal geringe Verbreiterungen, die diesen Stellen ein mehr krustenartiges Aussehen geben. Es muss wohl damit gerechnet werden, dass diese Art auf breiterem, glatterem Untergrunde deutlicher krustenförmige Kolonien bilde, vielleicht mit lappigen bis bandförmigen Ausläufern am Rande.

Konsistenz der Kolonie ziemlich fest, fast knorpelig.

Fig. 13. *Leptoclinides sparsus* n. sp.
Kolonie von zwei verschiedenen Seiten; × 2¼.

Färbung der Kolonie fleckig und sprenkelig weiss-grau-schwarz. Die undurchsichtig weissen Flecken rühren hauptsächlich von den Personen her, werden aber durch oberflächliche Kalkkörper-Einlagerung an den Personen-Aussenflächen verstärkt. In den Zwischenpartien, an denen die Kalkkörpereinlagerung durch eine Blasenzellenschicht überlagert ist, herrscht ein grauer Farbton vor, der durch Einlagerung von Pigmentzellen eine schwarze Sprenkelung aufweist.

Oberfläche der Kolonie eben, nicht glatt, aber auch nicht sehr rauh, am besten wohl als duff zu bezeichnen. Personen-Aussenflächen im allgemeinen unregelmässig über die obere Fläche zerstreut, bei bandförmigen Teilen der Kolonie vielfach auf die Mittelpartie beschränkt, in der Randpartie fehlend oder nur stellenweise auftretend. Die Personen-Aussenflächen stellen sich dar als unscharfe weisse Flecke mit dunklerer Mittelpartie, in deren

Zentrum die Branchialöffnung infolge von Kalkkörper-Einlagerung in dem Branchialsipho als hellerer, nicht deutlich strahliger Punkt erscheint. Kloakalöffnungen mässig weit von einander entfernt in den Mittellinien der bandförmigen Kolonieteile bezw. auf den etwas wulstig verdickten Randpartien der mehr flächenhaften Kolonieteile. Es sind kleine, mehr oder weniger breit spindelförmige dunkle Spaltöffnungen auf grauem Grunde, in geringer Entfernung umgeben von einem meist geschlossenen, mehr oder weniger regelmässigen Kranz weisser Personen-Aussenflächen. Die ganze Region einer Kloakenöffnung samt dem Kranz der Personen-Aussenflächen ist meist deutlich flachhügelig erhaben, zweifellos infolge von Auftreibung durch die darunter liegende Kloakenhöhle.

Zellulosemantel sehr fest, zumal in der Aussenschicht, knorpelig. In den Zwischenpartien zwischen den Personen-Aussenflächen bildet er zu äusserst eine dünne, sehr feste Oberhaut, eine hornartige Schicht ohne Blasenzellen und ohne Kalkkörper von etwa 6—10 μ Dicke. Auf diese folgt eine bis etwa 140 μ dicke mehrfache (etwa 6—8-fache) Lage von dicht gedrängt stehenden Blasenzellen. Diese Blasenzellen nehmen von aussen nach innen an Dicke und an Derbheit der Wandung ab. Die äussersten sind etwa 35 μ dick und haben eine einseitig stark verdickte Wandung, die innersten sind nur etwa 18 bis 24 μ dick, zartwandig. Weiter im Innern der Kolonie treten Blasenzellen im allgemeinen nur sehr spärlich und vereinzelt auf, etwas reichlicher vielleicht nur noch in den Basalpartien. Spindel- und Sternchenzellen finden sich in der Grundmasse des Zellulosemantels mässig dicht. Kalkkörper treten in ziemlich dichter, mehrfacher Lage unmittelbar unter der aus Blasenzellen zusammengesetzten Rindenschicht auf, während sie in der Rindenschicht fehlen. Nur im Bereich der Personen treten sie an die Oberfläche der Kolonie heran. Gegen das Innere der Kolonie werden sie spärlich. Die Kalkkörper sind morgensternförmig, selbst die kleinsten in den thorakalen Seitenorganen gefundenen von etwa 5 μ Dicke zeigten schon eine gefelderte, unebene Oberfläche. Die Stacheln, etwa 8 bis 16 im Umkreis des optischen Äquatorialquerschnittes, sind verhältnismässig breit und kurz (Spitzenwinkel fast 60^{0}), aber scharfspitzig. Die Kalkkörper werden im allgemeinen bis etwa 40 μ dick. Ganz vereinzelt trifft man auf hypertrophe Kalkkörper, die eine Dicke von 50 μ erreichen mögen. Besondere Ansammlungen kleinster und kleiner Kalkkörper finden sich in den thorakalen Seitenorganen sowie, gleichsam rauchwolkenartig herausgequollen, unmittelbar ausserhalb dieser Organe. Schliesslich finden sich im Zellulosemantel noch sehr grosse, unregelmässig sternförmige rhizopodenartige Pigmentzellen auf der Grenze zwischen Rindenschicht und Innenschichten, die ihre pseudopodienartigen Ausläufer in der engen Zwischenmasse zwischen den Blasenzellen weit in die Rindenschicht hineinsenden. Diese Pigmentzellen enthalten feinkörniges bis staubartiges schwarzes Pigment. Ihre Zusammengruppierung verursacht die oben erwähnten schwarzen Sprenkel.

Kloakensystem: Die Kloakenöffnungen führen in breite Kloakenhöhlen, die sich nach unten in ein gemeinsames Kloakalsystem fortsetzen. In den bandförmigen Teilen der Kolonie beschränkt sich dieses Kloakalsystem auf einen mehr oder weniger breiten Achsenkanal, der wohl kleine Ausbuchtungen, aber keine Verzweigungen bildet. In den mehr krustenförmigen breiteren Teilen der Kolonie, die ich nicht daraufhin untersuchte, mag das Kloakalsystem etwas komplizierter sein.

Die Personen haften sehr fest am Zellulosemantel und waren in keinem Falle unverletzt oder nur wenig verletzt herauszulösen. Sie sind verhältnismässig gross, im ausgewachsenen Zustande schätzungsweise etwa $1{,}_2$ mm lang; doch kam diese Länge infolge von Verzerrung bei der Einschmiegung in den verfügbaren Raum nicht zur klaren Anschauung.

Der Thorax war so stark verschrumpft, dass seine normale Gestalt nicht festzustellen war.

Branchialsipho am breit abgerundeten Vorderende des Thorax gelegen, lang, schlank, drehrund, ohne deutliche Lappenbildung am äuseren Ende, mit mässig kräftiger Ringmuskulatur.

Atrialsipho ziemlich weit hinten an der Rückenseite gelegen, etwas schief kegelförmig, nach abwärts geneigt und mit dem schlanken, ganzrandigen distalen Ende unmittelbar in eine Kloakalhöhle oder in den axialen Kloakalkanal, wenn nicht in kurze, dem zentralen Kloakalsystem zuführende Kanäle oder Ausbuchtungen einmündend, mit mässig starker Ringmuskulatur. Häufig ragt das äusserste distale Ende des Atrialsiphos papillenartig in den Kloakalraum vor.

Zurückzieher am Ende des Thorax anscheinend ganz fehlend; wenigstens konnte ein solches Organ nicht nachgewiesen werden. (Ich kann das Fehlen eines Zurückziehers nicht mit voller Sicherheit behaupten).

Thorakale Seitenorgane etwas näher dem Endostyl als der dorsalen Medianlinie in oder nahe der Mitte der Thoraxlänge gelegen, ganz innerlich. Es sind sehr kurze und sehr breite Säcke, die in ganzer Breite eng an die Innenseite der Leibeswand angeschmiegt sind, nur sehr wenig weit in die Peribranchialräume hineinragen und durch eine ziemlich kleine Öffnung nach aussen münden.

Taille eng, mässig lang.

Abdomen eng gestielt und breit beutelförmig. Es gehen schlanke, an den blinden Enden derbere und birnförmig angeschwollene, im übrigen zartwandige Doppelröhren bildende Gefässanhänge vom Abdomen ab. Diese Gefässanhänge sind zum Teil sehr lang und zeigen Verästelungen.

Branchialtentakel zu zwei verschiedenen Grössen abwechselnd in zwei konzentrischen Ringen gelegen, im ganzen etwa 18.

Kiemensack mit 4 Kiemenspalten-Zonen. Etwa 7 bis 9 Kiemenspalten in einer Halbzone.

Darm eine einfache, etwas klaffende Schleife bildend. Magen äusserlich und innerlich glattwandig, dick oval bis gerundet kastenförmig, fast kugelig. Mitteldarm vom Magen und vom Enddarm scharf abgesetzt, durch scharfe Einschnürung in einen birnförmigen Nachmagen und einen dick spindelförmigen Drüsendarm geteilt. Enddarm weit.

Geschlechtsapparat: Personen protogyn? In den Personen nur männliche Geschlechtsorgane aufgefunden. Hode aus 5, 6 oder 7 birnförmigen Hodenblasen gebildet, die locker rosettenförmig von der Leibeswand nach innen ragen, mit ihren breiten Polen an die Darmschleife stossend, während ihre nach aussen gerichteten Spitzpole sich über dem Mittelpunkt der Rosette zur Bildung des Samenleiters vereinen. Der Samenleiter beschreibt 7 bis 8 lockere, die Spitzpole der Hodenblasen umkreisende Spiralwindungen bevor er nach vorn geht. Er zeigt keine besondere Erweiterung, die als Samenmagazin angesprochen werden könnte. Einzelne geschwänzte Larven in den basalen Teilen des Zellulosemantels.

Erörterung: *L. sparsus* unterscheidet sich von allen näher verwandten Formen durch das Auftreten der grossen sternförmigen Pigmentzellen in der Rindenschicht des Zellulosemantels. Im übrigen verweise ich auf die Erörterungen unter der vorhergehenden, zu der gleichen Artgruppe gehörenden Form, *L. diemenensis*.

Gen. Trididemnum D. V.

Die Gattung *Trididemnum* steht zweifellos der Gattung *Leptoclinides* sehr nahe. Ich halte es nicht für ganz ausgeschlossen, dass beide Gattungen später verschmolzen werden müssen.

Trididemnum cerebriforme Hartmr.

1913, *Trididemnum cerebriforme* Hartmeyer, Tunic., in: L. Schultze, Zool. anthrop. Forschungsr. Südafrika, p. 139, Taf. VII Fig. 1, Taf. VIII Fig. 4, 5.

1919, *Trididemnum cerebriforme*, Michaelsen, Z. Kenntn. Didemnid., p. 37, Textf. 2.

Fundangabe: Stewart-Insel, Halfmoon Bay, 5—7 Fd.; 19. Nov. 1914.

Weitere Verbreitung: Kapland (Hartmeyer 1913).

Bemerkung: Die vorliegende Kolonie entspricht nicht nur in der Organisation der Personen und des Zellulosemantels im wesentlichen dem von mir nachuntersuchten Originalstück, sondern zeigt auch in der eigentümlichen Gestaltung der Kolonie-Oberfläche die gleiche Bildung, wenn auch die oberflächlichen Wülste im ganzen schmäler sind als bei dem Original.

Eine geringfügige Abweichung vom Original, wenigstens von dem von mir untersuchten Bruchstück, liegt vielleicht in der grösseren Dicke der aus Blasenzellen gebildeten Rindenschicht, die bei jenem Originalstück nur eine etwa 3fache Lage von Blasenzellen aufwies, während sie bei dem neuen Stück stellenweise eine 10- bis 12-fache Lage von Blasenzellen zeigt. An anderen Stellen ist die Rindenschicht auch bei diesem Stück viel dünner.

Gen. Didemnum Sav.

Didemnum psammatodes (Sluit.) var. *maculatum* (Nott).

1892, *Leptoclinum maculatum* Nott, Comp. Ascid. N. Shore Reef, p. 316. Taf. XXVII.

1898, *Leptoclinum ianthimum* Sluiter, Tunic. Süd-Afrika, p. 38, Taf. II Fig. 5, Taf. V Fig. 11—13.

1919, *Didemnum psammatodes* var. *ianthinum*, Michaelsen, Z. Kenntn. Didemnid., p. 13.

1920, *Didemnum psammatodes* var. *ianthinum*, Michaelsen, Krikobr. Ascid. westl. Ind. Oz.: Didemnid., p. 29.

Fundangabe: Neuseeland, Nord-Insel, Bay of Islands, 2 Fd.; 1. Jan. 1915.

Weiteres Vorkommen im Gebiet: Neuseeland, Nord-Insel, North Shore bei Auckland (Nott 1892).

Weitere Verbreitung: Moçambique (Sluiter 1898, Michaelsen 1920).

Bemerkung: Ich glaube Nott's *Leptoclinum maculatum* mit Sicherheit der *Didemnum psammatodes*-Gruppe zuordnen zu dürfen, und zwar der früher als var. *ianthinum* (Sluit.) bezeichneten Form. Wenngleich *L. maculatum* der älteste Name für eine Form des variablen *Didemnum psammatodes* ist, so behalte ich aus praktischen Rücksichten doch diesen gebräuchlicheren jüngeren Namen für die Art bei und beschränke mich darauf, die betreffende Varietät durch den älteren Namen zu bezeichnen.

Var. *intermedium* Mich.

1920, *Didemnum psammatodes* var. *intermedium* Michaelsen, Krikobr. Ascid. westl. Ind. Oz.: Didemnid., p. 23.

Fundangabe: Neuseeland, Süd-Insel, Lyttleton; (Lendenfeld s., Mus. Berlin).

Weitere Verbreitung: Sansibar (Michaelsen 1920).

Bemerkung: Das vorliegende Objekt, das ich dieser Form glaube zuordnen zu müssen, zeigt einen Hypurgon-Zustand in mässig weit vorgeschrittenem Stadium.

Didemnum studeri Hartmr. f. *typica*.

1879, *Synoicum* sp., Studer, Fauna Kerguelensland, p. 130.

1900, *Leptoclinum asperum*, Sluiter (non Gottschaldt), (part.: spec. Maunganui), Tunic. Stillen Oc., p. 19.

1907, *Leptoclinum tenue*, part., Michaelsen, Tunic., in: Erg. Hamburg. Magalh. Sammelr., p. 39.

1909, *Didemnum gottschaldti* Hartmeyer (part.), Tunic., in: Bronn, Kl. Ordn. Tier-R., p. 1449.

1911, *Didemnum studeri* Hartmeyer, Ascid. Deutsch. Südpolar-Exp., p. 538.

1919, *Didemnum studeri typicum*, Michaelsen, Kenntn. Didemnid., p. 23.

Fundangaben: Auckland-Inseln, Masked Island, Carnley Harbour, an der Küste, an Ascidien (*Corella eumyota* Sluit.) und an einer Patelliden-Schale; 30. Nov. 1914. Port Ross, ca. 10 Fd., an Florideen; 25. Nov. 1914. Stewart-Insel, Halfmoon Bay, 5—7 Fd., an dünblättrigen Algen; 19. Nov. 1914.

Weiteres Vorkommen im Gebiet: Chatham-Inseln (Sluiter 1900).

Weitere Verbreitung: Kerguelen (Studer, 1879); Magalhaensisches Gebiet (Michaelsen 1919).

Bemerkungen: Bei einigen Kolonien von den Auckland-Inseln (nicht bei allen) sind die Stacheln der Kalkkörper deutlich vorspringend, plump, gerundet. Die thorakalen Seitenorgane sind verhältnismässig gross, und besonders gross auch die Kalkkörper-Klumpen, die aus diesen Organen hervorgegangen sind, aber nur noch locker an diesen, ihren Matrizien, haften.

Die zur Beobachtung gelangten Hoden — die meisten Personen waren noch unreif — erwiesen sich ausnahmslos als zweiteilig.

Zu dieser Art gehört auch ein Teil des von Sluiter (l. c. 1900, p. 19) als *Leptoclinum asperum* Gottsch. bestimmten Materials der Ausbeute Schauinsland's, nämlich die Kolonie von Maunganui (Chatham-Inseln), die ich durch freundliche Vermittlung Hartmeyer's nachuntersuchen konnte.

Dieses Stück von Maunganui stimmt selbst in den ganz geringfügigen aus Gottschaldt's Beschreibung ersichtlichen Merkmalen nicht mit dem Original überein. Dieses *Didemnum* von Maunganui hat zahlreiche Blasenzellen im Zellulosemantel, und die Stacheln der Kalkkörper sind nicht spitzig, sondern sehr flach gewölbt, kaum hervortretend, sodass die Kalkkörper fast glatt kugelig erscheinen. Die Richtigkeit der Bestimmung der anderen Kolonie von Pitt-Island (Chatham-Inseln) ist kaum wahrscheinlicher, denn es ist geradezu unmöglich, nach der ungenügenden Beschreibung die Gottschaldt'sche Art wiederzuerkennen.

Var. *africanum* (Mich.).

1909, *Leptoclinum tenue* (part.), Michaelsen, Tunic., in Erg. Hamburg. Magalh. Sammelr., p. 39.

1914, *Leptoclinides africanus typica* (part.), Michaelsen, Diagn. westafr. Ascid., p. 78.

1915, *Leptoclinides africanus* f. *typica*, Michaelsen, Tunic., in Meeresf. Westafrikas, p. 488, Taf. XIX Fig. 56—68.

1919, *Didemnum studeri* var. *africanum*, Michaelsen, Z. Kenntn. Didemnid., p. 29.

Fundangabe: Stewart-Insel, Port Pegasus, 25 Fd.; 20. Nov. 1914.

Weitere Verbreitung: Magalhaens-Strasse (Michaelsen 1909); Westafrika, Angola (Michaelsen 1914).

Didemnum paradoxum (Nott)

1892, *Polysyncraton paradoxum* u. *P. fuscum* Nott, Comp. Ascid. N. Shore Reef, p. 318, Taf. XXVIII, p. 321, Taf. XXIX.

1920, *Polysyncraton paradoxum* var. *maheina* Michaelsen, Krikobr. Ascid. westl. Ind. Oz.; Didemnid., p. 12.

Vorkommen im Gebiet: Neuseeland, Nord-Insel, North Shore bei Auckland (Nott 1892).

Weitere Verbreitung: Seychellen (Michaelsen 1920).

Didemnum chondrilla n. sp.

Fundangaben: Neuseeland, Nord-Insel, 2 Seeml. O. von North Cape, 55 Fd., harter Boden; 2. Jan. 1915. — Little Barrier Island, 30 Fd., Schalen-Boden; 29. Dez. 1914. — Colville Channel, 35 Fd., Sandgrund; 21. Dez. 1914. — Stewart-Insel, Paterson Inlet, 5—15 Fd., weicher Boden; 17. Nov. 1914. — Stewart-Insel, 18 Fd.; Suter (Mus. Berlin).

Erörterung: Diese neue neuseeländische Art, die nach der Gestaltung des männlichen Geschlechtsapparates der früheren Gattung *Polysyncraton* zugeordnet werden müsste, steht dem *Didemnum sycon* Mich.[1]) vom westlichen Indischen Ozean offenbar so nahe, dass sie nicht durch Gattungsgrenzen von ihr getrennt werden darf. Da *D. sycon* eine einfache, aus einer einzigen Hodenblase bestehende

[1]) W. Michaelsen, 1919, Z. Kenntn. d. Didemn., p. 5. — 1920, Krikobranche Ascid. westl. Indisch. Oz.: Didemnid., p. 44, Taf. I Fig. 1—3.

Hode aufweist, also der Gattung *Didemnum* im alten Sinne angehört, so ergibt sich, dass die Zerklüftung der Hode in mehrere Hodenblasen nicht als Grund für eine Gattungssonderung angesehen werden kann, dass also die Gattung *Polysyncraton* nicht aufrecht zu erhalten ist, sondern unter Erweiterung der Diagnose mit der älteren Gattung *Didemnum* verschmolzen werden muss. Diese Anschauung wird gestützt auch durch die Erkenntnis, dass innerhalb

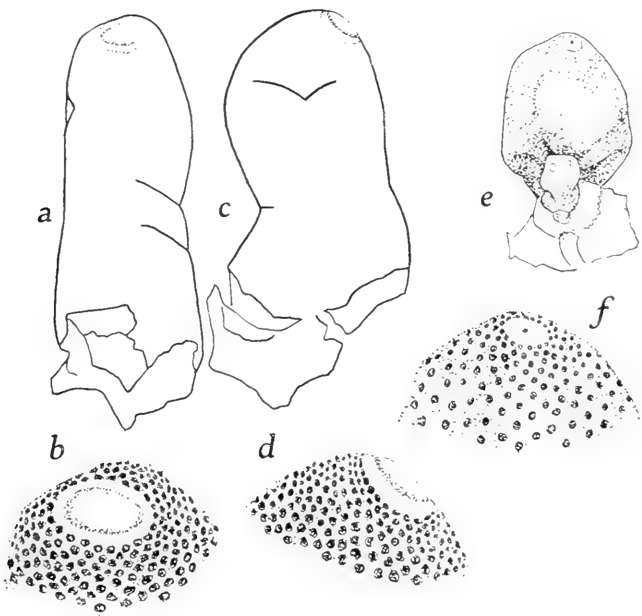

Fig. 14. *Didemnum chondrilla* n. sp., *a*, *c* und *e* = ganze Kolonien, mehr oder weniger skizzenhaft, $\times 1^1/_2$; *b*, *d* und *f* = die apikalen Pole derselben mit der Kloakenöffnung, $\times 3$.

einer und derselben Art eine einfache Hode oder eine aus 2 oder 3 Hodenblasen bestehende Hode auftritt, wie Van Name[1]) es bei seinem *Leptoclinum speciosum* Herdm. var. *bermudense*, und wie ich selbst (l. c. 1919, p. 33) bei *Didemnum studeri* Hartmr. *typicum* fand.

Vielleicht steht auch *Didemnum lambitum* (Sluit.) von den Chatham-Inseln (siehe unten!) der neuen Art nahe. Sluiter erwähnt zwar nichts von dem Vorkommen einer einzigen grossen

[1]) W. G. Van Name, 1920, Ascid. Bermuda Isl., p. 364.

Kloakenöffnung an der Kuppe der Kormidien, wie sie für *D. sycon* und *D. chondrilla* charakteristisch ist, doch mag eine dem entsprechende Bildung bei dem Sluiter'schen Material undeutlich gewesen und übersehen worden sein.

Ich füge in die folgende Beschreibung des *D. chondrilla* Angaben über Abweichungen von *D. sycon* und *D. lambitum* ein.

Beschreibung. Kolonie (Fig. 14) meist aus einem einzigen Kormidium bestehend, selten zwei Kormidien (Fig. 14*e*) aus gemeinsamer Basis entspringend. Kormidium fast kugelig oder mehr länglich, oval, gerundet kegelförmig oder länglich stempelförmig, manchmal seitlich etwas abgeplattet, aber nicht so dünn, dass es als zungenförmig bezeichnet werden könnte. Kolonien mit der Basis in ganzer Breite an Schneckenschalen-Bruchstücken oder ähnlichen Hartkörpern angewachsen. Anwachsstelle quer abgestutzt und am Rand etwas erweitert, mit mehr oder weniger deutlichem Anwachssaum. Die Gestalt ist bei meinem recht zahlreichen Material stets einfach, oberflächlich wohl manchmal etwas uneben, aber nie wirklich höckerig wie das mir vorliegende Originalstück von *D. lambitum* und das von Sluiter abgebildete Original dieser Art.

Grössenverhältnisse: Grösste Kolonie (von Little Barrier Island) 60 mm lang, 45 mm breit und dick.

Konsistenz der Kolonien sehr verschieden, weichlich fleischig, fast gallertig, (wenn auch mit ziemlich zäher Oberhaut), bis fest und hart-elastisch etwa wie härtlicher Kautschuk. Die Verschiedenheit der Konsistenz beruht wohl zum Teil auf verschieden guter Konservierung, zum Teil jedoch auch auf verschieden reicher Ausstattung mit Kalkkörpern.

Färbung der Kolonie im allgemeinen ziemlich hell, farblos grau, fast undurchsichtig, bis ziemlich dunkel braunrot, durchscheinend. Viele Kolonien zeigen eine helle, rötliche Schieferfarbe. Diese allgemeine Färbung geht manchmal in ein kreidiges Weiss über. Der rötliche Farbenton vieler Kolonien rührt nicht von typischen Pigmentzellen in den Oberflächenschichten her, wie bei *D. sycon*, sondern von einer homogenen Färbung des Zellulosemantels. Einen bedeutsamen Einfluss auf die Färbung hat die verschiedene Ausstattung mit heller färbenden Kalkkörpern. Die unregelmässig in die Aussenschicht eingebetteten Personen erscheinen als hellere, undurchsichtige Pünktchen.

Oberfläche der Kolonie glatt, wenn auch nicht ganz eben, höchstens zart und seicht gewellt, ohne kalkkörperhaltige Papillen, wie sie für *D. sycon* charakteristisch sind.

Branchialöffnungen unregelmässig über die Kolonie-Oberfläche zerstreut, etwa $^1/_2$ mm oder etwas weniger von einander entfernt, ziemlich unscheinbare weisse oder weissliche Pünktchen bezw. Löcher im Mittelpunkt von schwach ausgeprägten, manchmal kaum erkennbaren kreisförmigen Höfen. Eine Sechsstrahligkeit der Branchialöffnungen war in keinem Falle erkennbar.

Kloakenöffnungen (Fig. 14*b*, *d* u. *f*): Jede Kolonie trägt meist an dem mehr oder weniger deutlich als Kuppe ausgeprägten Apikal-Ende eine einzige grosse Kloakenöffnung, wie bei *D. sycon*. Selten finden sich Kolonien, die seitlich eine zweite Kloakenöffnung oder deren zwei aufweisen. Die Kloakenöffnungen sind nicht ganz gleich gestaltet. In mehr oder weniger geschlossenem Zustande (Fig. 14*f*) stellten sie sich als grübchenförmige Einsenkungen oder als kleine rundliche Löcher dar, manchmal von einem kreidigen Hof umgeben. In gedehntem Zustande (Fig. 14*b* u. *d*) erscheinen sie als rundes Loch mit etwas aufragendem Rande oder als etwas unregelmässig umrandete, bis etwa 5 mm weite Löcher in der Oberhaut, durch die der massige Achsenteil der Kolonie sichtbar wird. Bei meinem Material hat sich meist die Aussenhaut an der Kuppe der Kolonie mit dem Randsaum der Kloakenöffnung unter Kollabierung des darunter liegenden Kloakenraumes so dicht an den fleischigen Achsenteil der Kolonie angelegt, dass die Kloakenöffnung durch den Achsenteil ventilartig geschlossen scheint (manchmal quillt der Achsenteil sogar ein wenig aus der Kloakenöffnung heraus). Bei oberflächlicher Betrachtung kann eine solche Kloakenöffnung leicht den Eindruck einer Zufallsbildung machen, einer Verletzung der Kolonie, bei der ein Stück der zäheren Oberhaut vom fleischigen Kern der Kolonie abgerissen sei.

Innerer Bau der Kolonie ähnlich wie bei *D. sycon*, jedoch wenigstens nicht immer so gleichmässig ausgebildet. Wie bei *D. sycon*, so führt auch bei *D. chondrilla* die Kloakenöffnung an der Kuppe der Kolonie in einen unter den oberflächlichen Schichten gelegenen Kloakalraum ein. Bei einer näher untersuchten Kolonie von North Cape erstreckt sich dieser Kloakalraum in der Schicht der Personen und in der Schicht unterhalb der Personen wie bei

D. sycon ziemlich weit gegen die Basis der Kolonie hin, einen personenlosen fleischigen Achsenkörper von den oberflächlichen personenhaltigen Schichten sondernd; jedoch ist bei *D. chondrilla* die Scheidung eines äusseren Kloakalsystems im Bereich der Personen und eines inneren Kloakal-Untergrundsystems durch eine Horizontallamelle wenigstens nicht deutlich ausgeprägt. Allerdings glaubte ich an einer Stelle der leider schlecht erhaltenen Kolonie von North Cape auch eine solche Horizontallamelle zu erkennen. Im anderen Äusserstfalle scheint das Kloakalsystem auf einen ziemlich kleinen Kloakalraum beschränkt zu sein. Zweifellos setzt sich dieser Kloakalraum an den Seitenteilen der Kolonie in enge Kloakalkanäle fort; doch konnte ich diese nicht immer sicher nachweisen. Ich vermute, dass die Ausbildung des Kloakalsystems wie die anderer Verhältnisse (Kalkkörper, Knospung, Geschlechtsbildung) bei der Aufeinanderfolge verschiedener Personen-Generationen verschiedene Entwicklungs- und Rückbildungsstadien durchmacht. Ein derartiges Stadium eigentümlicher Art zeigte eine Kolonie von Colville Channel. Bei dieser fanden sich nur ganz vereinzelt ausgewachsene Thoraces, dagegen vielfach wohl ausgebildete Abdomina mit ganz kleinen, offenbar unausgewachsenen Thoraces oder Thorakalknospen, die noch nicht an die Kolonieoberfläche herangewachsen waren, und deren Körperöffnungen noch geschlossen schienen. Zweifellos waren in dieser Kolonie die Thoraces einer älteren Generation bis auf einzelne länger ausdauernde zurückgebildet, während die Thoraces der jüngeren Generation noch in der Entwicklung begriffen waren. Zahlreiche Kotballen, eingebettet in den inneren Teilen des Zellulosemantels, deuten auf die Tätigkeit der älteren Generation hin. In dieser Kolonie, deren Kuppenteil allerdings abgeschnitten war, konnte ich keine Spur eines Kloakalsystems auffinden. Alle Kloakalräume schienen mit den Thoraces der Personen älterer Generation zurückgebildet zu sein. Mutmasslich würde sich mit der endgültigen Lagerung der Thoraces jüngerer Generation und mit der Ausbildung ihrer Atrialöffnungen ein neues Kloakalsystem gebildet haben.

Zellulosemantel weich fleischig bis knorpelig wie härtlicher Kautschuk. Blasenzellen fehlen; auch Pigmentzellen sind nicht deutlich erkannt worden, jedenfalls nicht in solch charakteristischer Weise ausgebildet wie bei *D. sycon*. Spindel- und Sternchenzellen dagegen überall sehr zahlreich. Kalkkörper morgensternförmig, verhältnismässig klein, vereinzelt bis 28 μ dick, meist aber viel kleiner bis winzig, und zwar winzig nicht nur die noch in den thorakalen Seitenorganen befindlichen, sondern auch die im Zellulosemantel weit zerstreuten. Die Stacheln sind meist fein und zart, ihre Zahlen verhältnismässig gross, etwa 10 oder mehr am Rande des Profilumrisses vorragend. Bei einzelnen verhältnismässig sehr grossen Kalkkörpern, bei denen die Stacheln zugleich auch relativ grösser sind, ist ihre Zahl etwas geringer, etwa 8 am Rande des Profilumrisses. Bei *D. sycon* sind die Kalkkörper im allgemeinen noch kleiner, bei *D. lambiton* im allgemeinen etwas grösser. Bemerkenswert ist eine grosse Verschiedenheit in der Zahl und Verteilung der Kalkkörper bei *D. chondrilla.* Besonders auffallend ist in dieser Hinsicht die oben erwähnte Kolonie ohne Kloakalsystem (von Colville Channel), insofern ihr auch jegliche Kalkkörper fehlen. Es scheint, als ob auch die Dauer der Kalkkörper eine beschränkte sei, und dass sich diese Elemente, wenigstens bei dieser Art, mit jeder Thorax-Generation neu bildeten. Da die jungen Thoraces, an denen thorakale Seitenorgane noch fehlen, noch nicht imstande sind neue Kalkkörper zu liefern, so erklärt sich dieser kalkkörperlose Zwischenzustand ungezwungen als eine gewisse Lebensstufe der Kolonie. Diese Auffassung entspricht auch den sonstigen Befunden über das verschiedene Verhalten der Kalkkörper. Jene kalkkörperlose Kolonie stellt den unteren Äusserstfall in einer stufenweisen Anreicherung mit Kalkkörpern dar. Die nächst höhere Stufe zeigt eine Kolonie von dem gleichen Fundort, bei der sich eine sehr dünne Schicht locker verteilter Kalkkörper dicht unter der Oberhaut hinzieht, die Oberhaut selbst noch fast ganz freilassend und so gewissermassen ein subcutanes Skelett bildend. Stellenweise weist diese Schicht noch breite Lücken auf, die ganz frei von Kalkkörpern sind oder im Bereich einzelner Personen leichte Wölkchen von Kalkkörpern zeigen, den ersten Beginn einer Schichtbildung. Eine bedeutende Vermehrung erfuhren die Kalkkörper bei einer näher untersuchten Kolonie von der Stewart-Insel. Hier bildeten die Kalkkörper eine dichte, dicke Schicht in den oberflächlichen Teilen einschliesslich der Oberhaut und nach innen im allgemeinen bis an die Horizontalschicht der Personentaillen, stellenweise aber noch weiter nach innen, bis in die Schicht der Abdomina oder gar eine kleine Strecke in den Achsenkörper der Kolonie hinein. Die Höchstausbildung zeigt eine Kolonie von North Cape, bei der die Kalkkörper in zerstreuter Anordnung bis ins Innerste des Achsenkörpers eingedrungen sind. Übrigens können die Kolonien in verschiedenen Regionen eine verschiedene Ausstattung mit Kalkkörpern zeigen. Zumal die Basalteile sind in der Regel reichlicher mit Kalkkörpern versehen, und hier dringen sie auch weiter in dem Achsenkörper hinein, wenn sie in den apikalen Teilen der Kolonie noch auf die oberflächlichen Schichten beschränkt sind. Das Maximum der Kalkkörper-Ansammlung bei *D. chondrilla* gleicht ungefähr dem, was ich bei *D. sycon* und bei dem Original von *D. lambitum* fand. Es finden sich bei allen näher untersuchten Kolonien zerstreut oder locker haufenweise ellipsoidische Kotballen in den Zellulosemantel eingebettet, und zwar sowohl in den äusseren Schichten wie im Innersten des Achsenkörpers. Es erscheint mir fraglich, ob es sich hierbei um einen echten Hypurgon-Zustand handelt, nämlich um eine Einlagerung von Kotballen, die von lebenden Personen ausgestossen wurden. Vielleicht sind diese ziemlich spärlichen Kotballen im Zellulosemantel von *D. chondrilla* nur die zum Teil verlagerten Überreste abgestorbener und zerfallener Personen einer älteren Generation. Schliesslich finden sich im Zellulosemantel noch mehr oder weniger scharf begrenzte, wolkenförmige dichte Gruppen von gelblich grauen, rundlichen, bis 12 μ dicken Nierensekret-Körnern.

Personen im ausgewachsenen Zustand bis 1,2 mm lang, mehr oder weniger genau senkrecht gegen die Kolonieoberfläche gestellt.

Thorax eiförmig, etwas länger als dick.

Branchialsipho lang cylindrisch mit erweiterter Basis, ungefähr doppelt so lang wie in der Mitte dick, nicht sehr scharf vom Thorax abgesetzt, apikal nicht deutlich gelappt, dickwandig, aber nur mit schwacher Längs- und Ringmuskulatur versehen.

Atrialsipho nicht deutlich ausgebildet. Atrialöffnung anscheinend ein einfaches, jedenfalls nicht grosses Loch an der Rückenseite.

Thorakale Seitenorgane äusserlich, seitlich etwas hinter der Mitte des Thorax, dem Endostyl etwas näher als der dorsalen Medianlinie, von der Gestalt kleiner, schief zugeschnittener, breitrandiger Kummen. In einer Kolonie von der Stewart-Insel lag vielfach in diesen Kummen, etwas aus ihnen hervorragend, je ein ovales Körperchen, das besonders in der Rindenpartie durch Pikrokarmin stark gefärbt war, während sein Inneres von winzigen Kalkkörpern eingenommen wurde. Manchmal lag ein solches ovales Körperchen ausserhalb des dann leeren Seitenorganes. Offenbar werden bei dieser Art die Kalkkörper klumpenweise aus dem thorakalen Seitenorgan ausgestossen, um sich erst später frei zu machen und zu zerstreuen.

Zurückzieher am Hinterende des Thorax in ganzer Länge der Taille mit dieser verwachsen, ungemein lang, bis in das Innerste des Achsenkörpers hineinragend, wie bei *D. sycon*.

Taille eng und schlank, viel länger als dick, beidenendes ziemlich scharf abgesetzt; bei *D. lambitum* ebenso.

Abdomen ungefähr ebenso gross wie der Thorax, unregelmässig beutelförmig. Nicht nur die Geschlechtsorgane, sondern auch abgebogene Teile des Darmes verursachen unregelmässige Vorwölbungen am Abdomen.

Branchialtentakel schlank fingerförmig, etwa 20 oder mehr an Zahl, nach dem Schema 1, 3, 2, 3, 1 sehr verschieden gross, doch anscheinend die winzigen der 3. Ordnung nur in kurzen Strecken ausgebildet, sodass jenes Schema streckenweise in das Schema 1, 2, 1, 2, 1 übergeht.

Kiemensack mit 4 Kiemenspaltenzonen. In jeder Halbzone 6, wenn nicht 7 oder 8, lang gestreckte Kiemenspalten.

Darm eine in der Wendepolgegend etwas klaffende, sonst eng geschlossene, etwas oder stark verbogene Schleife bildend. Ösophagus lang und schlank. Magen gerundet kastenförmig bis dick olivenförmig, glattwandig. Mitteldarm kurz und meist eng. Eine Sonderung in Nachmagen und Drüsendarm konnte ich nicht deutlich erkennen. Enddarm mässig dick.

Geschlechtsorgane: Nicht nur die Personen, sondern anscheinend die ganzen Kolonien eingeschlechtlich, gerade so, wie ich es bei *D. sycon* fand. Bei je einer *D. chondrilla*-Kolonie von North Cape und von der Stewart-Insel mit normal ausgewachsenen Personen und spärlicher Knospung waren anscheinend überhaupt keine Geschlechtsorgane ausgebildet, während 3 näher untersuchte Kolonien von Colville Channel mit nur vereinzelten normal ausgewachsenen Personen und üppiger Personensprossung (Thoraces überwiegend sehr klein und unausgewachsen, noch nicht an die Kolonie-Oberfläche heranreichend) Geschlechtsorgane aufwiesen. An einer dieser Kolonien fanden sich nur männliche, an den beiden anderen nur weibliche Personen bezw. in den Zellulosemantel eingebettete Eier oder Embryonen. Die Hode ist der Darmschleife, und zwar mehr dem rücklaufenden als dem hinlaufenden Schleifen-Ast, eng angelagert, mit ihrer nach aussen gerichteten Seite eine Vorwölbung des Abdomens verursachend. Sie besteht aus einigen wenigen (4 einmal sicher nachgewiesen, vielleicht manchmal nur 3 oder 2?) unregelmässig birnförmigen Hodenblasen, deren nach aussen divergierende Spitzpole sich im Zentrum der Rosette zur Bildung des Samenleiters vereinen. Der Samenleiter beschreibt einige eng aneinander gelegte Spiralwindungen, die die Hodenblasen-Rosette eng umkreisen. An einem Sagitalschnitt durch die Hode konnte ich sicher nur 4 Spiralwindungen des Samenleiters nachweisen; doch mögen tatsächlich einige mehr vorhanden sein. Da die benachbarten Windungen meist eng aneinander gepresst waren, so liess sich bei dem ungünstigen Erhaltungszustand des Materials ihre Zahl nicht ganz sicher ausmachen. Durch die Mehrzahl der Hodenblasen in einer Hode unterscheidet sich *D. chondrilla* bedeutsam von *D. sycon* und auch von *D. lambitum*, an dessen Originalstück ich eine einfache, dick linsenförmige Hode nachweisen konnte. Ovarium an den Personen weiblicher Kolonien an gleicher Stelle wie die Hode bei männlichen Kolonien. Es findet sich an jedem zur Beobachtung gelangten Ovarium eine hervorragend grosse, an den Personen einer Kolonie aber verschieden grosse Eizelle, die nach aussen in den Zellulosemantel hineingewachsen erscheint. Viele losgelöste Eizellen oder junge Embryonen fanden sich bei den beiden weiblichen Kolonien eingebettet in den tieferen Schichten des Zellulosemantels.

Didemnum lambitum (Sluit.).

1900, *Didemnoides lambitum* Sluiter, Tunic. Stillen Oc., p. 18, Taf. IV Fig. 1.

1909, *Didemnum lambitum, Leptoclinum lambitum*,[1]) Hartmeyer, Tunic.; in: Bronn, Kl. Ordn. Tier.-R., p. 1450, 1454.

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[1]) Mir ist die Literaturstelle, auf die sich die Synonymie-Angabe *Leptoclinum l.* bezieht, nicht bekannt.

Vorkommen im Gebiet: Chatham-Inseln, Waitangi (Sluiter 1900).

Ich konnte den Basalteil einer Originalkolonie, den Hartmeyer mir freundlichst anvertraute, untersuchen. Ich mutmasse, dass *D. lambitum* dem *D. chondrilla* Mich. von Neuseeland sowie dem *D. sycon* Mich. vom westlichen Indischen Ozean (siehe oben unter *D. chondrilla*) nahe steht, wenngleich Sluiter nichts von einer einzigen grossen Kloakenöffnung an der Kuppe der Kormidien erwähnt, sondern ausdrücklich angiebt, dass gemeinschaftliche Kloakenöffnungen zu fehlen scheinen. Die für *D. sycon* und *D. chondrilla* charakteristische grosse Kloakenöffnung ist im geschlossenen Zustande manchmal wenig deutlich, während sie im geöffneten Zustande leicht für eine zufällige Verletzung der Oberhaut der Kolonie gehalten werden mag, für ein Loch, entstanden durch Abreissen eines Fetzens der zähen Haut der Kolonie. Leider ist bei meinem Untersuchungsobjekt die Kuppe des Kormidiums abgerissen. Im Folgenden einige ergänzende Angaben über diese Art nach Untersuchung an jenem basalen Teilstücke einer Kolonie.

Über das Kloakalsystem kann ich nach Untersuchung lediglich eines Basalstückes der Kolonie nur unvollständige Angaben machen. Das einzige, was ich an Kloakalräumen in diesem Basalstück erkennen konnte, waren einzelne, meist kollabierte Kanäle, die von den Atrialöffnungen einzelner Personen ausgingen.

Kalkkörper des Zellulosemantels klein, bis 36 μ dick, also im allgemeinen etwas grösser als die von *D. chondrilla*, aber der Gestalt nach diesen anscheinend ganz gleich, mit etwa 8—10 Stacheln im Profilumriss. Nach Sluiter sind die grösseren Kalkkörper "mit nur wenigen Strahlen, die an der Basis dick und dornförmig sind mit zapfenförmiger Spitze. Die kleinen haben viel mehr Strahlen, welche mehr dreieckig und spitz sind." Ich habe derartige grössere wenigstrahlige Kalkkörper in meinem Originalstück nicht finden können. Die Verteilung der Kalkkörper in der Kolonie gleicht ungefähr der, wie wir sie in höchster Anreicherung bei *D. chondrilla* finden. Die Kalkkörper bilden eine dichte Ansammlung in den Aussenschichten bis weit ins Innere hinein. Gegen das Innerste der Kolonie wird die Verteilung der Kalkkörper eine sehr unregelmässige — "haufenweise vereinigt" nennt Sluiter es —; sie bilden hier lang gestreckte milchstrassenähnliche Wolken, die sich gabeln und anastomosieren und somit ein inneres Gerüst, eine Art Innenskelett, darstellen. Kotballen und Nierensekretkörner wurden nicht im Zellulosemantel gefunden.

Branchialsipho lang, annähernd cylindrisch, dickwandig, aber mit nur schwacher Muskulatur versehen, apikal deutlich 6-zähnig.

Thorakale Seitenorgane äusserlich, seitlich etwas hinter der Mitte des Thorax gelegen, dem Endostyl etwas genähert, länglich tütenförmig, in ganzer Länge dem Thorax angelegt, offen und schief zugeschnitten. Die Kalkkörper gehen anscheinend in freier Strömung (nicht zu Ballen vereint, wie bei *D. chondrilla*) aus den thorakalen Seitenorganen hervor.

Zurückzieher am Hinterende des Thorax wie bei *D. chondrilla* ungemein lang, bis in das Innerste der Kolonie reichend.

Taille scharf ausgeprägt, aber anscheinend nicht so lang wie bei *D. chondrilla*.

Kiemensack nach Sluiter mit nur 5 kleinen, fast runden Kiemenspalten in einer Reihe. Ich konnte wenigstens an einem Kiemensack des Originals 6 Kiemenspalten in einer Halbzone sicher nachweisen, vielleicht mögen aber auch 7 in dieser Halbzone vorhanden gewesen sein. Die Kiemenspalten waren auch bei anscheinend ausgewachsenen Personen verhältnismässig kurz, kaum 3 mal so lang wie breit, wenn auch nicht fast kreisförmig ("fast rund" nach Sluiter).

Geschlechtsorgane: Personen wenigstens teilweise zwittrig. Hode von einer einfachen, dick linsenförmigen Hodenblase gebildet. Samenleiter nach Sluiter 7, nach meinem Befund auch 8, wenn nicht 9 Windungen beschreibend. Ovarien in der Regel mit einer überwiegend grossen Eizelle, die als Vorwölbung in den Zellulosemantel hineinragt, um sich später ganz loszulösen und dann frei im Zellulosemantel dicht unterhalb der Personenschicht zu liegen.

Didemnum albidum (Verr.).

1851, *Didemnum roseum* + *Leptoclinum gelatinosum* Sars, Ber. Reise Lofoten Finm., p. 153, 154.

1871, *Leptoclinum albidum* (part.) + *L. luteolum* (part.) Verrill, Descr. Ascid. N. England, p. 446.

1892, *Leptoclinum densum* Nott, Comp. Ascid. N. Shore Reef, p. 311, Taf. XXII.

1909, *Didemnum densum*, Hartmeyer, Tunic., in: Bronn, Kl. Ordn. Tier-R., p. 1449.
1910, *Tetradidemnum albidum*, Van Name, Comp. Ascid. N. England, p. 878 (hier ausführl. Liter. über die nördliche Form).
1921, *Didemnum albidum*, Hartmeyer, Stud. Westgrönl. Ascid., p. 81.
1923, *Didemnum albidum*, Hartmeyer, Ascid. I, in: Dan. Ingolf-Exp. Taf. I Fig. 21—23.

Fundangaben: Neuseeland, Nord-Insel, vor New Plymouth, 8 Fd.; 12. Jan. 1915. — Hauraki-Golf, North Channel bei Kawai-Insel, 10 Fd.; 29. Dec. 1914. — Slipper Island, Küste; 20. Dec. 1914. — 10 Ml. NW. von Cape Maria v. Diemen, 50 Fd.; 5. Jan. 1915.

Weiteres Vorkommen im Gebiet: Neuseeland, Nord-Insel, North Shore bei Auckland (Nott 1892).

Weitere Verbreitung: Nördlicher Atlantischer Ozean und Nördliches Eismeer, von Neu-England und Nord-Norwegen bis Grönland, Spitzbergen und ins Weisse Meer (Van Name 1910 u. a.).

Erörterung: Die Zugehörigkeit des vorliegenden Materials sowie des *D. densum* Nott zu dem nordatlantisch-arktischen *D. albidum* (Verr.) kann als sicher angenommen werden. Schon die gute Schilderung Nott's von seiner Form liess kaum noch einen Zweifel zu. Nott hatte die wesentlichsten Charaktere der Art (Fehlen von Blasenzellen im Zellulosemantel, gerundete Gestalt der Kalkkörper-Stacheln, Zusammensetzung der Hode aus 2 Hodenblasen u. a.) schon erkannt, lange bevor sie in ihrer Gesamtheit für die nordatlantisch-arktische Form festgestellt wurden.

In der Gestaltung der Kalkkörper zeigt mein neuseeländisches Material nicht die Einförmigkeit wie anscheinend das Nott'sche Material, sondern die gleiche Variabilität, wie sie Hartmeyer an seinen westgrönländischen Kolonien fand (l. c. 1921, p. 83). In manchen Kolonien sind die Stacheln der Kalkkörper kuppelförmig, in anderen mehr kegelförmig. Eine in ersterer Richtung besonders weit gehende Ausbildung zeigte die Kolonie von New Plymouth. Bei dieser treten die Stacheln, zumal an einigen hypertrophen, bis 90 μ dicken Kalkkörpern, noch weiter als halbkugelförmig aus der Oberfläche der Zentralmasse des Kalkkörpers hervor, sodass ihre Basis etwas verengt erscheint. Diese Kalkkörper machen den Eindruck, als seien einige mässig grosse Kugeln in mehr oder weniger regelmässiger Anordnung an eine grössere Zentralkugel angewachsen. Manchmal ordnen sich hierbei die Stacheln in einer Äquatoriallinie an, meist allerdings mit Anfügung noch je eines Polstachels, sodass Steuerrad- und Kreisel-Formen entstehen. (Fig. 15). Ähnliche Kalkkörper-Gebilde mit etwas abgeschnürten Kugelstacheln finde ich von Hartmeyer für ein arktisches *D. albidum* angegeben (l. c. 1923, Taf. I Fig. 21). Übrigens kommt eine solche Sonderform der Kalkkörper auch noch bei einer anderen arktischen Didemnide vor, nämlich bei *Lissoclinum wandeli* Hartmr. (l. c. 1923, Taf. I Fig. 26). Leider ist ausser der Abbildung der Kalkkörper bisher nichts über diese Art, bis jetzt ein nomen nudum, bekannt geworden, sodass wir uns über ihr Verhältnis zu *Didemnum albidum* kein Urteil bilden können.

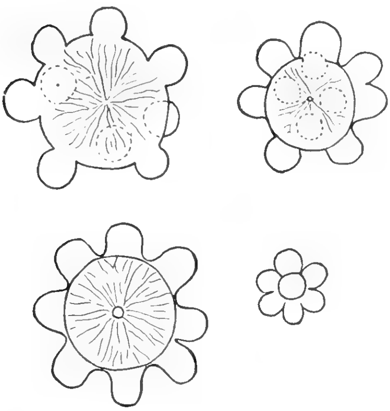

Fig. 15. *Didemnum albidum* Verr. von New Plymouth. Kalkkörper extremer Form, zum Teil mitten durch geschnitten, × 335.

Als Ergänzung will ich noch anführen, dass ich auch bei meinem neuseeländischen Material die thorakalen Seitenorgane als äusserlich und ziemlich umfangreich erkannte.

Auffallend, jedoch nicht einzig in ihrer Art, erscheint die geographische Verbreitung des *D. albidum*, die kaum anders, denn als „bipolar" bezeichnet werden kann. Sie erinnert an die Verbreitung gewisser Botrylliden und der Ascidien-Gruppe *Ascidia lagena* Mich.—*longisiphonica* Kiär[1]).

Didemnum tuberatum (Nott).

1892, *Leptoclinum tuberatum* Nott, Comp. Ascid. N. Shore Reef, p. 314, Taf. XXVI.

1900, *Leptoclinum scidula* Sluiter, Tunic. Stillen Ocean, p. 19.

1909, *Didemnum scidula* + *D. tuberatum*, Hartmeyer, Tunic.; in: Bronn, Kl. Ordn. Tier-R., p. 1451, 1551.

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1) Vergleiche W. Michaelsen, Ascid. Ptychobr. Diktyobr. Neuseeland. Chatham-Ins., p. 364.

1920, *Trididemnum tuberatum*, Michaelsen, Krikobr. Ascid. westl. Ind. Oz.: Didemnid., p. 6.

Fundangaben: Neuseeland, Nord-Insel, Little Barrier Island, 30 Fd.; 29. Dez. 1914. — Hauraki-Golf, Kawai, North Channel, 10 Fd.; 29. Dez. 1914. — Vor Stewart-Insel, ca. 35 Fd.; 20. Nov. 1914. — Stewart-Insel, 20 Fd.; 16. Nov. 1914. — Halfmoon Bay, 5—7 Fd.; 19. Nov. 1914. — Auckland-Inseln, Figure 8 Island, Carnley Harbour, Küste, an Ascidien (*Corella eumyota*); 8. Dez. 1914.

Weiteres Vorkommen im Gebiet: Neuseeland, Nord-Insel, North Shore und Rangitoto bei Auckland (Nott 1892). — Süd-Insel, French Passage und d'Urville-Insel (Sluiter 1900).

Erörterung: Ich habe der für ihre Zeit vorzüglichen Beschreibung Nott's nicht viel hinzuzufügen.

Die „pharyngeal tubercles" des Neuseeländer Autoren, nach der Zeichnung (l. c. 1892, Taf. XXVI Fig. 1, p. 1) mit Kalkkörpern gefüllte, geschlossene ovale Säcke jederseits am Thorax, in die Kloakalräume hineinragend, im Text (l. c. 1892, p. 314) ganz richtig als "projection of the testmatrix containing enormous quantities of small spicules" bezeichnet, sind nach meiner Nomenklatur als 2 thorakale Seitenorgane zu bezeichnen, und ihre Ausbildung ist für diese Art sehr charakteristisch. Es sind verhältnismässig sehr umfangreiche, auf schmaler, derbwandiger Basis sitzende, ballonförmig aufgeblähte, dünnwandige Säcke, die weit in die den Thorax dorsal und seitlich umfassenden Kloakalräume hineinragen. Sie sind gegen diese Kloakenräume natürlich geschlossen, öffnen sich jedoch nach unten in die Zellulosemantelmasse.

Die Kalkkörper sind im allgemeinen bis etwa 25 oder 30 μ dick, vereinzelte hypertrophe, nur in wenigen Kolonien beobachtet, erreichen eine Spannweite von 60 μ. Die Stacheln der Kalkkörper sind stets, wie es auch der Abbildung Nott's entspricht, kegelförmig und ziemlich spitz. Ich fand bei dieser Neuseeländer Art in keinem Falle Kalkkörper mit walzenförmigen Stacheln, wie sie für *D. biglans* (Sluit.)[1]) bezw. *D. gaussi* Mich.[2]) charakteristisch

[1]) C. Ph. Sluiter, 1906, Tunic.; in: Exp. antarct. franç. (1903—1905) p. 29, *(Leptoclinum b.)*.

[2]) R. Hartmeyer, 1911, Ascid. Deutsch. Südpolar-Exp., p. 499 *(Didemnum b.)*. — W. Michaelsen, 1919, Kenntn. Didemnid., p. 30 *(Didemnum gaussi)*.

sein sollen, Formen, die ebenfalls solch grosse, ballonförmig aufgeblähte Seitenorgane besitzen.

Zwei (oder drei) kurze, birnförmige Gefässanhänge entspringen mit gemeinsamer Basis seitlich am Abdomen. Die von Nott irrtümlicherweiser "Vascular appendages" bezeichneten als von der Taille ausgehenden Organe dieser Art (l. c. 1892, p. 315, Taf. XXVI Fig. 2 v, ap) sind tatsächlich Zurückzieher (Retraktoren) von sehr charakteristischer Gestaltung. Sie entspringen am Hinterende des Thorax, sind aber mit der Taille fast in deren ganzer Länge verwachsen, ungefähr so lang wie der Thorax, am blinden Ende schwach oder etwas stärker angeschwollen, oberflächlich infolge des Abragens der Muskel-Enden gleichsam zerfasert, kurz-zottig.

Ich habe früher (l. c. 1920, p. 6) diese Art irrtümlicherweise zu *Trididemnum* gestellt, verleitet durch Nott's Angabe, dass er bei reifen Personen nur drei Kiemenspalten-Zonen gefunden habe (stets 4 bei jungen). Tatsächlich hat *Didemnum tuberatum* (ohne röhrenförmigen Atrialsipho) nichts mit der Gattung *Trididemnum* zu tun. Ich meinerseits glaube auch bei ausgewachsenen Personen 4 Kiemenspalten-Zonen erkannt zu haben, wenngleich infolge der starken Schrumpfung des Materials in keinem Falle ganz sicher. Sollten in der Tat manchmal nur 3 bei reifen Personen erhalten geblieben sein, so wäre das wohl nur als vielleicht abnorme Umbildung, nicht als etwas Ursprüngliches, anzusehen.

Sluiter's *Leptoclinum scidula* ist mit dieser Art identisch, wie ich nach Untersuchung eines mir von Hartmeyer freundlichst überlassenen Originalstückes feststellen kann.

Didemnum tuberatum scheint dem *D. candidum* Sav. (siehe unten!) nahe zu stehen, unterscheidet sich aber durch die so grossen thorakalen Seitenorgane von dieser Art.

Didemnum candidum Sav.

1810? *Didemnum candidum* (nom. nud.), Savigny, Tabl. syst. Ascid., p. 6.

1816, *Didemnum candidum* Savigny, Mém. anim s. vertèbr., p. 14, 194, Taf. IV Fig. 3, Taf. XX Fig. 1.

1886, *Leptoclinum speciosum* + *L. s. asperum* + *L. tenue* (part. ?) + ? *L. annectens*, Herdman, Rep. Tunic. Challenger II, p. 281, Taf. XXXIX Fig. 8—11; ? Taf. XL Fig. 3—5; p. 274, Taf. XXXIV Fig. 8—13; p. 277, Taf. XXXVI Fig. 1—9; p. 281, Taf. XXXIX Fig.

8—11; ? Taf. XL Fig. 3—5; p. 280, Taf. XXXIV Fig. 14 Taf. XXXVIII Fig. 5—9.

1892, *Leptoclinum niveum* Nott, Comp. Ascid N. Shore Reef, p. 308, Taf. XXIV.

1897, *Leptoclinum cretaceum* Sluiter, Tunic. Süd-Afrika, p. 36, Taf. I Fig. 11, Taf. 5 Fig. 7—10

1907, *Leptoclinum tenue* (part), Michaelsen, Tunic.; in: Erg. Hamburg. Magalh. Sammelr., p. 39.

1909, *Didemnum novae-seelandiae* Hartmeyer, Tunic, in: Bronn, Kl. Ordn. Tier-R., p. 1450.

1910, *Didemnum lutarium* Van Name, Comp. Ascid. N. England a. neighb. brit. prov., p. 371, Taf. XXXVII Fig. 7, Textf. 8, 9.

1915, *Didemnum candidum*, Hartmeyer, Ascid. Suez, p. 419, Textf 13, 14.

1919, *Didemnum candidum* Michaelsen, Z. Kenntn. Didemnid., p. 18.

1920, *Didemnum candidum* Michaelsen, D. Krikobr. Ascid. westl. Indisch. Oz.: Didemnid., p. 19.

1921, *Didemnum candidum*, Van Name, Ascid. West Ind Reg. southeast. U. S., p. 323, Textf. 16—25.

Fundangaben: Neuseeland, Nord-Insel, Moko-Hinau-Insel im Hauraki Golf, 5 Fd.; 30. Dez. 1914. — Colville Channel, 35 Fd.; 21. Dez. 1914. — Neuseeland, Süd-Insel, Queen Charlotte-Sund, 3—10 Fd.; 19.—20. Jan. 1915. — Lyttleton (Lendenfeld s., Mus. Berlin). — Stewart-Insel, 20 Fd.; 16. Nov. 1914.

Weiteres Vorkommen im Gebiet: Neuseeland, Nord-Insel, North Shore und Rangitoto-Insel bei Auckland (Nott 1892).

Weitere Verbreitung: New Hampshire bis Bahia in Brasilien, einschliesslich der Bermuda-Inseln (Herdman 1886 und Van Name 1910 und 1921); Magalhaensisches Gebiet (Herdman 1886 und Michaelsen 1920); Moçambique (Sluiter 1897); Süd-Madagaskar und Mauritius (Michaelsen 1920).

Erörterung: Ich schliesse mich in der weiteren Fassung dieser, zumal in der Gestaltung der Kalkkörper sehr variablen Art an Van Name (l. c. 1921, p. 323) an. Von früher beschriebenen Neuseeländer Arten glaube ich *Leptoclinum niveum* Nott mit *Didemnum candidum* vereinen zu sollen.

Didemnum mortenseni n. sp.

Fundangabe: Stewart-Insel, Port Pegasus, an abgestorbener Austernschale, 25 Fd.; 20. Nov. 1914.

Beschreibung. Koloniegestalt und Bodenständigkeit: Die Kolonie ist eine ungefähr 1 bis $1^1/_2$ mm dicke härtliche Kruste, die, überall fest anliegend, eine von Bohrschwämmen zermürbte Austernschale und deren Aufwuchs überzieht, und zwar vom Rande her sowohl die Ober- wie die Unterseite.

Oberfläche der Kolonie, abgesehen von den durch den Untergrund verursachten Unebenheiten, ziemlich eben, im feineren rauh. Personen-Aussenflächen markiert durch ziemlich gleichmässig, aber ohne besondere Ordnung verteilte breit-ovale, dunkelgraue Feldchen von ca. $0{,}_{35}$ mm Breite und $0{,}_4$ mm Länge, die durch hellere, im allgemeinen schmälere Zwischenpartien voneinander getrennt sind, sodass die ganze Oberfläche der Kolonie wie ein grobes Sieb aussieht. Stellenweise gehen die Personen-Aussenflächen bis dicht an den hier und dann wulstig geformten Rand der Kolonie heran, stellenweise zieht sich die Randpartie dagegen in personenloser Strecke dünn aus.

Branchialöffnungen als winzige, helle sechsstrahlige Sternchen mit 3 grösseren und 3 kleineren Winkelläppchen excentrisch auf den Personen-Aussenflächen gelegen.

Kloakalöffnungen spärliche, ganz unregelmässig gestaltete Löcher mit dünnhäutigem Rande, ungefähr so gross wie die Personen-Aussenflächen bis etwa doppelt so gross.

Zellulosemantel durch mässig starke Einlagerung von Kalkkörpern etwas brüchig. Blasenzellen und Pigmentzellen fehlen. Spindel- und Sternchenzellen ungemein zart. Kalkkörper unregelmässig und locker durch alle Schichten des Zellulosemantels zerstreut, vielstrahlig-maulbeerförmig, mit mehr oder weniger flach kuppelförmigen, höchstens halbkugelig erhabenen, seltener gerundet stumpfkegelförmigen Stacheln (ähnlich den typischen Kalkkörpern von *D. albidum*), bis etwa 85 μ dick. Die kleinsten Kalkkörper in den thorakalen Seitenorganen bis etwa 10 μ Dicke sind noch glatt kugelig, aber schon solche von 16 μ Dicke zeigen deutliche Maulbeerform.

Bau der Kolonie. Die Kolonie wird gebildet von zwei weit getrennten Zellulosemantel-Platten, die am Rande in einander übergehen und ausserdem nur durch die von sehr dünner Zellulosemantel-Masse gestützten Personen zusammen gehalten werden. Die Oberflächen-Platte ist etwa 0,5 mm, die Grundplatte etwa 0,2 bis 0,3 mm, der je nach Kontraktion sehr verschieden weite Zwischenraum etwa 0,5 bis 0,75 mm dick. Die mehr oder weniger genau senkrecht oder schräge zur Oberfläche der Kolonie stehenden Personen sind mit dem oberen Teil des Thorax etwa bis zum ersten Quergefäss des Kiemensackes in die Oberflächen-Platte des Zellulosemantels eingebettet, während andererseits ihr eigentliches Abdomen in die Grundplatte des Zellulosemantels eingesenkt ist. Diese Einsenkung der Abdomina in die Grundplatte ist insofern noch unvollkommen, als sie meist noch mehr oder weniger starke Hervorragungen an der Oberfläche der Grundplatte verursachen. Die mittleren und unteren Partien des Thorax samt der mässig schlanken Taille durchspannen im allgemeinen frei den Zwischenraum zwischen den beiden Zellulosemantel-Platten, der als umfangreicher, durch die Kloakalöffnungen unmittelbar ausmündender Kloakalraum anzusprechen ist. Weitere, etwa in die dünne Grundplatte eindringende Kloakalräume bezw. -kanäle sind nicht vorhanden. Die den Kloakalraum durchziehenden Teile der Personen sind nur an der Ventralseite und mehr oder weniger weit lateral von einer sehr dünnen Zellulosemantel-Hülle bedeckt, dorsal und mehr oder weniger weit lateral ganz nackt, unmittelbar von der Flüssigkeit des Kloakalraums bespült. Eine etwas bessere Stütze besitzen einige randständige Personen, da sie mit ihrer ganzen Ventralseite fest in die hier unter Zusammenbiegung und Verschmelzung der beiden Platten gebildete Randmasse des Zellulosemantels eingebettet sind. (Diese besser gestützten randständigen Personen waren infolgedessen in ganzer Länge nur wenig kontrahiert und liessen die Organisation des Thorax deutlich erkennen, während die den Kloakenraum frei durch-

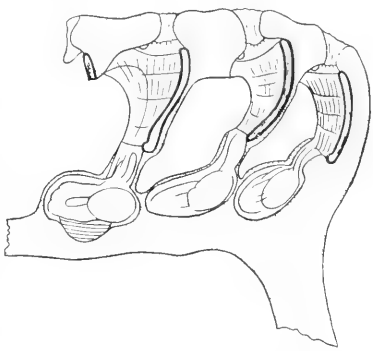

Fig. 16 *Didemnum mortenseni* n. sp. Vertikalschnitt durch die Randpartie einer Kolonie; × 25.

setzenden Personen in ihren Mittelteilen bis zur Unkenntlichkeit verschrumpft waren).

Personen bei mässig starker Schrumpfung etwa bis $1^{3}/_{4}$ mm lang, meist etwas kürzer.

Thorax etwa doppelt so lang wie in der Mitte breit, nach hinten verschmälert, ventral stark gewölbt.

Branchialsipho gerade am breiteren vorderen Pol des Thorax, mässig lang, etwas über der Basis verengt, nach aussen fast trichterförmig erweitert, mit nur mässig starker Ringmuskulatur, apikal in 6 Läppchen auslaufend.

Atrialsipho nicht ausgebildet. Atrialöffnung ein sehr grosses, ganzrandiges Loch, das den grösseren Teil der Dorsalseite des Thorax ungefähr von der Höhe des ersten Kiemensack-Quergefässes bis fast zum Hinterende des Thorax einnimmt. Eine Atrialzunge scheint nicht gebildet zu sein.

Thorakale Seitenorgane auch an entkalkten Präparaten sehr deutlich erkennbar, sehr gross, ganz innerlich. Es sind breite, annähernd kreisrunde Säcke, fast doppelt so breit wie lang, die ziemlich weit vorn am Thorax, ungefähr in der Höhe des ersten Kiemensack-Quergefässes, jederseits in die Peribranchialräume hineinhängen. Durch eine mässig weite Öffnung ergiessen sie ihren Inhalt in die dünne ventrallaterale Zellulosemantel-Hülle der Person, ungefähr dort, wo diese Hülle in die Oberflächen-Platte des Zellulosemantels übergeht, wenn nicht unmittelbar in diese Oberflächen-Platte. Manchmal, mutmasslich infolge gelegentlicher Auswärtsbiegung oder Verzerrung, sah es so aus, als ragten die thorakalen Seitenorgane in den Kloakalraum hinein.

Einen Zurückzieher am Hinterende des Thorax konnte ich nicht deutlich erkennen. Falls er vorhanden ist, kann er wohl nur sehr kurz sein.

Taille ziemlich eng und mässig lang, bei stark geschrumpftem Thorax kaum enger als das Hinterende des Thorax, vom eigentlichen Abdomen scharf abgesetzt.

Abdomen seitlich zusammengedrückt-beutelförmig, mehr oder weniger stark zur Seite abgebogen, sodass es horizontal in der Grundplatte zu liegen kommt, eine Breitseite nach unten gerichtet, eine nach oben, hier eine mehr oder weniger starke Vorwölbung der Grundplatte in den Kloakalraum hinein hervorrufend. Gefässanhänge am Abdomen im allgemeinen kurz und anscheinend spärlich, länger und zahlreicher nur in den personenlosen Zuwachs-Randpartien der Kolonie.

Branchialtentakel stummelförmig bis fadenförmig, nach dem Schema 1, 3, 2, 3, 1 oder (stellenweise?) 1, 2, 1, 2, 1 verschieden gross, etwa 16 (?) an Zahl.

Kiemensack mit 4 Kiemenspalten-Zonen, etwa 8 Kiemenspalten in einer der vorderen Halbzonen (in den hinteren weniger?).

Darm eine fast kreisrunde Schleife mit mässig weitem Lumen bildend. Ösophagus lang und eng. Magen gerundet kastenförmig, glattwandig, mit Cardiawulst, ohne Pyloruswulst. Mitteldarm (nicht ganz deutlich) in Nachmagen und Drüsendarm gesondert (?). Enddarm mässig weit.

Geschlechtsapparat: Nur männliche Geschlechtsorgane beobachtet, Kolonien anscheinend getrenntgeschlechtlich. Auch keine Embryonen und Larven im Zellulosemantel. Hode stets aus 3 grossen, plump und unregelmässig birnförmigen, ziemlich eng aneinander gepressten Hodenblasen bestehend, deren Innenfläche durch die Pressung zu einer stumpfwinkligen Innenkante umgeformt ist. Der bei praller Füllung ziemlich dicke Anfangsteil des Samenleiters windet sich in ungefähr 5, durch deutliche Zwischenräume von einander getrennten Spiralumläufen eng um die Hodenblasen-Rosette herum.

Erörterung: Diese neue Art ist besonders auffallend durch den Umfang, den der Kloakalraum bei ihr gewonnen hat. Sie bildet in dieser Hinsicht einen weiteren Schritt von dem Zustand kanalartiger Kloakalräume nach dem von *D. sycon* Mich. [1]) dargestellten Zustand, in dem der Kloakalraum ein breiter, tiefer Raum ist, der von den ganzen Personen frei durchspannt wird.

Besonders wesentliche Charaktere des *D. mortenseni* sehe ich auch in der Gestaltung der thorakalen Seitenorgane und der männlichen Geschlechtsorgane.

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1) W. Michaelsen, 1920, Krikobr. Ascid. westl. Ind. Oz.: Didemnid., p. 45 Taf. I Fig. 1, 3.

Fam. **Synoicidae.**

Gen. **Pseudodistoma,** nov. gen.

Diagnose: Atrialsipho 6-lappig, ohne Atrialzunge, gesondert an der Personen-Aussenfläche ausmündend.
Kiemensack mit wenigen (3) Kiemenspalten-Zonen.
Darm eine einfache höchstens im Taillenteil etwas gedrehte Schleife bildend; Magen mit (wenigen) Längswülsten.
Personen mit einem langen, schlanken Postabdomen in gerader Verlängerung des Abdomens. Herz und Gonaden im Postabdomen.
Hodenblasen zweizeilig ährenförmig am Samenleiter sitzend.

Typus: *Pseudodistoma cereum* n. sp.

Ich stelle diese neue Gattung für eine Art auf, die in mehreren Hinsichten typische Distomiden-Charaktere aufweist, aber doch zu den Synoiciden gestellt werden muss, weil sie ein richtiges, Herz und Gonaden enthaltendes Postabdomen aufweist.

Eine eingehendere Erörterung über diese Gattung knüpfe ich an die Erörterung des *P. cereum.*

Pseudodistoma cereum n. sp.

Fundangabe: Stewart-Insel, ca. 35 Fd., Sandgrund; 20. Nov. 1914.

Beschreibung: Kolonien länglich ballonförmig, apikal etwas verschmälert, gerundet, basal mehr oder weniger deutlich stielförmig verschmälert, im deutlichsten Falle auf etwa die halbe Maximaldicke in fast $^2/_5$ der ganzen Kolonie-Länge; im Mindestfalle nur ein kleiner, schiefer Fortsatz am kaum verschmälerten, abgerundeten Basal-Ende. Die Kolonien haben anscheinend mit dem schmalen Basal-Ende festgesessen und mögen "in situ" hoch aufgeragt haben.

Grössenverhältnisse der grössten, deutlich gestielten Kolonie: Länge 62 mm, wovon etwa 24 mm auf den Stiel entfallen, grösste Dicke 19 mm, Dicke des Stiels 8—10 mm.

Aussehen bräunlich gelbgrau, wachsartig durchscheinend mit undurchsichtigen, dunkelgrau und gelblich braunen, zum grossen Teil tief ins Innere zurückgezogenen Personen.

Konsistenz mässig fest knorpelig.

Oberfläche infolge von der Einsenkung der Personen-Aussenflächen uneben, auch im feineren nicht ganz glatt, sondern durch mikroskopisch kleine Unebenheiten von meist kegel- oder kuppelförmiger Gestalt etwas duff gemacht.

Personen nicht zu Personensystemen zusammengestellt. Gemeinsame Kloakenöffnungen sind nicht vorhanden. Die Personen stehen ziemlich weitläufig und ohne Regel zerstreut (bei dem vorliegenden Material zum grossen Teil tief ins Innere der Kolonie zurückgezogen), äusserlich durch breite, narbenartige Einsenkungen von ca. 1 mm oder etwas mehr Breite und mehr oder weniger scharf umrandeter ovaler Form angedeutet. Auf jeder dieser Personen-Einsenkungen findet sich eine Branchialöffnung und eine Atrialöffnung, die Branchialöffnung meist deutlich 6-strahlig auf mehr oder weniger deutlicher warzenförmiger Papille, die Atrialöffnung anscheinend weniger regelmässig gestaltet und auf nur undeutlicher, anscheinend kleinerer warzenförmiger Papille.

Zellulosemantel weich knorpelig, mit etwas zäherer Oberhaut, im allgemeinen durchscheinend, aber nicht wasserhell, da die verhältnismässig sehr dicht gestellten Spindel- und Sternchenzellen, sowie kleine grob granulierte Rundzellen eine Trübung verursachen. Blasenzellen fehlen. In der äussersten Schicht, wenn nicht dicht unter der Oberhaut, liegen ziemlich weitläufig zerstreut verhältnismässig sehr grosse, 75 bis 175 μ dicke, breit ovale bis kugelige Pigmentzellen, die schon bei Lupenvergrösserung als zerstreute warmbraune Pünktchen in die Augen fallen. Diese Pigmentzellen sind prall mit braunen und schwärzlichen Pigmentkörnern von 10 μ Dicke erfüllt.

Die Personen liegen mit ihrem thorakalen Ende mehr oder weniger genau senkrecht zur Oberfläche der Kolonie, während sich das postabdominale Ende in die Richtung der Kolonie-Achse hineinbiegt. Trotzdem sie sich im allgemeinen leicht vom Zellulosemantel loslösen, gelang es mir wegen ihrer Schlankheit und Zerbrechlichkeit nicht, auch nur eine einzige unzerstückt herauszupräparieren. Die Gestalt der Personen ist infolge verschiedener Zusammenziehung sehr verschieden; zumal das Postabdomen kann einmal verhältnismässig dick und entsprechend kurz, ein andermal ungemein dünn und lang sein. Einen recht guten Massstab für die Kontraktionsverhältnisse bietet der Verlauf des Samenleiters: Im schlanken, langgestreckten Postabdomen verläuft er geradlinig, im plumpen, zusammengezogenen Postabdomen bildet er sehr breite, enge Schlängelungen. Die Länge einer stark zusammengezogenen ausgewachsenen Person mag ungefähr 6 mm betragen, wovon etwa 1 mm auf den Thorax, $1^1/_2$ mm auf das Abdomen und $3^1/_2$ mm auf das Postabdomen entfallen. Andererseits erwies sich allein das Bruchstück eines sehr schlanken, nach Massgabe des Samenleiters vollständig ausgestreckten Postabdomens als 13 mm lang. Da aus dem Verlauf des Darmes und der Gestalt des Kiemensackes bei dem vorliegenden Material hervorgeht, dass auch Thorax und Abdomen in beträchtlichem Masse kontraktil sind, wenn auch wohl nicht ganz so stark wie das Postabdomen, so glaube ich die Äusserstmasse kaum zu erreichen, wenn ich annehme, dass die Länge einer normalen ausgewachsenen Person infolge verschiedener Kontraktion bezw. Streckung zwischen 5 und 20 mm schwanken kann. Dem entspricht auch ungefähr die grosse Strecke, die sich das Thorakalende gewisser Personen durch Kontraktion von der Oberfläche der Kolonie ins Innere zurückgezogen hat.

Thorax in stark kontrahiertem Zustand kurz und breit, im Profil annähernd quadratisch mit etwas vorspringenden Dorsalecken.

Branchialsipho in der Mitte der Vorderfläche des Thorax in meist ziemlich scharfem Absatz entspringend, kurz cylindrisch, weniger lang als breit, kronenförmig, apikal in 6 regelmässige, breit gerundete, annähernd halbkreisförmige Lappen ausgezogen. Ringmuskulatur des Branchialsiphos ziemlich kräftig, eine mehrfache Lage bildend.

Atrialsipho an der Dorsalkante der Vorderfläche des Thorax stehend, in gleicher Richtung wie der Branchialsipho gerade nach vorn ragend oder dorsalwärts abgebogen, fast cylindrisch oder quer, in der Profillinie zusammengedrückt, nicht ganz so lang wie breit, apikal in 6 umgekehrt herzförmige oder kurz-zungenförmige Lappen ausgezogen, die wenigstens annähernd gleich gross sind; jedenfalls ist keiner dieser Lappen überwiegend gross und als Atrialzunge anzusprechen. Die Ringmuskulatur des Atrialsiphos ist ziemlich kräftig, vielleicht nicht ganz so kräftig wie die des Branchialsiphos.

Abdomen mindestens durch eine scharfe, wenn auch feine Einschnürung, vielfach durch einen beträchtlichen Dickenunterschied vom Thorax abgesetzt, etwas länger als der Thorax, je nach der Kontraktion kaum dünner als der Thorax bis etwa $^1/_3$ so dick.

Postabdomen cylindrisch, in gerader Verlängerung des Thorax, stets länger als Thorax und Abdomen zusammen, bei starker Streckung ein vielfaches so lang, in ganzer Länge oder in einem mehr oder weniger grossen Vorderteil kaum dünner als das Abdomen und nicht scharf, sondern nur undeutlich durch geringe Dickenabnahme von demselben abgesetzt, manchmal in den mittleren und hinteren oder nur in den hinteren Teilen infolge starker Streckung allmählich oder ziemlich schnell stark verengt, hinten gerundet abstutzt und in einen ziemlich scharf abgesetzten, dünn-cylindrischen Gefässanhang mit anscheinend einfachem Lumen auslaufend. Bei den beiden Personen, deren Hinterende unverletzt zur Beobachtung gelangte, war der Gefässanhang $0{,}3$ bezw. $0{,}4$ mm lang bei einer Dicke von ungefähr $0{,}05$ mm.

Leibeswand ziemlich derb. Ringmuskulatur nur in den Siphonen, und zwar hier als ziemlich kräftige, breite Sphinkter entwickelt. Längsmuskulatur vom Vorderende des Thorax bis zum Hinterende des Postabdomens als zahlreiche ziemlich schmale, durch verschieden breite Zwischenräume von einander gesonderte Längsmuskelbündel gehend. Diese Längsmuskulatur zeigt vielfache Unregelmässigkeiten, insofern die Längsmuskelbündel sich häufig in zwei schmälere spalten oder einzelne Fasern zu einem benachbarten Bündel hinüber senden. Die Zahl der Längsmuskelbündel ist infolgedessen an verschiedenen Stellen verschieden. Ich zählte am Umfang eines Postabdomen-Vorderteiles etwa 30 Bündel, an einem Thorax ca. 40.

Branchialtentakel schlank, ihre Zahl anscheinend gering, (ca. 16?).

Flimmerorgan nicht klar erkannt.

Kiemensack mit 3 Kiemenspalten-Zonen, die vorn und hinten einen beträchtlich breiten Kiemensack-Rand frei lassen, sodass der Endostyl an beiden Enden die äussersten Kiemenspalten-Zonen überragt. Kiemenspalten sehr lang und schmal, parallelrandig, mehr als 20 in einer Halbzone. Parastigmatische Quergefässe fehlen. Dorsalfalten-Züngelchen gross, hakenförmig. Übrigens waren diese Verhältnisse infolge starker Schrumpfung des Thorax so schwer klar zu stellen, dass irgendwelcher Irrtum nicht ganz ausgeschlossen sein mag.

Darm eine einfache, nicht beträchtlich gedrehte, gerade nach hinten ragende, in ganzer Länge eng geschlossene Schleife bildend. Ösophagus gerade nach hinten gehend, ziemlich lang, sodass der Magen ziemlich weit hinten zu liegen kommt, dem Wendepol der Darmschleife etwas näher als dem Schlundeingang. Magen

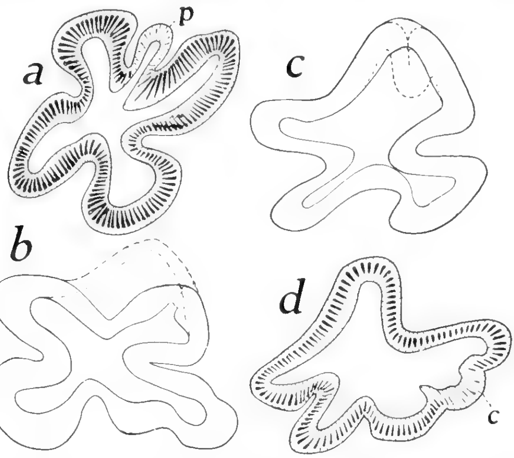

Fig. 17. *Pseudodistoma cereum* n. sp. 4 Querschnitte durch einen Magen, *a* in der Zone des Pylorus, *b* in der Mitte, *c* am Ende des vorderen Viertels, *d* in der Zone der Cardia; *p* = Pylorus, *c* = Cardia; bei *b* u. *c* der abweichende Umriss eines dicht davor liegenden Querschnittes punktiert eingezeichnet; $\times$ 68.

ungefähr so lang wie breit, mit 4 anscheinend ziemlich regelmässigen Längswülsten, die vorn und hinten schulterartig vorragen und breite, tiefe Einsenkungen bezw. Längsfurchen (innerlich Längsfalten) zwischen sich fassen. Im Querschnitt stellt der Magen, dessen Lumen durch diese Faltenbildung sehr verengt ist, im grösseren Teil seiner Länge ein ziemlich regelmässiges langarmiges Kreuz dar. Cardia und Pylorus liegen nicht sich gerade gegenüber an den Enden des Magens, sondern einander etwas genähert, der Pylorus zwischen zwei Längswülsten, die Cardia anscheinend an der Flanke eines Längswulstes, doch war das letztere nicht ganz sicher feststellbar, da der näher untersuchte Magen (Fig. 17) am Vorderende etwas unregelmässiger gestaltet erschien. Eine Längsfurche ging nicht ganz bis an das Vorderende, sondern wurde vorn durch eine kurze Spaltfurche in etwas weiter ventral liegender Linie ersetzt. Der Mitteldarm ist vom Magen scharf abgesetzt und zeigt bei den näher untersuchten Personen verschiedene Einschnürungen; doch erscheint es mir fraglich, ob diese Einschnürungen nur gelegentliche Kontraktionsverengungen darstellen, oder ob sie eine Sonderung des Mitteldarms in physiologisch verschiedene Teile anzeigen. Der Enddarm ist meist infolge Füllung mit nicht scharf geballten Fäcesmassen stark angeschwollen. After nicht klar erkannt.

Das Epicard zeigt im Postabdomen einen mässig starken, an verschiedenen Stellen verschieden starken Besatz von sehr kleinen Mesenchymzellen. Das Herz glaube ich im Hinterende des Postabdomens erkannt zu haben.

Geschlechtsorgane: Die Personen sind zwittrig. Die Gonaden liegen im Postabdomen und zwar verhältnismässig sehr weit hinten. Die Hode besteht aus zahlreichen, mehr als 30, etwas verschieden dicken (durchschnittlich etwa 110 μ), unregelmässig birnförmigen Hodenblasen, die ziemlich regelmässig zweizeilig durch zarte, ziemlich kurze Sonderausführgänge in den Samenleiter einmünden. Bei weit ausgestrecktem Postabdomen ist auch die Hode stark in die Länge gezogen und locker, sodass die Ährenform der Anordnung der Hodenblasen deutlich hervortritt. Bei zusammengezogenem, verkürztem Postabdomen ist auch die Hode zusammengezogen und verkürzt, sodass die Hodenblasen, gedrängt stehend, eine längliche Gruppe bilden, und die Ähren-Anordnung nicht erkennbar ist. Die Hoden erstrecken sich ungefähr von der Mitte des Postabdomens nach hinten bis ungefähr zum Beginn des hintersten Viertels, das von Gonaden frei bleibt. Unregelmässige Kontraktion bezw. Streckung des Postabdomens beeinflusst natürlich dies Lagenverhältnis. Der aus der Hode hervorgehende Samenleiter ist bei gestreckten Personen geradlinig, während er bei stark kontrahierten Personen zumal in der vorderen Hälfte des Abdomens eine dichte breite Schlängelung bildet. In der Mittelpartie der vorderen Hälfte des Postabdomens zeigt der hier prall mit Samenmassen gefüllte Samenleiter (in der Regel?) eine deutliche, bis 60 μ dicke Anschwellung, die als Samenmagazin angesprochen werden muss. Das Ovarium liegt mehr oder weniger dicht vor der Hode, bei kontrahierten Personen unmittelbar vor der Hode, bei gestreckten Personen durch eine beträchtliche Strecke von derselben getrennt, jedenfalls nahe der Mitte des Postabdomens. Besondere Bruträume scheinen nicht gebildet zu werden. Embryonen bezw. geschwänzte Larven fanden sich in der Regel einzählig in dem Ausführwege, bei zwei Personen im Abdomen dicht hinter der Region des Magens (einmal ein Embryo, einmal eine geschwänzte Larve), bei zweien neben dem Wendepol der Darmschleife, also teilweise im Abdomen, teilweise im Postabdomen (geschwänzte Larven), und schliesslich bei einer Person ganz im Postabdomen, und zwar diesmal anscheinend zu zweien, nämlich eine geschwänzte Larve im Anfangsteil des Postabdomens und ein Embryo weiter hinten, eine kurze Strecke vor dem Ovarium. Es erscheint mir allerdings nicht ganz sicher, ob dieser letztere Embryo der Person entstammt. Es finden sich nämlich bei manchen Personen offenbar parasitische Embryonen im Postabdomen [1]), so auch bei der in Rede stehenden Person im Bereich der Hode, also hinter dem Ovarium und demnach sicher nicht aus diesem hervorgegangen. So mag auch jener Embryo dicht vor dem Ovarium, wenn er auch ein ganz anderes Entwicklungsstadium darstellt, ein derartiger Fremdorganismus sein.

Erörterung. Diese Art, für die ich die neue Gattung *Pseudodistoma* aufstelle, zeigt bei typischer Synoiciden-Natur offenbare Hinneigung zu gewissen Arten, die zur Zeit einer ganz anderen Familie zugerechnet werden, nämlich den Polycitoriden. Wie ich an anderer Stelle [2]) darlegte und jetzt wieder zu zeigen habe (siehe die Erörterung unter *Amaroucium scabellum* und *A. circumvolutum*) ist die Abgrenzung der Fam. *Synoicidae* von der Fam. *Polycitoridae* durchaus nicht an allen Stellen klar ersichtlich (Beziehung des *Synoicum appendiculatum* Mich. zu der Gattung *Heterotrema*). Das entscheidende Merkmal, das Vorhandensein bezw. Fehlen eines Postabdomens, lässt uns vielfach im Stich. Morphologisch ist das Postabdomen ein Auswuchs des Abdomens, in den Herz und Gonaden hinein verlagert werden, und dessen Sonderung die verschieden-

[1]) Vergl. M. Caullery, 1908, Recherches sur les Synascidies du genre Colella et Considérations sur la Famille des Distomidae. In: Bull. Sci. France Belgique, XLII, p. 48.

[2]) W. Michaelsen, 1923, Neue u. altbek. Ascid. Reichsmus. Stockholm, p. 21.

sten Schärfegrade zeigt. Schon bei manchen zweifellos den Polycitoriden zuzuordnenden Formen verlängert sich das Abdomen über den Wendepol der Darmschleife hinaus nach hinten, und zugleich ragen auch die Gonaden über das Hinterende der Darmschleife hinaus in diese Verlängerung des Abdomens hinein. Diese Verlängerung könnte füglich als Postabdomen angesprochen werden, das sich noch nicht scharf vom Abdomen gesondert hat. Bei manchen Formen, so bei *Polycitor möbiusi* Hartmr.[1]) und *Sigillina australis* Sav.[2]), Caullery[3]), kommt es zur Bildung eines Fortsatzes am Abdomen, der im wesentlichen die Struktur eines Postabdomens aufweist, ohne jedoch die Gonaden in sich aufzunehmen. Schliesslich scheint bei *Synoicum appendiculatum* Mich. (l. c. 1923, p. 14), das normalerweise die Gonaden wie bei typischen Synoiciden in einem scharf ausgeprägten Postabdomen beherbergt, in gewissen, mit der Knospenabschnürung zusammenhängenden Zuständen eine teilweise Zurückverlagerung der Gonaden in das Abdomen vorzukommen. Wir sehen also an verschiedenen Stellen ein Hinüberwechseln systematischer Beziehungen und morphologischer Verhältnisse über die zur Zeit zwischen den Familien der Synoiciden und Polycitoriden gezogenen Grenzen. Für eine endgültige Festlegung dieser Grenzen und Gruppierung der Arten bezw. Diagnostizierung der Gattungen fehlt meines Erachtens zur Zeit noch die genügende Grundlage.

Einer der bedeutsamsten Punkte, in denen *Pseudodistoma cereum* von den typischen Synoiciden abweicht und sich den typischen Polycitoriden an die Seite stellt, ist das Fehlen jeglicher Kloakenbildung bezw. die unmittelbare Ausmündung der Atrialöffnung an der Oberfläche der Kolonie und die annähernd regelmässig 6-strahlig kronenförmige Gestalt des Atrialsiphos. [Andererseits zeigen unter den Polycitoriden die Gattungen *Sycozoa* und *Distaplia* die typische Synoicidenbildung der Kloakalräume und des bilateralen, nicht radiären, Baues des Atrialsiphos (Atrialzunge)]. Vom Synoicidentypus abweichend ist ferner die ungemein geringe Zahl, 3, der Kiemenspalten-Zonen.

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[1]) *Colella möbiusi* R. Hartmeyer, 1905, Ascid. Mauritius, p. 396. — *Polycitor möbiusi*, 1912, Ascid. Deutsch. Tiefsee-Exp., p. 305.

[2]) I.-C. Savigny, 1816, Mém. anim. s. vertèbr., p. 179.

[3]) M. Caullery, S. l'anat. position syst. *Sigillina*, p. 832. — 1908, l. c. p. 47.

Von Polycitoriden-Arten, die eine nähere Beziehung zu *Pseudodistoma cereum* zu haben scheinen, kommen nur solche in Betracht, die ebenfalls 3 Kiemenspalten-Zonen besitzen, die Arten der Gattung *Sigillina* und einige Arten der Gattung *Eudistoma*. Von diesen letzteren ähnelt ihm *Eu. möbiusi* Hartmr. (l. c.) nicht nur in der äusseren Tracht, in Form und Aussehen der Kolonie sowie in der Anordnung der Personen, sondern auch in gewissen Organisationsverhältnissen der Person. *Eu. möbiusi* besitzt nämlich hinten am Abdomen einen langen Fortsatz, der seiner Struktur nach ganz dem Postabdomen der Synoiciden, insbesondere des *Pseudodistoma cereum*, gleicht, jedoch keine Gonaden beherbergt.[1])

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[1]) Nach Untersuchung einer Kolonie von Sansibar kann ich feststellen, dass die Gonaden beider Geschlechter neben der Darmschleife im Abdomen liegen, dass die Personen von *Eu. möbiusi* zwittrig sind. Die Hode besteht aus ungefähr 18 unregelmässig birnförmigen, ca. $0{,}_{25}$ mm langen und $0{,}_{15}$ mm dicken Hodenblasen, deren sehr feine, verschieden lange Sonderausführgänge nach und nach, je zu 2 oder mehreren, teilweise dichotomisch und teilweise mehr doldenförmig, zu einem Samenleiter zusammenfliessen. Die Hodenblasen bilden zusammen eine längliche Rosette, aus deren Zentrum der Samenleiter hervorgeht. Der Samenleiter ist anfangs nur etwa $0{,}_{04}$ mm dick, schwillt aber allmählich an, manchmal bis zu einer Dicke von $0{,}_{23}$ mm (also fast so dick wie eine Hodenblase), manchmal weniger stark, um im distalen Teil wieder dünner zu werden. Dieser schlank spindelförmige Teil des Samenleiters ist prall mit Samenmassen gefüllt und mag als Samenmagazin angesprochen werden. Das kleine Ovarium sitzt neben der Hode, anscheinend dicht vor dem Zentrum der Hode (dem Beginn des Samenleiters), von einzelnen Hodenblasen nach vorn hin überragt und meist unter den Hodenblasen versteckt und infolgedessen leicht zu übersehen. Eine überwiegend grosse, mit grobkörnigen Dottermassen gefüllte und daher weniger Farbstoff annehmende Eizelle ist etwa $0{,}_{3}$ mm dick, daneben 1 oder 2 wenig kleinere, etwa $0{,}_{2}$ mm dicke stark färbbare, zart granulierte unausgewachsene. Den an der Dorsalseite des Thorax sitzenden kurz- und breit-sackförmigen Brutraum halte ich im Gegensatz zu Hartmeyer (l. c. 1912, p. 308) für eine echte Bruttasche, homolog den Bruttaschen von *Sycozoa* und *Distaplia*. Diese Tasche ist zwar bei *Eu. möbiusi* nicht gestielt wie bei jenen, aber doch scharf vom Thorax abgesetzt, bruchsackartig, und nur durch eine sehr schmale Öffnung mit dem Thorax in Verbindung gesetzt. Die Bildung eines vermittelnden Röhrenstiels, der auch bei den Arten jener Gattungen sehr verschieden lang ausgebildet, manchmal sehr kurz ist, kann ich nicht für so wesentlich ansehen. Ich fand die Bruttasche stets nur wenig grösser als den in

Einen ähnlichen, wenn auch etwas dünneren und schärfer abgesetzten, anscheinend gonadenlosen (wenigstens männliche Gonade im Abdomen gelegen) Postabdominalfortsatz besitzt *Sigillina australis* Sav. (Caullery) (l. c.). Diese Art stimmt mit *Pseudodistoma cereum* auch in der Gestaltung des Magens auffallend überein. Savigny spricht (l. c. 179) von einigen ins Innere vorspringenden Kanten ("arêtes saillantes"), denen die Nähte ("sutures") der äusseren Oberfläche entsprechen, und in den betreffenden Abbildungen (l. c. Taf. XIV Fig. 1, 3, 4 u. 7) sieht man am Magen 4 scharf ausgeprägte Längswülste, an jeder Seite einen mittleren, der beiderseits von einem die Profillinie bildenden Längswulst flankiert wird. Hartmeyer glaubt die Richtigkeit dieser Feststellung in Zweifel ziehen zu müssen[1]) weil Sluiter eine *Sigillina* mit glattwandigem Magen gefunden habe. Ich kann mich dieser Anschauung nicht anschliessen, denn Savigny ist ein durchaus zuverlässiger Beobachter, und seine Angaben und Abbildungen sind genau und scharf. Ich würde eher in Zweifel ziehen, ob die betreffende Sluiter'sche Art, *Sigillina caerulea*[2]), zu Recht in die Gattung *Sigillina* gestellt worden sei. Meines Erachtens schliesst sie sich vielmehr eng an *Eudistoma möbiusi* Hartmr. an. Übrigens sind die Geschlechtsverhältnisse jener malayischen Art, sowie auch die des Typus der Gattung *Sigillina*, noch näher festzustellen. Die weiblichen Organe sind bei beiden noch ganz unbekannt. Es ist also fraglich, ob die Personen zwittrig oder getrenntgeschlechtlich sind. Noch unsicherer erscheint mir die Gattungszugehörigkeit

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ihr enthaltenen Embryo bezw. die geschwänzte Larve, deren Rumpf eine Länge von $2^1/_3$ mm erreichen kann; manchmal war die Bruttasche, einen kleinen Embryo enthaltend, sehr klein. Bei mehreren Personen fand ich nicht nur einen einzigen Nachkömmling in der Bruttasche, wie es nach Hartmeyer für diese Art charakteristisch sein soll, sondern deren zwei, nämlich neben einer ausgewachsenen geschwänzten Larve einen sehr kleinen Embryo, nur wenig grösser als eine ausgewachsene Eizelle am Ovarium. Es ist einleuchtend, dass nach dem Ausschlüpfen der Larve der kleine Embryo die Bruttasche wenigstens anfangs bei weitem nicht ausfüllt; doch mutmasse ich, dass sich die Bruttasche durch Zusammenziehung bald der Grösse des zurückbleibenden Embryos anpasst.

[1]) R. Hartmeyer, 1909, Tunic. In: Bronn, Kl. Ordn. Tierr., p. 1441.

[2]) C. Ph. Sluiter, 1909, Tunic. Siboga-Exp. II, p. 31, Taf. II Fig. 12—16

von *Colella cyanea* Herdm. (l. c. 1899, p. 69, Taf. Pol. IV Fig. 1—6), die Hartmeyer (l. c. 1909, p. 1441) fraglicherweise zu *Sigillina* stellt. *C. cyanea* soll 5 oder 6 Kiemenspalten-Zonen und nach der Abbildung (l. c. Fig. 5) mindestens 3 Dorsalfaltenzüngelchen besitzen, fällt also in dieser Hinsicht ganz aus dem Rahmen der hier besprochenen Gruppe, deren Arten durchweg 3 Kiemenspalten-Zonen aufweisen, heraus.

Eine endgültige Beantwortung der Frage nach den Beziehungen zwischen den hier erörterten Arten ist meines Erachtens nur nach Klarstellung der Geschlechtsverhältnisse derselben zu geben. Zu beachten wäre hierbei vielleicht noch die Struktur des Zellulosemantels: Bei *Sigillina australis, S. caerulea* und *Colella cyanea* finden sich Blasenzellen im Zellulosemantel, während solche bei *Eudistoma möbiusi* und *Pseudodistoma cereum* fehlen.

Gen. **Amaroucium** Edw.

Was den Umfang und Inhalt der Gattung *Amaroucium* bezw. ihr Verhältnis zur Gattung *Synoicum* anbetrifft, so halte ich es jetzt für richtiger, ihr auch alle die Arten einzuverleiben, bei denen die Wülste des Magens eine deutliche Längsrichtung aufweisen, wenn sie auch mehr oder weniger durch Querfurchen zerschnitten sind, und in der Gattung *Synoicum* nur die Arten mit typisch maulbeerförmigem Magen zu belassen, eine Umordnung, die ich auch schon bei der Erörterung von *Synoicum* (besser *Amaroucium*) *steineni* Mich. in Vorschlag gebracht habe.[1])

Amaroucium scabellum n. sp.

Fundangaben: Neuseeland, Nord-Insel, Little Barrier Island, 30 Fd., Schillgrund; 29. Dez. 1914 (Typen). — Colville Channel, 35 Fd., Sandgrund; 21. Dez. 1914.

Vorliegend einige Kolonien bezw. Kormidien einer Art, die in vielen Hinsichten auffallend an *Synoicum appendiculatum* Mich.[2]) von den Azoren erinnert; wenngleich sie in der Gestaltung der

1) W. Michaelsen, 1920, Ascid. Krikobr. Roten Meeres: Clavelinid. Synoicid.

2) W. Michaelsen, 1923, Neue u. altbek. Ascid. Reichsmus. Stockholm p. 10, Textfig. 2—4.

Kolonie sehr charakteristische Besonderheiten aufweist. Ich habe jene Art von den Azoren der Gattung *Synoicum* zugeordnet, weil die Magenwülste manchmal durch Querkerben geteilt erscheinen und dann den Beginn einer Magengestaltung darstellen, die in ihrer höchsten Ausbildung als Maulbeerform bezeichnet für die Gattung *Synoicum* charakteristisch ist. Ich halte diese Zuordnung nicht mehr führ statthaft. Die Hinneigung zur Maulbeerform des Magens ist doch zu geringfügig, die für die Gattung *Amaroucium* charakteristische Längswulstung des Magens doch noch zu sehr ausgesprochen, bei vielen Personen ganz rein ausgeprägt. Ausserdem ist es doch noch fraglich, ob sich die Maulbeerform des Magens wirklich durch Querteilung von Längswülsten herausgebildet hat. Neuerdings will es mir fast scheinen, als hätten wir in der Maulbeerform eine von *Amaroucium*-Magenwülsten ganz unabhängige Bildung vor uns, hervorgegangen aus einer feinen Felderung, wie sie etwa der Magen von *Macroclinum stewartense* n. sp. (siehe unten!) aufweist, einer Felderung, die äusserlich gar nicht hervortritt und höchstens die Innenseite der Magenwand uneben erscheinen lässt. Wie die hier zu beschreibende Neuseeland-Art, so stelle ich jetzt auch jene Azoren-Art zur Gattung *Amaroucium*. Auch dieses Vorgehen bringt meiner Ansicht nach keine endgültige Lösung der Frage. Die Gattung *Amaroucium* bezw. die Gattungsgruppe *Amaroucium-Aplidium* ist sicherlich keine natürliche Gruppe; erscheint es mir doch fast, als bilde die hier zu erörternde Artgruppe (*A. scabellum* und Verwandte) eine Sondergruppe (Gattung?), die mit der Gattung *Heterotrema* zu verschmelzen sei, einer Gattung, deren Stellung noch ganz unsicher ist. und die man bis vor kurzem noch zur Fam. *Polycitoridae* rechnen musste (vergl. Michaelsen, l. c. 1923, p. 21). Eine eingehendere Besprechung dieser Verhältnisse schliesse ich in die Erörterung über *Amaroucium circumvolutum* (Sluit.) (siehe unten!) ein.

Beschreibung. Kolonien (Fig. 18) aus mehreren Kormidien bestehend. Kormidien schemelförmig, scharfkantig kreisrund oder oval, wenn nicht etwas unregelmässiger umrandet, mit konvexer Oberfläche und mehr oder weniger breiten, manchmal sehr schmalen, zurückweichenden Seitenflächen. Bei stärkerer Ausbildung der Seitenflächen hat das Kormidium die Gestalt eines an der breiten Oberseite gewölbten, an der schmäleren Unterseite abgestutzten

Kegels, bei schwacher Ausbildung der Seitenflächen nähert sich die Gestalt des Kormidiums derjenigen einer bikonvexen Linse. Während die meisten vorliegenden Kormidien vom Untergrunde losgerissen sind, stehen ihrer zwei mit der schmalen Grundfläche auf einer gemeinsamen dünnen, breiten Basalplatte, die ihrerseits auf einem flachen Kiesgrunde gelegen zu haben scheint. Ich vermute, dass auf dem Untergrunde bezw. auf der Basalplatte eine ziemlich feste Sand- oder Kiesschicht lag, in die die Kormidien bis zum scharfen Rande der Oberseite eingebettet waren.

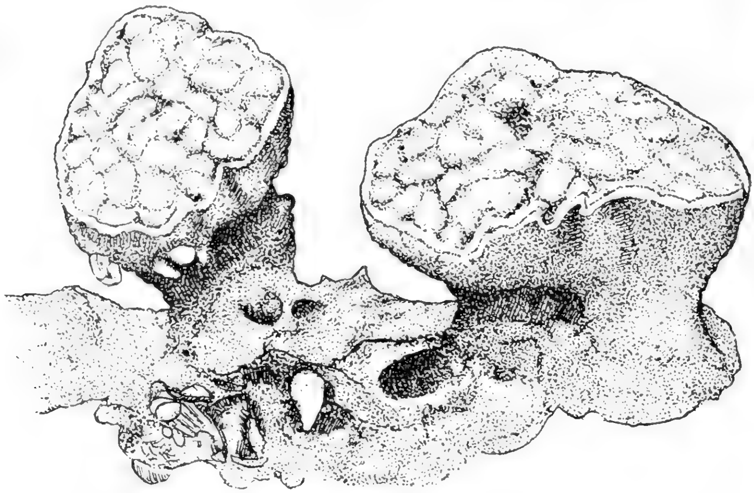

Fig. 18. *Amaroucium scabellum* n. sp. Kolonie mit 2 Kormidien; × 9/8.

Grössenverhältnisse der Kolonien: Grösster Durchmesser des grössten (abgerissenen) Kormidiums 70 mm; grösstes noch an der Basalplatte sitzendes Kormidium an der freien Oberfläche 40 bezw. 45 mm, an der Grundfläche ca. 30 mm im Durchmesser bei einer Höhe von ca. 25 mm messend; Basalplatte (2 Kormidien tragend) sehr verschieden dick, im Mindestmass etwa 3 mm, bei einer grössten Flächenerstreckung von ca. 100 mm.

Aussehen der Kolonie infolge von Inkrustierung dunkel sandgrau; ganz undurchsichtig.

Oberfläche der Kolonie im feineren infolge von Inkrustierung rauh, an der Basalplatte uneben, an den Seiten der Kormidien ziemlich eben, an der konvexen Oberseite der Kormidien uneben, mit einem ziemlich regelmässigen Netz tiefer Furchen oder Gräben, die durch eine dicht innerhalb des scharfen Randsaumes des Kormidiums vorlaufende Ringfurche zu einem geschlossenen System zusammengefasst werden. Die annähernd kreisförmigen, ovalen oder gerundet polygonalen, seltener länglichen Maschenräume des Furchennetzes sind polsterförmig erhaben. Die Breite der polsterförmigen Maschenräume beträgt durchschnittlich etwa 5 mm.

Branchialöffnungen unscheinbar, nicht erkannt, ebensowenig Kloakalöffnungen. Ich mutmasse, dass einige Kloakalöffnungen in der marginalen Ringfurche des Kormidiums liegen.

Innerer Bau des Kormidiums: Dicht unterhalb der oberflächlichen Furchen und Gräben verlaufen mehr oder weniger weite, zum teil ziemlich umfangreiche Kloakalkanäle, die zusammen mit einem marginalen Ringkanal ein dem äusseren Furchennetz entsprechenden Kanalnetz bilden. Die diese Kanäle von der Aussenwelt abschliessende Aussenwand, im Grunde der äusserlichen Furchen und Gräben, ist sehr dünn. Die Personen stehen annähernd senkrecht zur Oberseite der Kolonie reihenweise jederseits von diesen Kloakalkanälen, in die zweifellos ihre Atrialöffnungen einmünden. Diese Personenreihen sind jedoch nicht ganz regelmässig und einfach. Vielfach treten einzelne Personen aus der Reihe heraus, sodass eine Zickzackreihe oder eine mehrfache Reihe jederseits neben der personenlosen Linie der Kloakalkanäle entsteht. Es liegt offenbar ein ausgesprochenes System der Anordnung der Personen zugrunde, und zwar bildet ein Kormidium anscheinend ein einziges, durch den Zusammenhang der Kloakalkanäle bestimmtes Personensystem, wenngleich das zusammenhängende Kloakalkanal-Netz durch mehrere Kloakenöffnungen ausmünden mag.

Zellulosemantel ziemlich fest knorpelig, überall, sowohl in der Basalplatte wie in den Kormidien, dicht mit mässig grobem Sand, Spongiennadeln und dergl. durchsetzt, wodurch seine Druckfestigkeit noch erhöht wird. Blasenzellen fehlen. Sternchen- und Spindelzellen zart. Es finden sich ausserdem zahlreiche grobgranulierte, kugelige oder ovale Rundzellen von durchschnittlich etwa 6 μ Dicke (Pigmentzellen?).

Personen offenbar meist stark verschrumpft. Sie lösen sich zwar im allgemeinen sehr leicht vom Zellulosemantel los, doch gelang es mir nicht, eine sicherlich vollständige Person heil herauszulösen, da das meist ungemein lange und sehr zarte Postabdomen stets abriss. Die Gestaltung und die Grösse der Personen ist sehr verschieden, hauptsächlich infolge der verschiedenen Gestaltung und Grösse des Postabdomens, in geringem Masse auch infolge Verschiedenheit des Thorax und Abdomens; durch verschiedene Schrumpfung ist diese Verschiedenheit offenbar noch verstärkt worden. Die längste zur Beobachtung gelangte, offenbar stark gestreckte Person ist mindestens 11 mm lang; ob ihr noch ein beträchtliches Stück des Postabdomens fehlt, muss dahin gestellt bleiben. Die kürzeste zur Beobachtung gelangte Person ist nur $3^1/_2$ mm lang, trotzdem ihr Postabdomen vollständig zu sein scheint. Das letztere ist jedoch nicht ganz sicher; denn das hintere Ende ihres kegelförmig zugespitzten Postabdomens ist nicht intakt; es mag sich in heilem Zustande noch in einen ungemein dünn fadenförmigen Postabdominalteil fortgesetzt haben.

Thorax sehr verschieden gestaltet, vielfach verzerrt, je nach der Streckung etwa doppelt so lang wie breit bis etwa 6 mal so lang wie breit, häufig dorsal verkürzt (verschrumpft), bei geschlechtsreifen Personen meist in den mittleren und hinteren dorsalen Teilen zur Bildung eines Brutsackes stark aufgebläht.

Branchialsipho in der Regel gerade am vorderen Pol des Thorax gelegen, häufig infolge von Schrumpfung etwas dorsalwärts verschoben und geneigt, kurz cylindrisch, weniger lang als breit, anscheinend konstant in 6 regelmässige, kurz herzförmige oder einfach gerundete Lappen auslaufend, mit ziemlich dicker und gleichmässig dicker Ringmuskelschicht.

Atrialsipho eine kurze Strecke hinter dem Branchialsipho gelegen, nur selten infolge besonderer Streckung so weit vorragend wie der Branchialsipho, viel kleiner als dieser, von der Gestalt eines kleinen abgestutzten Kegels, mit verhältnismässig enger Öffnung und unregelmässig gekerbtem Apikalrand, mit ziemlich dicker Ringmuskulatur. Dicht vor dem Atrialsipho, eine deutliche, wenn auch kurze Strecke von ihm getrennt, ragt eine ziemlich grosse Atrialzunge vom Thorax ab. Die Atrialzunge ist in der Regel einfach zungenförmig, ungefähr doppelt so lang wie breit, apikal in der Gestalt eines abgerundeten gleichseitigen Dreieckes endend. Meist weist die Atrialzunge eine feine und ziemlich regelmässige

Ringelung auf, mutmasslich eine Kontraktionserscheinung, deren Regelmässigkeit auf der regelmässigen Anordnung der zarten Quermuskulatur des Organes beruht. Manchmal ist diese Ringelung auf den apikalen Teil beschränkt. Selten bildeten sich einige wenige tiefere Einkerbungen an den Seitenrändern oder ein Paar fast lappige Vorwölbungen an der Basis. Mit einer Dreilappigkeit, wie sie für die Atrialzunge des *A. appendiculatum* charakteristisch ist, haben diese undeutlichen Basallappen sicherlich nichts zu tun; sie verdanken ihr stärkeres Hervortreten offenbar nur einer gelegentlichen stärkeren Kontraktion gewisser Quermuskelbündel. An einer einzigen der vielen zur Beobachtung gelangten Personen fand sich eine deutlich ausgesprochene und gleichmässige Zweizipfligkeit der Atrialzunge. Eine typisch dreizipfliche Atrialzunge, wie sie für *A. appendiculatum* charakteristisch ist, wurde nicht beobachtet.

An der ventralen Hinterecke des Thorax findet sich in der Regel ein dünnhäutiger, nicht muskulöser thorakaler Blindsack von cylindrischer, apikal gerundeter, oder kürzerer kuppelförmiger Gestalt, ähnlich dem des *A. appendiculatum*, das einem solchen Blindsack seinen Namen verdankt. Die Grösse dieses Blindsackes schwankt bei *A. scabellum* in noch weiteren Grenzen als bei *A. appendiculatum*. Manchmal konnte ich bei der neuen Art überhaupt keine Spur eines solchen Organs erkennen, doch möchte ich nicht behaupten, dass es dann ganz fehlte.

Abdomen scharf vom Thorax abgesetzt, meist etwas kürzer als der Thorax, selten, bei anscheinend stärkerer Streckung, etwas oder beträchtlich länger, meist stark gebogen, ventral konvex, seltener gerade gestreckt.

Postabdomen sehr verschieden gestaltet, manchmal kurz, pfriemförmig, hinten kegelförmig verjüngt, anscheinend am Hinterende in einen dünnen Gefässanhang auslaufend, häufig sehr lang und nach anfänglicher Verjüngung gleichmässig dick, walzenförmig, wenn nicht dünn, fadenförmig. Bei oberflächlicher Betrachtung hielt ich diese dünnen und sehr dünnen, walzenförmigen bezw. fadenförmigen Weichkörperteile für Gefässanhänge. Eine genauere Untersuchung ergab jedoch, dass es mit Längsmuskulatur, Epicard und Mesenchymzellen ausgestattete echte Postabdominalteile seien. Bei der schlankesten, offenbar stark gestreckten, mindestens 11 mm langen Person ist das ca. 6,4 mm lange Postabdomen im allgemeinen nur 0,09 mm dick. Vielleicht war es ursprünglich noch länger, denn das Hinterende scheint abgerissen zu sein. In der Regel ist das Vorderende des Postabdomens deutlich dünner als das Abdomen und infolgedessen scharf von diesem abgesetzt. Auch liegt sein Ursprung in der Regel (wie bei *A. appendiculatum*) etwas ventral, zum mindesten insofern, als das Hinterende des Abdomens mit dem Wendepol der Darmschleife dorsal in scharfem Absatz etwas vorspringt.

Leibeswand ziemlich zart, mit charakteristisch angeordneter Muskulatur, die im wesentlichen mit der von *A. appendiculatum* übereinstimmt. Am Thorax sieht man eine offenbar etwas variable Anzahl, jederseits etwa 20, ziemlich zarte Längsmuskelbündel in weiten, sehr unregelmässigen Abständen verlaufen, die manchmal spitze Gabelungen, selten auch Anastomosen aufweisen. Nach vorn treten diese Längsmuskelbündel, sich zerfasernd, zum grössten Teil auf den Branchialsipho, zum geringeren Teil auf den Atrialsipho über. Am Hinterende des Thorax vereinen sich die Längsmuskeln jederseits zu einem ziemlich breiten, enggeschlossenen, dicken Bande, an dessen Querschnitten man noch die Zusammensetzung aus mehreren (etwa 10?) dicken, in nicht immer ganz einfacher Schicht eng zusammengelegten Längsmuskelbündeln erkennen kann. Diese beiden breiten Längsmuskelbänder ziehen sich durch die ganze Länge des Abdomens hin und treten, sich etwas dorsalwärts verschiebend, auch auf das Postabdomen über, das sie ebenfalls in ganzer Länge — soweit erkannt — durchziehen. Sie bilden jederseits am Postabdomen eine beträchtliche Verdickung der Wandung, in deren Mittellinie das Epicard ansetzt. Die Ringmuskulatur ist wenigstens der Hauptsache nach auf die Siphonen beschränkt, an denen sie je einen ziemlich kräftigen Sphinkter bildet. Am Thorax konnte ich eine allgemeine Ringmuskulatur sonst nicht nachweisen; sie kann jedenfalls nur ungemein zart sein. Es fand sich aber an den mittleren Teilen des Thorax genau wie bei *A. appendiculatum* noch ein besonderes System von zarten Quermuskeln jederseits in der Höhe der Kiemensack-Quergefässe und durch je einen den Peribranchialraum durchsetzenden Muskelstrang mit den Quermuskeln der Kiemensack-Quergefässe in Verbindung gesetzt. In den beiden Längslinien dieser trabekelartigen Verbindungsmuskelstränge zeigt der Thorax vielfach eine Längsfurche als Folge scharfer Kontraktion dieser Verbindungsstränge. Die aus der äusseren Gabelung dieser Verbindungsstränge hervorgehenden Quermuskelstränge der Leibeswand reichen ventralwärts fast bis zur ventralen Medianlinie. Sie enden unter Zerfaserung eine kurze Strecke vor der Medianlinie oberhalb des sehr breiten Endostyls. Die dorsalen Äste der Quermuskelstränge sind beträchtlich kürzer und enden unter Zerfaserung in beträchtlicher Entfernung von der dorsalen Medianlinie.

Branchialtentakel und Flimmerorgan nicht klar erkannt.

Kiemensack bei allen vorliegenden Personen stark geschrumpft, mit etwa 20 Kiemenspalten-Zonen. Die Zahl konnte nur nach Beobachtung der unklar durchschimmernden Dorsalfalten-Züngelchen festgestellt werden, und zwar nicht ganz sicher. Jedenfalls ist sie beträchtlich grösser als bei dem nahe verwandten *A. appendiculatum.*

Darm eine einfache, gerade nach hinten ragende oder mit dem Abdomen gebogene, manchmal auch etwas verzerrte, in ganzer Länge eng geschlossene Schleife bildend. Magen ungefähr in der Mitte des hinlaufenden Darmschleifen-Astes, gerundet prismatisch, in der Regel mit etwa 6 unregelmässigen, seine ganze Länge durchmessenden Längswülsten, die an den Enden zum Teil schulterartig vorragen. Manchmal schienen diese Längswülste durch einige wenige Querkerben geteilt zu sein. Besonderheiten des Mitteldarms nicht deutlich erkannt. Enddarm einfach, ziemlich weit, ausmündend dicht hinter der Mitte des Thorax durch ein in den Atrialraum hineinragendes, durch zwei Kerben bis auf den Grund geteiltes Afterstück, bestehend aus zwei grossen, glattrandigen, ovalen, mehr oder weniger auswärts gebogenen oder eingerollten Afterlippen.

Geschlechtsapparat: Personen zwittrig. Hode nur an wenigen Personen gefunden, bestehend aus einer ziemlich grossen Anzahl (etwa 14?) bis 90 μ dicken, unregelmässig birnförmigen Hodenblasen, die nicht ganz regelmässig zweizeilig in Zickzackanordnung im mittleren und hinteren Teil des Postabdomens in dem vom Epicard abgeteilten Dorsalraum liegen, eng eingebettet in die hier etwas zurückgedrängten Massen der Mesenchymzellen. Samenleiter ziemlich dick, bei fast allen untersuchten Personen prall mit Sperma gefüllt, auch an solchen Personen beobachtet, die keine Hode zu besitzen schienen, bei diesen Personen bis in das scheinbare Hinterende des Postabdomens zu verfolgen. Mutmasslich liegt hier wie bei *A. appendiculatum* eine durch Knospenabschnürung bewirkte Stummelbildung des Postabdomens vor. Ovarium vor der Hode im Dorsalraum des Postabdomens, meist mit einer die übrigen an Grösse weit übertreffenden Eizelle, die die Leibeswand des Postabdomens zunächst vorwölbt, und in späteren Stadien eine bruchsackartige Vorwölbung in den Zellulosemantel hineintreibt. Ich beoachtete derartige noch am Ovarium haftende Eizellen mit einem grössten Durchmesser von $^2/_3$ mm. Als Brutraum dienen die mittleren und hinteren Teile der thorakalen Atrialhöhle, die sehr stark aufgewölbt sind und nach hinten meist rucksackartig vorspringen. Dieser grosse Brutraum nimmt mehr als die Hälfte der Rückenseite des Thorax ein, von der er manchmal kaum das vordere Fünftel frei lässt. Selbst die Atrialöffnung ist bei voller Entwicklung des Brutraumes in dessen Bereich einbezogen, insofern sie an der Vorderwand dieser Vorwölbung zu sitzen kommt. Der Brutraum enthält in der Regel nur einen einzigen Embryo bezw. eine einzige geschwänzte Larve von auffallender Grösse. Eine derartige Larve hat, den umgeschlagenen Schwanzteil nicht eingerechnet, eine Körperlänge von $1{,}1$ mm bei einer Breite von $0{,}44$ mm. Sehr selten liegt im Brutraum hinter einer geschwänzten Larve noch ein Embryo in sehr frühem Entwicklungsstadium. (Bei *A. appendiculatum* finden sich in der Regel mehrere gleichalterige, verhältnissmässig kleine Embryonen oder geschwänzte Larven in dem nur wenig vorragenden, undeutlich ausgebildeten Brutraum.)

Erörterung. Die obige Beschreibung zeigt, dass *A. scabellum* in einigen sehr bemerkenswerten Bildungen (im Besitz eines dünnhäutigen Blindsackes hinten-ventral am Thorax, sowie in der eigenartigen Bildung der Quermuskeln am Thorax und dem dorsalwärts verschobenen Ansatz des Postabdomens) mit *A. appendiculatum* übereinstimmt. Um so auffallender ist es, dass die neue Art in der Gestaltung der Atrialzunge, die in der Verwandtschaftsgruppe des *A. appendiculatum* in der Regel dreiteilig ist, abweicht. Das seltene (bei meinem Material nur einmal beobachtete) Vorkommen einer zweiteiligen Atrialzunge bei *A. scabellum* zeigt aber, dass es sich hier um einen noch etwas schwankenden Charakter handelt, dem in diesem Falle keine tiefgründige Bedeutung zuzumessen ist.

Schon die charakteristische Koloniegestaltung unterscheidet *A. scabellum* scharf von *A. appendiculatum*.

Eine weitere Besprechung dieser Art siehe unten, unter *A. circumvolutum*.

Amaroucium circumvolutum (Sluit.).

1900, *Psammaplidium circumvolutum* Sluiter, Tunic. Stillen Ocean, p. 14, Taf. I Fig. 7, Taf. III Fig. 1.

1909, [*Polyclinum*] *circumvolutum*, Hartmeyer, Tunic.; in: Bronn, Kl. Ordn. Tier-R., p. 1471.

Fundangaben: Neuseeland, Nord-Insel, North Cape, an der Küste unter Steinen; 3. Jan. 1915. — Colville Channel, 35 Fd., Sandgrund; 21. Dez. 1914.

Weiteres Vorkommen im Gebiet: Chatham-Inseln, Maunganui (Sluiter 1900).

Dieser Sluiter'schen Art ordne ich einige Ascidien-Kolonien von der Nord-Insel Neuseelands zu, die, abgesehen von gewissen unwesentlichen, auf Variabilität beruhenden Verschiedenheiten, in ausgesprochener Weise den Charakter der Originalkolonie von *Psammaplidium circumvolutum* wiederspiegeln. Dieser Zuordnung scheinen allerdings einige bedeutsame Verhältnisse in der Organisation der Personen entgegen zu stehen; ich glaube aber annehmen zu dürfen, dass diese anscheinenden Abweichungen nur auf der Ungunst des Originalmaterials beruhen. Die Person, die der Sluiter'schen Abbildung zu Grunde lag, war offenbar stark verzerrt und wohl auch gepresst.

Beschreibung. Koloniegestaltung nicht immer so massig wie beim Original. Diese Kolonien sind zum Teil viel dünner, bis krustenförmig, im Mindestfalle nur etwa 2 mm dick. Auch die Struktur der oberen Fläche mit ihren Furchen und dazwischen verlaufenden Wällen ist nicht immer so stark ausgeprägt wie beim Original, wenngleich meist noch deutlich erkennbar.

In der Gestaltung der Personen (Fig. 19*a* u. *b*) stimmt mein Material in dem bedeutsamsten Punkte, darin nämlich, dass das Postabdomen nicht gerade hinten aus dem Abdomen entspringt, mit Sluiter's Angaben überein; im übrigen aber zeigten sich viele Abweichungen, die ich, wie oben angegeben, hauptsächlich auf Verzerrung der zur Untersuchung gekommenen Originalperson zurückführe. (Die Schilderung, in der irgend welche Hinweise auf variable Bildungen fehlen, scheint auf der Untersuchung nur dieser einen Person zu beruhen). Während nach Sluiter das Postabdomen dorsal aus dem Abdomen entspringen und frei vom Abdomen abragen soll, konnte ich an vielen Personen feststellen, dass das eng gestielte Postabdomen ventral entspringt und sich eng an die Hinterseite des in der Regel gerade nach hinten ragenden Abdomens anlegt. (Bei der von Sluiter abgebildeten Person ist das Abdomen offenbar postmortal ventralwärts abgebogen und zugleich in seinem Taillenteil so gedreht, dass der Ursprung des Postabdomens anscheinend dorsal zu liegen kam). Ihrer Gestalt nach zeigen die Personen meines Materials insofern eine weitgehende Verschiedenheit, als sie zum Teil gerade gestreckt (Fig. 19*a*), zum Teil mehr oder weniger stark ventralwärts eingekrümmt sind Fig. 19*b*). Diese Einkrümmung beruht zweifellos auf dem Verlauf der am Thorax noch ziemlich gleichmässig über die Seiten verteilten, im Bereich des Abdomens und Postabdomens aber sich ventralwärts verschiebenden und sich schliesslich jederseits zu einem dichten Bande zusammenschliessenden Längsmuskeln der Leibeswand. Eine Kontraktion dieser Längsmuskeln führte zu einer Verkürzung der Ventralseite von Abdomen und Postabdomen, die sich ventralwärts einkrümmten, während die dorsalen Teile des Abdomens mit der Darmschleife und das Dorsalfach des Postabdomens mit der Hode dorsalwärts vorquollen. Bei dieser ventralen Verkürzung rückt naturgemäss auch der Ursprung des Postabdomens aus dem Abdomen in die Höhe, manchmal so stark, dass er nur noch eine sehr kurze Strecke von der Taille, bezw. dem Hinterende des Thorax entfernt bleibt. Das Postabdomen zeigt eine ganz eigenartige Gestaltung, hauptsächlich charakterisiert durch die verschiedene Ausbildung der beiden durch das Epicard gesonderten Fächer. Das die ziemlich massige Hode — Ovarien sind mir nicht zur Anschauung gekommen — enthaltende Dorsalfach des Postabdomens ist durch seinen Inhalt stark aufgetrieben und anscheinend verkürzt. Das engere Ventralfach überragt infolgedessen mit seinem hinteren Teil das Dorsalfach. Das Hinterende des Ventralfaches ist nicht immer so einfach wie in der Figur dargestellt.

Häufig läuft es in zwei blasige Hervorragungen aus, oder es trägt etwas weiter vorn noch eine kleinere dritte blasige oder stummelige Hervorragung. (In der Sluiter'schen Abbildung kommt diese charakteristische Gestaltung des Postabdomens nicht zur Anschauung, mutmasslich, weil sie eine Flächenansicht, nicht eine Seitenansicht darstellt). Ektodermale Gefässanhänge habe ich nicht gesehen.

Der Branchialsipho ist kurz, regelmässig kronenförmig, in 6 gleich grosse Lappen auslaufend.

Der Atrialsipho trägt eine grosse Atrialzunge, die nur selten einfach, meist dreiteilig ist. Meist sind die Seitenlappen viel kürzer als der mittlere, der auch stets viel weiter vorragt. Nur selten sind die drei Lappen fast bis zur Basis gesondert; meist sind die Seitenlappen deutlich als Anhänge des mittleren ausgebildet.

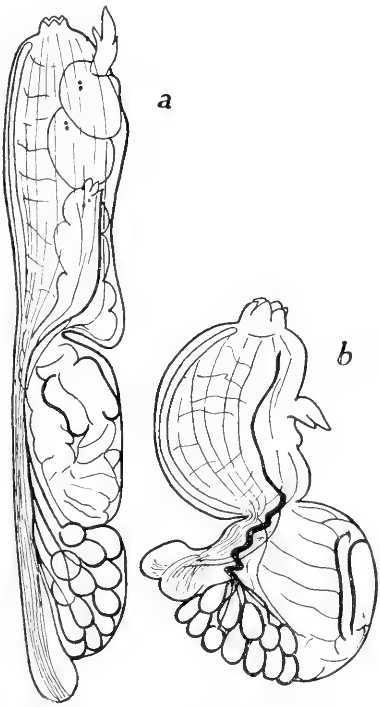

Fig. 19. *Amaroucium circumvolutum* (Sluit.). Ganze Personen, *a* gestreckt, *b* zusammengezogen; × 35.

Die Leibeswand ist mässig dick und enthält ziemlich beträchtliche, in ganzer Länge vom Branchialsipho bis zum Hinterende des Postabdomens verlaufende Längsmuskeln, etwa 14 im allgemeinen weit gesonderte Bündel, die sich hinten jederseits zu einem dichten Längsbande zusammenschliessen (siehe oben!). Sluiter's Angabe, dass die Muskulatur äusserst schwach sei, finde ich bei meinem Material nicht bestätigt.

Über die innere Organisation des Thorax kann ich wegen schlechter Konservierung meines Materials keine näheren Angaben machen; jedenfalls sprach nichts gegen die Sluiter'schen Angaben.

Der Darm bildet stets eine einfache, nur im Taillenteil gedrehte Schleife. Der Magen soll nach Sluiter glattwandig, kugelig sein. Bei meinem Material weist er 5 durch seine ganze Länge verlaufende breite Längswülste auf, die am Cardia-Ende schulterartig vortreten. Bei manchen Personen sind aber diese Magenwülste infolge von Aufblähung so sehr ausgeglättet, dass sie bei Betrachtung des durchsichtig gemachten Ganzobjektes kaum in Erscheinung treten und erst in Querschnitten an der Verdünnung des Wandungsepithels der zwischen den Wülsten liegenden Längsfurchen erkannt werden können. Ich nehme an, dass Sluiter bei seiner Untersuchung ein solcher Magen vorgelegen hat.

Geschlechtsapparat (Fig. 19): Wenngleich ich bei keiner Person ein Ovarium gefunden habe, so muss ich doch annehmen, dass die Personen zwittrig, mutmasslich protogyn, sind; denn ich sah geschwänzte Larven im Brutraum von Personen, die mit einer Hode ausgestattet waren. Die Hode besteht aus einer mässig grossen Zahl, etwa 12, birnförmigen Hodenblasen, deren verhältnismässig dicke Sonderausführgänge sich nach und nach zu einem nur wenig dickeren Samenleiter vereinen. Da die Sonderausführgänge im allgemeinen sehr kurz sind — manchmal fliessen zwei Hodenblasen unmittelbar mit ihren Spitzpolen zusammen —, so entsteht ein eng gedrängtes Büschel von Hodenblasen, das das aufgetriebene Dorsalfach des Postabdomens ausfüllt. Der Stielteil des Hodenblasen-Büschels ist häufig etwas spiralig gedreht. Der Samenleiter ist mässig dick, prall mit Samenmassen gefüllt. Ovarien konnte ich an keiner Person erkennen; doch trugen einige Personen, und zwar solche mit wohl ausgebildeter Hode, im schwach aufgetriebenen Atrialraum eine geschwänzte Larve oder deren zwei, selten auch drei. Die Sluiter'sche Darstellung der Geschlechtsorgane (l. c. 1900, p. 15, Taf. III Fig. 1) ist nicht ganz klar. Danach soll das Ovarium in der Mitte des Postabdomens, umgeben von den Hodenbläschen sein. In der Abbildung sieht man dagegen im hinteren Teil des birnförmigen Geschlechtsorganes biasige Gebilde, die doch wohl Hodenblasen darstellen sollen, im vorderen Teil eine Anzahl kleinerer, im Profil kreisrunder Gebilde mit dunklerem Mittelfleck. Sollen diese als Ovarium gedeutet werden? Sie sehen in der Tat nicht wie die Eizellen eines Ovariums aus. Ganz ähnliche Bilder boten mir dagegen die optischen Querschnitte der spiralig aus der Längsrichtung herausgedrehten Spitzpole und Sonderausführgänge der Hodenblasen an einer durchsichtig gemachten Person.

Erörterung: *A. circumvolutum* steht offenbar dem *A.* [*Synoicum*] *appendiculatum* Mich. (l c. 1923, p. 10) von den Azoren und dem *A. scabellum* n. sp. (siehe oben!) von der Nord-Insel Neuseelands nahe. Es bildet zusammen mit diesen eine enge Gruppe, deren Hauptcharakter wohl in der besonderen Art der Inserierung des Postabdomens liegt, die sehr an die Gattung *Polyclinum* erinnert, ohne jedoch mit ihr auf eine Stufe gestellt werden zu können. (Bei diesen *Amaroucium*-Arten gehen die Längsmuskeln der Leibeswand auf das Postabdomen über, bei *Polyclinum* dagegen nicht). Ein weiterer gemeinschaftlicher Charakter dieser Arten liegt in der Gestalt des Magens mit den wenigen (5 oder 6) breiten Längswülsten.

Schon bei der Erörterung des *A.* [*Synoicum*] *appendiculatum* (l. c. 1923, p. 21) deutete ich auf gewisse Übereinstimmungen mit Arten hin, die bisher zu der Familie der Polycitoriden gestellt wurden, nämlich mit *Heterotrema sarasinorum* Fiedler[1]) von Ceylon und *Polycitor* (*P.*) *torensis* Mich.[2]) aus dem Roten Meer. Der Vergleich der Hodenlage von *A. circumvolutum* mit der bei *Heterotrema sarasinorum* (l. c. 1889, Taf. XXV Fig. 4) bestärkt mich noch in der Anschauung, dass wir verwandte Bildungen vor uns haben. Ich vermute, dass der Körperteil, in dem sich die Hode bei *Heterotrema sarasinorum* findet, nichts anderes ist als das an das Abdomen angepresste Dorsalfach eines Postabdomens, während das (wie bei *A. circumvolutum*) weiter nach hinten ragende Ventralfach, infolge von Zerrung und Zerreissung undeutlich gemacht, durch die beiden losgerissenen, anscheinend frei endenden Muskelbänder (Fig. 4 M. F.) der Leibeswand angedeutet wird. Vielleicht wäre es zu rechtfertigen, wenn man diese Artgruppe unter dem Namen *Heterotrema* als Gattung oder als Untergattung von *Amaroucium* absonderte, charakterisiert durch den ventralwärts verschobenen Ansatz des Postabdomens und die geringe Zahl (5 oder 6) der Längswülste des Magens. (Nach Fiedler weist der Magen von *H. sarasinorum* allerdings eine etwas grössere Schwankung in der Zahl der Längsfalten auf, nämlich von 6—10; doch schliesse ich aus der Abbildung vom Querschnitt des Magens, Fig. 6 M, dass diese Falten nicht

[1]) K. Fiedler, 1889, Heterotrema sarasin., Synascidiengatt. Distomidae, p. 559.

[2]) W. Michaelsen, 1920, Ascid. krikobr. Roten Meeres: Clavelinid. Synoicid., p. 3.

alle gleichwertig sein mögen, und dass Fiedler auch etwaige bedeutungslose sekundäre Einfaltungen als echte Längsfalten mitgerechnet hat. Bei der erwähnten Abbildung vom Querschnitt des Magens kann es z. B. zweifelhaft sein, ob man 6 oder 7 Magenwülste zählen soll).

Amaroucium stelliferum (Sluit.).

1900, *Psammaplidium stelliferum* Sluiter, Tunic. Stillen Ocean, p. 13.
1900, *Psammaplidium* [*Amaroucium*] *stelliferum*, Hartmeyer, Tunic., in: Bronn, Kl. Ordn. Tier-R., p. 1471.

Vorkommen im Gebiet: Neuseeland, Süd-Insel, French Passage (Sluiter 1900).

Diese Art ist in den mir vorliegenden Sammlungen nicht enthalten.

Amaroucium constrictum Sluit.

1900, *Amaroucium constrictum* Sluiter, Tunic. Stillen Ocean, p. 16, Taf. I Fig. 8a.

Vorkommen im Gebiet: Chatham-Inseln, Maunganui (Sluiter 1900).

In den mir vorliegenden Sammlungen anscheinend nicht enthalten.

Amaroucium variabile Herdm.

1879, *Amaroucium sp.*, Studer, Fauna Kerguelensland, p. 130.
1886, *Amaroucium variabile* Herdman, Rep. Tunic. Challenger II, p. 216, Taf. XXIX Fig. 7—12, Textf. 9.
1889, *Amaroucium variabile*, Studer, Forschungsr. Gazelle, p. 145.
1911, *Amaroucium variabile*, Hartmeyer, Ascid. Deutsch. Südpolar-Exp., p. 541, Taf. XLVII Fig. 1—5, Taf. LVI Fig. 4—8, Textf. 12, 13.
1912, *Amaroucium variabile*, Hartmeyer, Ascid. Deutsch. Tiefsee-Exp., p. 335, Taf. XLIV Fig. 8, 9.

Vorkommen im Gebiet: Chatham-Inseln (Sluiter 1900).

Weitere Verbreitung: Kerguelen (Studer 1879, Herdman 1886 und Hartmeyer 1911).

Ich muss die Verantwortung für die Richtigkeit der Bestimmung des Chatham-Materials Sluiter überlassen. Trotz der auffallenden Weite bei Annahme der Richtigkeit der Sluiter'schen Bestimmung, würde die geographische Verbreitung dieser Art nicht aus dem Rahmen der Verbreitung anderer subantarktischer Formen heraustreten.

Amaroucium phortax n. sp.

1906, *Amaroucium ritteri* part. vel in toto, Sluiter (nec Sluiter 1895), Tunic. Stillen Ocean, p. 15.

1906, *Amaroucium obesum* part. vel in toto, Sluiter, Tunic. Stillen Ocean, p. 17 (nec. Taf. I Fig. 9?)

Fundangaben: Neuseeland, Nord-Insel, Tauranga; Thilenius (Mus. Berlin). Vor Stewart-Insel, ca. 35 Fd.; 20. Nov. 1914 (var. *ptychodes*). Stewart-Insel, Paterson Inlet, 5—15 Fd.; 17. Nov. 1914 (var. *ptychodes*).

Weitere Verbreitung im Gebiet: Chatham-Inseln, Waitangi (Sluiter 1906: *A. obesum* part vel in toto). Neuseeland, Süd-Insel, D'Urville-Insel (auch French Passage? Sluiter 1906: *A. ritteri* part. vel in toto).

Ich fasse in dieser Art zwei Formen zusammen (f. *typica* von den Chatham-Inseln und Neuseeland, var. *ptychodes* von der Stewart-Insel), die sich anscheinend nur durch geringfügige, ihrem systematischen Werte nach noch nicht sicher zu beurteilende Eigenheiten unterscheiden. Die Beziehungen dieser Art zu gewissen Sluiter'schen Arten, von denen ich Originalmaterial nachuntersuchen konnte, sollen unten, bei der allgemeinen Erörterung, besprochen werden. An dieser Stelle will ich nur hervorheben, dass die Bezeichnung *Amaroucium obesum* keinenfalls auf ein *Amaroucium* des Neuseeland-Gebietes angewandt werden darf, da diese Artbezeichnung bereits für ein *Amaroucium* des Kapländischen Gebietes, *Psammaplidium obesum* Sluiter[1]), festgelegt ist.

Beschreibung: Koloniegestalt und Bodenständigkeit: Kolonien (Fig. 20) massig, einfach gerundet oder unregelmässig gestaltet, meist mit nur kleinem Teil der Unterseite festgewachsen, selten mit breiter Grundfläche dem Untergrunde aufliegend. Die Kolonien der var. *ptychodes*, die viel kleiner als die der typischen Form sind, machen zum Teil den Eindruck, als seien sie durch mehr oder weniger innigen Zusammenwuchs mehrerer einfach ge-

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1) C. Ph. Sluiter, 1897, Tunic. Süd-Afrika, p. 28.

stalteter Kolonien entstanden. Als gute Darstellung einer Kolonie der f. *typica* könnte die Abbildung Sluiter's von seinem *A. obesum* von den Chatham-Inseln (l. c. 1906, Taf. I Fig. 9) gelten; doch ist es fraglich, ob auch diese wie die zweite, von mir nachuntersuchte Originalkolonie (siehe unten!) zu *A. phortax* gehört.

Grössenverhältnisse der Kolonie: Die grösste mir vorliegende Kolonie der f. *typica*, ein Stück von Tauranga (Fig. 20), das in dicker Masse ein inniges Aggregat von einigen grossen Schneckenschalen und einer Spongie umwachsen hat, bildet eine unregelmässig und viel gebuckelte Masse von etwa 220 mm Länge, 85 mm Breite und 45 mm Dicke. Da diese Kolonie jedoch nicht einheitlich massig ist, sondern gewissermassen eine sehr dicke Kruste darstellt, so ist als eigentliche Dicke nur etwa 20—25 mm

Fig. 20. *Amaroucium phortax* n. sp. f. *typica*. Ganze Kolonie von Tauranga; $\times$ 3/4.

anzunehmen. Eine andere, einheitlich massige, nierenförmige Kolonie von Tauranga ist 60 mm lang, etwa 40—42 mm breit und 15—25 mm dick. Die Kolonien der var. *ptychodes* sind beträchtlich kleiner. Die einfachen Kolonien dieser fraglichen Varietät bezw. die Teilstücke der zusammengesetzten Kolonien sind etwa 6—20 mm breit und 5—12 mm hoch.

Konsistenz der Kolonie: Die Kolonien der f. *typica* sind ziemlich fest knorpelig mit sehr zäher Oberhaut, die sich in grossen Fetzen abziehen lässt. Die Kolonien der var. *ptychodes* sind weicher, fast fleischig, jedoch mit ebenso zäher Oberhaut versehen. Der beträchtliche Unterschied in der Konsistenz der Kolonien beider Formen mag auf verschiedener Konservierung beruhen.

Aussehen und Färbung der Kolonien verschiedener Herkunft verschieden. Kolonien der f. *typica* fast farblos, schwach durchscheinend, mausgrau oder sehr hell gelblich grau, mit undurchsichtig weisslichen Personen. Kolonien der var. *ptychodes* von der Stewart-Insel schwach durchscheinend rötlich violett, mit etwas helleren, sämischfarbenen undurchsichtigen Personen. Es ist fraglich, ob auch dieser Unterschied auf verschiedener Konservierung beruht. Vielleicht liegt hier eine echte Farbenvariation vor, wie sie so häufig bei Ascidien auftritt. Der Farbenton der Kolonien von der Stewart-Insel beruht nicht auf bestimmten Pigmentkörnchen, sondern ist gleichmässig an die Zellulosemantel-Masse gebunden.

Oberfläche der Kolonien ziemlich glatt, wenn auch nicht ganz eben. Die geringen Unebenheiten hängen jedoch nicht mit einer Systembildung zusammen. Personen-Aussenflächen als kleine, helle Kreisflecke von etwa $^1/_2$—$^2/_3$ mm Durchmesser erkennbar, der Hauptmasse nach unregelmässig und verschieden dicht über die Oberfläche verteilt. Personensysteme sind nur stellenweise deutlicher erkennbar als kreisbogenförmige oder reihenweise Anordnung der Personen, sowie hier und da kleine Fünfer- oder Sechsergruppen, in deren Mittelpunkt eine Kloakenöffnung zu liegen scheint. Bei einer sehr flachen, mit ganzen Grundfläche angewachsenen polsterförmigen Kolonie von Tauranga (Fig. 20) hat es den Anschein, als wäre ursprünglich eine regelmässigere Systembildung vorhanden gewesen, die im Laufe weiteren Wachstums zunächst in den kulminalen Teilen der Kolonie undeutlich geworden ist. Gerade in diesen kulminalen Teilen findet man Stellen, in denen die Personen spärlich sind. Diese Bildung erinnert an die von gewissen Korallen (z. B. von *Porites*-Blöcken) bekannte Erscheinung, dass die dem Nahrungszustrom besser ausgesetzten Aussenpartien ein üppiges, frisches Wachstum aufweisen, während die in Bezug auf Ernährung schlechter gestellten Mittelpartien mehr und mehr absterben. Branchialöffnungen meist etwas excentrisch in den Personen-Aussenflächen, winzige undeutlich strahlige Sterne, die von einer mehr oder weniger deutlichen Kreislinie umfasst sind.

Zellulosemantel mehr oder weniger fest und zäh, mit sehr zäher, in grossen Fetzen abziehbarer dünner Oberhaut. Blasenzellen sind im Zellulosemantel nicht vorhanden, dagegen zahlreiche Spindel- und Sternchenzellen, sowie durch die ganze Masse verteilte länglich rundliche Pigmentzellen (?) mit sehr hellem, grauem körneligen Inhalt.

Die ausgewachsenen Personen stossen mit ihrem Vorderende annähernd senkrecht an die Oberfläche der Kolonie, während ihre

Mittel- und Hinterteile infolge unregelmässiger Biegung ein lockeres Filzwerk im Innern der Kolonie darstellen. Eine Herauslösung ganzer Personen ist nicht geglückt. Je nach der Streckung und je nach der verschiedenen Länge des Postabdomens sind die Personen sehr verschieden lang. Die kürzeste in ganzer Länge zur Beobachtung gelangte Person ohne Gefässanhang war 4 mm lang, die längste ca.

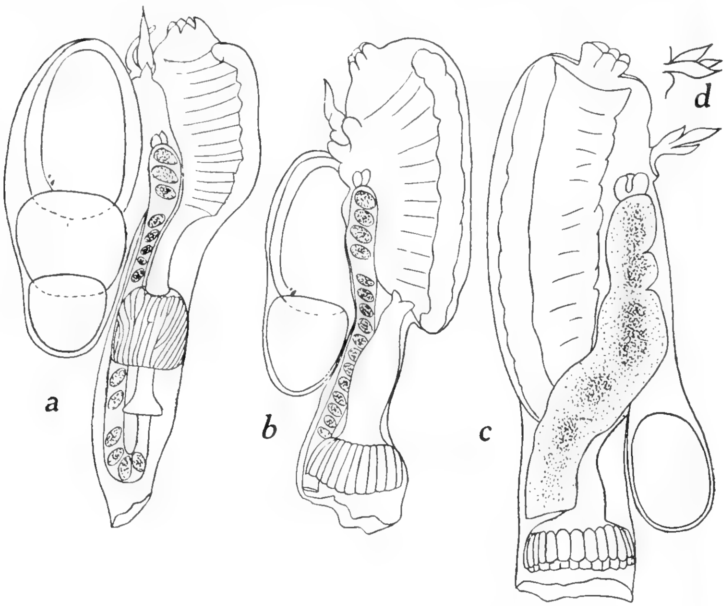

Fig. 21. *Amaroucium phortax* n. sp. Vorderenden verschiedener Personen, *a* u. *b* der f. *typica*, *c* der var. *ptychodes*; mit 3 bezw. 2 Embryonen, bezw. mit 1 Embryo im Brutsack; *d* Atrialzunge einer anderen Person; × 35.

9 mm, doch fanden sich manche Postabdomina und Postabdomen-Bruchstücke, die auf eine noch grössere Länge der vollständigen Person schliessen lassen. Im allgemeinen sind die Personen der var. *ptychodes* (Fig. 21 *c*) etwas grösser, wenn auch nicht länger als die der f. *typica* (Fig. 21 *a* u. *b*), doch ist es bei der ungemein verschiedenen und nicht messbaren Kontraktion der ganzen Personen wie einzelner Abschnitte derselben unmöglich, einigermassen bestimmte Masse anzugeben. Lediglich als Beispiel gebe ich an, dass bei einer anscheinend mässig stark kontrahierten Person der f. *typica* der Thorax etwa 1,25 mm lang und ohne Bruttasche 0,4 mm dick,

das Abdomen etwa $1{,}_{20}$ mm lang und $0{,}_{4}$ mm dick ist, bei anscheinend ähnlich kontrahierter Person der var. *ptychodes* der Thorax etwa 2 mm lang und $0{,}_{85}$ mm dick, das Abdomen etwa $1{,}_{75}$ mm lang und $0{,}_{75}$ mm dick ist. Der Thorax, bei dem vorliegenden Material in keinem Falle gut ausgestreckt, ist stets deutlich länger als breit, manchmal nur wenig, manchmal beträchtlich, bis etwa 4 mal so lang wie breit. Eine bedeutsame Umbildung zeigt er bei geschlechtsreifen Personen infolge Ausbildung einer Bruttasche (Fig. 21), einer starken Ausweitung der Rückenseite des Thorax, die bei ihrer Bildung zunächst in den hinteren Teilen beginnt, um schliesslich die ganze Rückenseite einzunehmen. Schon bald nach dem Beginn ihrer Ausbildung ragt die Bruttasche nach hinten über den Anfang des Postabdomens hinaus (Fig. 21 *c*). Bei voller Ausbildung ragt sie nach hinten über die Mitte des Magens hinaus und auch nach vorn bis zur Höhe des Branchialsiphos (Fig. 21 *a*). Es sieht dann aus, als wenn die Person auf dem Rücken des Thorax einen nach hinten herabhängenden Sack trüge (deshalb die Bezeichnung *A. phortax* = Sackträger). Abdomen so lang wie der Thorax, wenn nicht etwas kürzer oder länger, meist scharf vom Thorax abgesetzt, zumal scharf bei Personen mit Bruttasche, weniger scharf bei unausgewachsenen Personen. Postabdomen wenig scharf vom Abdomen abgesetzt, aber sein Beginn vielfach durch schlank kegelförmige Verengung gekennzeichnet, je nach dem Kontraktionszustand sehr verschieden lang, mindestens wohl etwa doppelt so lang wie Thorax und Abdomen zusammen, vielfach ein Mehrfaches dieser Länge ausmachend, manchmal ziemlich plump, nur wenig dünner als das Abdomen, manchmal ungemein schlank. Ein etwa 7 mm langes Postabdomen aus der Kolonie von Tauranga war an seinem dünnsten Teil nur ca. $0{,}_{12}$ mm dick. Das Hinterende des Postabdomens trägt anscheinend konstant einen kleinen ziemlich scharf abgesetzten, blasigen oder kuppelförmigen Auswuchs, der höchstens ein wenig länger als am Grunde dick ist. Häufig fand sich jederseits neben diesem medianen Auswuchs noch ein kleinerer seitlicher. Manchmal bildeten diese beiden seitlichen Auswüchse den am weitesten nach hinten ragenden Teil des Postabdomens, während der grössere mediane Auswuchs auf der hier stumpf kegelförmigen Endfläche des Postabdomens etwas nach vorn gerückt erschien. In wenigen Fällen erkannte ich (nur an einer Kolonie von

Tauranga) einen langen, dünnen Gefässanhang, ob neben einem der oben geschilderten Auswüchse oder an Stelle eines solchen, liess sich nicht feststellen. In einem Falle konnte ich den Gefässanhang bis zu 8 mm Länge im Zellulosemantel verfolgen, ohne sein Ende zu sehen; vielleicht war er also noch beträchtlich länger.

Branchialsipho (Fig. 21) mitten auf der gerundeten Vorderfläche des Thorax. Er ist klein, kronenförmig, etwa halb so lang wie breit, ziemlich scharf vom Thorax abgesetzt, und trägt apikal 6 regelmässige, kurze, gerundete Lappen. Seine Wandung ist ziemlich dick, aber mit nur schwacher Muskulatur versehen.

Atrialsipho in mässig weiter Entfernung vom Branchialsipho am Vorderende der Rückenseite des Thorax oder etwas weiter hinten, je nach der Kontraktion des Thorax, im äussersten Falle etwa am Ende des vorderen Viertels der Thorax-Rückenlinie. Der eigentliche Atrialsipho ist sehr kurz, ringwallförmig. In der Ausstattung mit Atrialzungen (Fig. 21) ist diese Art sehr variabel. In der Regel trägt der Vorderrand des Atrialsiphos 1 oder 3 schlank lanzettliche, apikal scharf zugespitzte Atrialzungen, selten deren zwei. Bei dem Auftreten von 3 Atrialzungen sind die beiden seitlichen meist wenig oder beträchtlich kürzer als die mittlere und manchmal basal mehr oder weniger weit mit dieser verschmolzen, sodass sie nur als Anhänge derselben erscheinen. Die mittlere bezw. die einzige Atrialzunge reicht, an die Körperwand angelegt, manchmal bis zur Kuppe des Branchialsiphos. Die Seitenränder und der Hinterrand des Atrialsiphos sind entweder fast glatt, ganzrandig oder unregelmässig eingekerbt, oder auch in 2 oder 3 kurze Zungen ausgezogen. Die Muskulatur des Atrialsiphos ist ziemlich schwach entwickelt.

Die Leibeswand des Thorax zeigt eine deutliche, aber ziemlich schwache Längsmuskulatur, bestehend aus jederseits etwa 14 (Zahl unsicher!) weit getrennten dünnen Längsmuskelbündeln.

Die innere Organisation des Thorax ist infolge starker Kontraktion nicht ganz klar zu stellen.

Branchialtentakel schlank, spitzig, anscheinend recht zahlreich, etwa 24 (Zahlenangabe sehr unsicher!).

Kiemensack mit ziemlich vielen Kiemenspaltenzonen. Ich glaube an einer halbausgewachsenen Person deren 13 erkannt zu haben, und mit diesem Befund schienen auch die mehr oder weniger unklaren Bilder von ausgewachsenen Personen übereinzustimmen; doch ist diese Zahlenangabe nicht ganz sicher. An einem kleinen gut ausgestreckten Teil eines Kiemensackes zählte ich 9 Kiemenspalten in einer Halbzone. Die Kiemenspalten waren bei dieser vollständig ausgewachsenen Person etwa 4 mal so lang wie breit.

Darm (Fig. 21 *a*) bei Personen mit gerade gestrecktem Körper eine einfache, in ganzer Länge eng geschlossene, gerade nach hinten ragende oder mehr oder minder um die Längsachse gedrehte Schleife bildend; bei Personen mit verkrümmtem Abdomen macht der Darm die Krümmung naturgemäss mit. Der Ösophagus ist schlank und ziemlich lang, sodass der Magen ungefähr in der Mitte des hinlaufenden Darmschleifen-Astes oder etwas weiter hinten zu liegen kommt. Bei unregelmässiger Kontraktion des Abdomens und des Darmes ändert sich auch die Lage des Magens. Der Magen ist ungefähr so lang wie breit, je nach Kontraktion bezw. Aufblähung etwas breiter oder schmäler, dorsoventral mehr oder weniger abgeplattet, vorn und hinten scharf abgesetzt, manchmal anscheinend infolge von Zerrung mehr oder weniger schief. Hinterende des Ösophagus und Vorderende des Mitteldarms springen zur Bildung eines ovalen Cardia- bezw. Pylorus-Wulstes etwas in den Magen ein. Die Wandung des Magens ist äusserlich zwar nicht glatt, aber doch nur mit verhältmässig wenig vorspringenden, den Magenfalten-Zwischenräumen entsprechenden Längsfurchen versehen. Zahlreiche scharf ausgeprägte Längsfalten der Wandung ragen weit in das Lumen hinein. Die Längsfalten bezw. die Längswülste des Magens, wenngleich der Hauptsache nach parallel mit einander in ganzer Länge des Magens verlaufend, zeigen stellenweise manche Unregelmässigkeiten, Gabelung, Teilung in 2 oder 3 hintereinander liegende, Einschiebung kürzerer und in Zusammenhang damit Schrägstellung einzelner Falten oder kleiner Gruppen (Fig. 21 *a*). Schon mit diesen Unregelmässigkeiten hängt eine Variabilität der Zahl der Falten bezw. Wülste zusammen. Ich glaube jedoch in dieser Hinsicht auch eine echte, auf Lokalrassen zurückzuführende Variabilität erkannt zu haben. Bei der Kolonie von Neuseeland und den Chatham-Inseln ergab eine Zählung im allgemeinen eine beträchtlich geringere Faltenzahl als bei den Kolonien von der Stewart-Insel, bei denen diese Zahl eine selbst für *Amaroucium* auffallende Höhe erreicht. Sollte es sich zeigen, dass die übrigen hier erwähnten oder noch weitere, an besserem Material vielleicht nachweisbare Unterschiede zwischen dem Material von Neuseeland und dem von der Stewart-Insel wesentlicher sind und somit eine Sonderung von Arten nötig machen, so schlage ich für die Form von der Stewart-Insel mit grösserer Zahl von Magenfalten die Bezeichnung "*A. ptychodes*" ("mit vielen Falten") vor. Bei dem Material der f. *typica* (Fig. 21 *a* u. *b*) fand ich an den Querschnittserien durch den Magen von 7 Personen 23—26 Falten des Magens (1mal: 23, 1mal: 24, 2mal: 25 und 3mal: 26), bei 4 Personen von der Stewart-Insel (Fig. 21 *c*) 29—32 (1mal: 29, 2mal: 31 und 1mal: 32). Am Ende des Magens geht auch bei dem Material von der Stewart-Insel die Zahl der im Querschnitt getroffenen Falten bis auf Zahlen zurück, wie sie für die f. *typica* charakteristisch sind, nåmlich bis auf 24 oder 23. Der Mitteldarm ist beidenendes scharf abgesetzt, im allgemeinen dünn und kurz, kaum so lang wie der Magen und nicht an den Wendepol der Darmschleife heranreichend. Eine Sonderung in Nachmagen und Drüsendarm ist nicht immer deutlich erkennbar. Bei einigen Personen der Kolonien zeigte der Mitteldarm jedoch ungefähr in seiner Mitte eine eigentümliche schmal-zonale, radförmige Erweiterung, die vielleicht als Grenzmarke zwischen Nachmagen und Drüsendarm anzusehen ist. Enddarm mässig und gleichmässig dick, ziemlich dicht hinter dem Atrialsipho ausmündend. After mit 2 grossen Afterlippen.

Das Epicard mit sehr dicker dorsaler und etwa halb so dicker ventraler Wandung, sowie mit ziemlich weitem, an den Seitenkanten nur wenig verengtem Lumen spannt sich so zwischen den Seitenwänden des Postabdomens aus, dass es dessen primäre Leibeshöhle in einen etwas umfangreicheren, die Gonaden enthaltenden Dorsalraum und einen etwas engeren Ventralraum teilt.

Geschlechtsapparat: Die Personen sind zwittrig. Die Hode nimmt den hinteren Teil des Postabdomens mit Ausnahme des äussersten Endes ein. Sie besteht aus zahlreichen unregelmässig birnförmigen, ovalen oder paketförmigen Hodenblasen, etwa 45 an Zahl, die je nach Kontraktion oder Strekung des Postabdomens dicht gedrängt oder locker bis fast zerstreut und mehr oder weniger regelmässig zweizeilig die Anhänge einer langen oder sehr langen Ähre bilden. Der die Achse dieser Ähre bildende

Samenleiter lässt sich nach hinten bis weit über die Mitte der Hodenblasen-Zeilen verfolgen. Andererseits geht er unter geringer, aber deutlicher Verdickung nach vorn bis in den Thorax hinein. Je nach der Kontraktion der Person beschreibt der Samenleiter hierbei schmale und weitläufige bis sehr breite und dichte Schlängelungen. Das Ovarium, überspannt von dem Samenleiter, liegt etwas vor dem Vorderende der Hode ziemlich weit hinter dem Wendepol der Darmschleife. Bei einigen Personen mit stark gestrecktem Postabdomen betrug die Entfernung zwischen diesem Wendepol und dem Ovarium ungefähr 3 mm. Bei stark gedrungenen Personen ist diese Entfernung weit geringer; einmal mass ich hier nur $0{,}_{58}$ mm. Als Brutraum dient die oben mit dem Thorax geschilderte dorsale rucksackförmige Bruttasche, die meist 1—3 Embryonen oder Larven enthält. Diese Embryonen und Larven sind sehr gross, bis ca. $0{,}_{38}$ mm dick, und füllen, eng aneinandergepresst, die Bruttasche vollkommen aus (Fig. 21).

Erörterung: Mit *A. phortax* vereine ich verschiedene von Schauinsland im Neuseeland-Gebiet gesammelte Stücke, die Sluiter (l. c. 1906) anderen Arten zuordnete, nämlich je einen Teil des Materials von *A. obesum* (Chatham-Inseln) und von *A. ritteri* (D'Urville-Insel), von denen ich typische Stücke nachuntersuchen konnte. *A. obesum* von den Chatham-Inseln (nicht zu verwechseln mit dem älteren *A.* [*Psammaplidium*] *obesum* Sluiter von Kapland) beruht auf 2 Originalkolonien, von denen eine abgebildet wurde (l. c. 1906, Taf. I Fig. 9). Mir liegt eine als Typus gekennzeichnete Kolonie dieser Art vor (von Prof. Schauinsland dem Berliner Museum übergeben), die ihrer Gestalt nach von der abgebildeten Kolonie abweicht und beträchtlich kleiner ist. Es ist augenscheinlich die zweite der beiden von Sluiter erwähnten Kolonien. Ihrer Gestalt und Grösse nach entspricht sie annähernd dem rechtsseitigen grossen Teilstück der von Sluiter abgebildeten Kolonie, und zwar auch in Färbung und in feinerem Aussehen so genau, dass ich an einer artlichen Zusammengehörigkeit dieser beiden vom gleichen Fundort stammenden Kolonien nicht zweifelte. Eine nähere Untersuchung ergab jedoch, dass diese Kolonie in der Organisation der Personen ganz beträchtlich von Sluiter's Angaben über *A. obesum* abweicht. Die hauptsächlichste Abweichung betrifft die Anzahl der Magenfalten. Nach Sluiter soll der Magen bei *A. obesum* mit

9 Längsfalten ausgestattet sein. Ich stellte an Querschnitten durch 2 Personen der mir vorliegenden Kolonie mit voller Sicherheit einmal 23 und einmal 26 Längsfalten fest, und bei vielen in durchsichtig gemachten Ganzpräparaten untersuchten Personen entsprachen die Verhältnisse wenigstens annähernd diesen Befunden. (Bei solchen Präparaten lassen sich die Falten der nicht in Horizontalflächen liegenden Teile der Magenwandung nur schätzungsweise zählen). Dieser Befund lässt sich mit Sluiter's Angabe kaum vereinen. Wenn auch eine ziemlich beträchtliche Variabilität in der Zahl der Magenfalten auftritt, so ist der Unterschied zwischen 9 und 23—26 doch zu beträchtlich, um ihn durch Variabilität innerhalb der Grenzen einer Art zu deuten. Ich halte deshalb eine uneingeschränkte artliche Vereinigung der grossen, abgebildeten Originalkolonie mit der zweiten, von mir untersuchten Cotype sowie mit dem übrigen hier als *A. phortax* zusammengefassten Material für unangebracht, kann mich allerdings nicht des Verdachtes erwähren, dass hier ein Irrtum Sluiter's vorliegt. Bei Betrachtung der Personen in Ganzpräparaten kehrt der dorsoventral zusammengedrückte Magen dem Beschauer manchmal seine nur wenige Falten zur Ansicht bringende Schmalseite zu Sollte sich Sluiter durch solch eine Ansicht haben täuschen lassen? Querschnitte, die allein ganz sichere Auskunft über die Zahl der Magenfalten geben können, hat Sluiter meines Wissens nicht angefertigt, wenigstens deutet nichts in seiner Beschreibung darauf hin. Was die übrigen Befunde Sluiter's anbetrifft, so liessen sie sich wohl mit den meinigen vereinigen, wenn man annimmt, dass Sluiter nur eine einzige Person oder nur wenige, zufällig übereinstimmend gestaltete Personen zur Schilderung der Organisation benutzte, und dass ihm infolgedessen die Variabilität in der Bildung gewisser Organe, zumal der Atrialzungen und ihrer Stellung am Thorax, entgangen sei. Was mich vor allem stutzig machte, ist der Umstand, dass Sluiter nichts von der bei *A. phortax* so ungemein charakteristisch gestalteten Bruttasche erwähnt, wie überhaupt nichts von Geschlechtsorganen, und dass er das Postabdomen als "höchstens 2 mm lang" angibt. Hat Sluiter vielleicht nur unausgewachsene Personen, wie sie in einzelnen Teilen der Kolonie vorwiegen oder lediglich enthalten sein mögen, näher untersucht? Das würde auch wohl die für ein *A. phortax* so geringe Zahl der Magenfalten erklären. Ich

halte es für das Richtigste, *A. obesum* Sluiter im ganzen zu *A. phortax* zu stellen, dem die zweite, mir vorliegende Kolonie mit Sicherheit zuzuordnen ist.

Ähnlich wie *A. obesum* von den Chatham-Inseln verhält sich *A. ritteri* Sluit. von Neuseeland (l. c. 1906, p. 15) zu *A. phortax*. Ich konnte eine der von Sluiter als *A. ritteri* bestimmten Kolonien von der D'Urville-Insel untersuchen und erkannte in ihr ein unzweifelhaftes *A. phortax*. Ich erwähne nur, dass die Querschnitte durch 2 Personen als Zahl der Magenfalten 24 bezw. 26 ergaben, und dass die für *A. phortax* charakteristische Bruttasche wohl ausgebildet erschien. Es ist wohl kaum fraglich, dass auch die übrigen, von mir nicht untersuchten Kolonien von der D'Urville-Insel und von dem nahe gelegenen Fundort "French Passage" zu dieser Art gehören. Das Originalmaterial des *A. ritteri*[1]) von der Torres-Strasse lässt sich dagegen nicht mit *A. phortax* vereinen. In der Abbildung (l c. Fig. 7) zeigt der Magen an der dem Beschauer zugewendeten Seite nur drei sehr breite Längsfalten. Man müsste bei der Annahme, dass jene Zeichnung die Magenverhältnisse richtig darstellt, auf etwa 6 Magenfalten schliessen[2]).

Was die Verwandtschaftsverhältnisse des *A. phortax* anbetrifft, so steht es wahrscheinlich dem *A. savignyi* Mich.[3]) aus dem Roten Meere nahe, das eine ähnliche rucksackartige Bruttasche aufweist. Es unterscheidet sich von dieser eryträischen Art nicht nur durch die Gestaltung der Kolonie (bei *A. savignyi* krustenförmig mit parallelrandigen Systemwällen an der Oberfläche), die Grösse der Personen (bei *A. savignyi* höchstens $4^1/_2$ mm lang) und die Gestaltung

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1) C. Ph. Sluiter, 1895, Tunic.; in: Semon, Zool. Forschungsr., p. 170, Taf. VII Fig. 6—8.

2) Aufklärungsbedürftig sind die Geschlechtsorgane dieser Art. Die Hodenblasen sollen jederseits von der hellen Linie in der Mitte des doppelten Septums, also jederseits des Epicards, liegen. Offenbar hat Sluiter die Pakete der Mesenchymzellen im Epicard für Hodenblasen gehalten. Das angebliche Ovarium soll ventral im Postabdomen liegen. Es sieht nach der Abbildung auch durchaus nicht wie ein *Amaroucium*-Ovarium aus. Ich halte es für parasitischer Natur; es mag das Eierpaket eines parasitischen Krebses sein. Auch die Abbildung von den Ausführgängen der angeblichen Gonaden ist unklar und wenig überzeugend.

3) W. Michaelsen, 1920, Ascid. krikobr. Roten Meeres: Clavelin. u. Synoicid., p. 11, Taf. Fig. 5—7).

des Atrialsiphos (bei *A. savignyi* sechslappig), sondern auch durch einige bedeutsame Verhältnisse der inneren Organisation, zumal durch die ungemein hohe Zahl der Magenfalten (bei *A. savignyi* meist 14 oder 15, manchmal noch einige weniger).

Bei dem ebenfalls dem *A. phortax* nahe stehenden *A. lubricum* Sluit.[1]) von Natal sollen die Personen höchstens 3 mm lang und das Postabdomen nicht länger als der Thorax sein, und die Wandung des Thorax eine kräftige Muskulatur besitzen. Auch ist die Zahl der Magenfalten (16) bei dieser Art viel geringer.

Aplidium mauritaniae Sluit [2]) von Nordwest-Afrika unterscheidet sich durch die Pigmentzellen im Zellulosemantel, durch die Kürze der Personen (bis 5 mm lang), die geringere Zahl der Kiemenspalten-Zonen (10) und der Magenfalten (14) von der neuen Art.

Auch *A. variabile* Herdman[3]) von den Kerguelen unterscheidet sich durch kleine Personen ("about 6 mm in antero-posterior length") und durch eine viel geringere Zahl der Magenfalten ("about fourteen well-marked longitudinal folds") von *A. phortax*. Dasselbe gilt für *A. recumbens* Herdm. (l. c. p. 227, Taf. XXIX Fig. 13—15) aus der Magalhaens-Strasse.

Gen. **Aplidium** Sav. vel **Amaroucium** Edw.

Aplidium vel *Amaroucium foliaceum* (Sluit.).

1900, *Psammaplidium foliaceum* + *Ps. ambiguum* Sluiter, Tunic. Stillen Ocean, p. 11, 12.

1900, *Psammaplidium* [*Amaroucium*] *foliaceum* + *Ps.* [*A.*] *ambiguum* Hartmeyer, Tunic., in: Bronn, Kl. Ordn. Tier-R., p 1471.

Vorkommen im Gebiet: Neuseeland, Süd-Insel, French Passage; Chatham-Inseln (Sluiter 1900).

Diese in den mir vorliegenden Sammlungen nicht enthaltene Art muss als "species inquir." angesehen werden. Ob sie zur Gattung *Aplidium* oder zur Gattung *Amaroucium* gehört, lässt sich aus der zweifachen Originalbeschreibung nicht ersehen.

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[1]) C. Ph. Sluiter, 1898, Tunic. Süd-Afrika, p. 31, Taf. I Fig. 8, Taf. V Fig. 1.

[2]) C. Ph. Sluiter, 1914, Ascid. West-Küste Afrikas, p. 50, Taf. IV Fig. 15.

[3]) W. A. Herdman, 1886, Rep. Tunic. Challenger II, p. 216, Taf. XXIX Fig. 7—12, Textfig. 9.

Gen. **Macroclinum** Verr.

Macroclinum hypurgon n. sp.

Fundangaben: Neuseeland, Nord-Insel, Hauraki-Golf; Suter (Mus. Berlin, Type!)

Auckland; Suter (Mus. Berlin).

Beschreibung: Kolonie mehr oder weniger regelmässig keulenförmig oder dick-birnförmig (Type!). Verengung am Grunde meist nicht stielartig abgesetzt und kurz, bei einer der vorliegenden Kotypen deutlich abgesetzt und ungefähr ebenso lang wie der Kopf der Kolonie.

Grössenverhältnisse der Kolonie: Grösste Kolonie 30 mm lang, am Kopf 12 mm, am Grund 8 mm dick; dick-birnförmige Type: 17 mm lang, wenn nicht länger (am Stielende abgerissen) und 14 mm dick.

Aussehen der Kolonie gelblich (Kotypen!) oder rötlich grau (Type!); schwach wachsartig durchscheinend; undurchsichtige Personen durchschimmernd.

Konsistenz der Kolonie fleischig mit festerer Oberhaut (Type!) oder weich knorpelig.

Oberfläche der Kolonie eben (Type!) oder anscheinend infolge unregelmässiger Kontraktion etwas uneben, im feineren glatt, im allgemeinen rein, ohne Fremdkörper-Aufwuchs, (Type!) an der basalen Verengung bezw. am Stiel meist mit Sand besetzt. Personen-Aussenflächen auf die obere Hälfte der Kolonie beschränkt, unregelmässig zerstreut, meist ziemlich dicht gestellt. Branchialöffnungen, an kleinen abgerissenen Fetzen der Oberhaut untersucht, unscheinbar, nicht deutlich strahlig. Kloakenöffnungen nicht aufgefunden.

Zellulosemantel fleischig (Type!) bis weich knorpelig, in der äussersten dünnen Schicht fester. Blasenzellen fehlen. Ausser Spindelzellen überall im Zellulosemantel zahlreiche unregelmässig gestaltete, hellgrau grob granulierte Zellen (Pigmentzellen?). Während eigentliche Fremdkörper im Zellulosemantel fast ganz fehlen, finden sich zahlreiche mehr oder weniger regelmässig ellipsoidische Kotballen in dem Zellulosemantel eingebettet, in der Art, wie wir es beim Hypurgonzustande gewisser

Didemniden [1]) und Polycitoriden [2]) finden, jedoch in anderer Anordnung. Während die Kotballen bei den bisher beobachteten Formen mit Hypurgon-Zustand ganz unregelmässig zerstreut auftreten, finden sie sich bei *Macroclinum hypurgon* meist mehr oder weniger eng kettenförmig oder rosenkranzförmig aneinander gereiht oder zu Strängen verschmolzen, die nur durch gleichmässige Einschnürungen ihre Zusammensetzung aus eiförmigen Kotballen verraten. In den oberen Teilen der Kolonie, zwischen den Personen, erstrecken sich diese Kotballen-Reihen mehr oder weniger genau abwärts, parallel der Personen-Erstreckung. Weiter innen in der Kolonie, unterhalb der Personenschicht bezw. im Achsenteil der Kolonie, verlaufen die Kotstränge unregelmässiger. Es hatte manchmal den Anschein, als lägen diese Kotballen-Stränge, wenigstens in den oberen Schichten der Kolonie, in engen kanalartigen Lücken des Zellulosemantels. Vielleicht haben wir es hier tatsächlich mit Kloakalkanälen zu tun, die von den Atrialöffnungen der Personen abwärts in das Innere der Kolonie hineinführen. Leider genügte der Erhaltungszustand des Materials nicht zu einer Klarstellung dieser Verhältnisse. Auffallend ist, dass ich niemals im Darm der Personen eine reihenweise Anordnung von Kotballen fand. Meist war der Darm überhaupt ganz leer. Nur selten zeigte sich im Darm ein einziger Kotballen, oder es fanden sich einige sehr wenige zerstreute Kotballen. Auch schienen mir einige Kotballen-Stränge im Zellulosemantel viel zu lang, als dass sie in einem Darm Platz gefunden haben könnten. Es liegt demnach der Schluss nahe, dass die jetzt zusammenhängenden Kotballen eines Stranges nicht das Resultat je einer einmaligen Defäkation, sondern mehrerer aufeinander folgender Defäkationen sind, und dass sie sich erst im Zellulosemantel — vielleicht bei der Einschmiegung in die engen Kloakenkanäle — zu Strängen zusammen geschlossen haben. Es ist aber andererseits in Betracht zu ziehen, dass die Spärlichkeit der Kotballen im Darm der Personen kein normaler, oder wenigstens kein allgemeiner dauernder Zustand sein kann, und dass mutmasslich in anderen Zuständen auch Reihen von Kotballen im Darm gefunden werden mögen.

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[1]) W. Michaelsen, 1919, Z. Kenntn. Didemn., p. 11.

[2]) W. Michaelsen, 1921, Ascid. westl. Indisch. Ozean. Reichsmus. Stockholm, p. 11.

Personen (Fig. 22) ziemlich regelmässig in der Koloniemasse eingebettet, mit dem Vorderende senkrecht gegen die Oberfläche der Kolonie gerichtet, im übrigen ziemlich regelmässig in die Längsrichtung der Kolonie eingebogen, die verengte Basalpartie der Kolonie frei lassend, ziemlich leicht aus der Zellulosemantel-Masse herauszulösen. Gut gestreckte Personen, deren keine unzerstückt zur Beobachtung gelangte, mögen bis 10 mm lang sein, wenn nicht länger. Die Dicke beträgt am Thorax und Abdomen etwa $^1/_3$ mm. Das Postabdomen, manchmal nur wenig dünner als der Vorderkörper, kann bei starker Streckung sehr schlank und dünn werden. Ich sah Postabdomen-Stücke von nur $0{,}08$ mm Dicke. Thorax und Abdomen sind bei guter Streckung zusammen ungefähr 2 mm lang, dabei ist der Thorax etwas länger als das Abdomen. Meist erscheint allerdings der Thorax bei dem vorliegenden Material stark kontrahiert, kürzer als das Abdomen. Bei guter Streckung, bei der der Thorax etwa 4 mal so lang wie dick ist, erscheint das Abdomen nur undeutlich durch eine ventrale Zonenkerbe abgesetzt. Bei kontrahiertem und infolgedessen verdicktem Thorax ist der Absatz zum Abdomen viel deutlicher. Bei einigen wenigen Personen erscheint der Thorax dorsal zur Bildung eines umfangreichen Brutraumes stark aufgebläht. Das Postabdomen, in gerader Verlängerung des Abdomens nach hinten gehend, ist bei kontrahierten, verkürzten Personen kaum dünner als das Abdomen und nicht deutlich von diesem abgesetzt, bei gestreckten Personen durch mehr oder weniger starke Verengung vom Abdomen unterschieden. Das Hinterende des Postabdomens läuft meist in einen kurzen, abgerundet kegelförmigen Anhang aus, der von der Hauptmasse des Postabdomens etwas abgesetzt ist. Ektodermale Gefässanhänge sind nicht beobachtet worden.

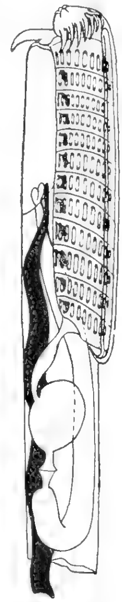

Fig. 22. *Macroclinum hypurgon* n. sp. Thorax und Abdomen einer Person; × 35.

Leibeswand im allgemeinen zart, nur am Vorderende und am äussersten Hinterende etwas derber. Muskulatur zart. Ringmuskulatur nur an den Siphonen erkannt. Längsmuskulatur am Thorax aus wenigen, jederseits etwa 8 (?) sehr feinen, weit getrennten Strängen bestehend, bis zum Hinterende des Postabdomens zu verfolgen, hier aber anscheinend noch spärlicher.

Branchialsipho (Fig. 22) gerade am Vorderende des Thorax, wenn nicht etwas dorsalwärts geneigt, sehr kurz, kronenförmig oder (in geschlossenem Zustande) abgestumpft kegelförmig, mit 6 regelmässigen Lappen.

Atrialsipho in geringer Entfernung vom Branchialsipho am Vorderende der Rückenseite, sehr kurz, dick wallförmig, aber am Vorderende meist (stets?) mit grosser, schlank-spitzbogenförmiger Atrialzunge, die vielleicht (nicht ganz genau erkannt) am Grunde jederseits eine kurze Nebenzunge trägt (vielleicht handelt es sich bei dieser fraglichen Bildung nur um gelegentliche, unwesentliche Einkerbungen und Vorwölbungen am Seitenrande der Atrialzunge). Auch der Hinterrand des Atrialsiphos scheint nicht ganz glatt zu sein; doch konnte an demselben eine deutliche Lappenbildung nicht nachgewiesen werden.

Branchialtentakel schlank fingerförmig, wenigstens zum Teil ziemlich gross, anscheinend in mässig grosser Anzahl (etwa 16? — sehr unsichere Zahlenangabe!).

Kiemensack (Fig. 22) mit ziemlich grosser Zahl von Kiemenspalten-Zonen. An einem gut gestreckten Thorax konnte ich deren 12 sicher nachweisen; vielleicht ist eine 13te am Vorderende durch Schrumpfung unkenntlich geworden. An anderen Personen glaubte ich 13 oder 14 zu erkennen. Es liegen etwa 9 oder 10 mässig lange (bei voller Streckung ziemlich lange?) Kiemenspalten in einer Halbzone (vom Endostyl bis zur dorsalen Medianlinie, nicht bis zur Reihe der Dorsalfalten-Züngelchen, gerechnet). Quergefässe sämtlich gleich stark. Die Dorsalfalten-Züngelchen sind ziemlich plump. Bei gut gestrecktem Kiemensack erreichen sie bei weitem nicht das nächstfolgende Quergefäss. Sie sind etwas zur linken Seite verschoben. Endostyl hinten kurz eingebogen und in eine kurze Retropharyngealrinne übergehend.

Darm (Fig. 22) vom Hinterende des Kiemensackes nach hinten ragend, eine etwas klaffende, in der Ösophagealregion um ungefähr 180° gedrehte (stets?), im übrigen einfache Schleife bildend. Ösophagus schlank. Magen ungefähr in der Mitte des hinlaufenden Darmschleifen-Astes oder etwas weiter vorn, oval bis fast kugelig, manchmal etwas schief. Einmündung des Ösophagus in den Magen in der dorsalen Medianlinie des Magens beträchtlich nach hinten gerückt, fast bis zur Mitte des Magens. Magenwandung äusserlich und innerlich ganz glatt. Mitteldarm gerade hinten aus dem Magen hervorgehend, beidenendes sehr scharf abgesetzt, sehr kurz, bei weitem nicht den Wendepol der Darmschleife erreichend, im allgemeinen sehr dünn, aber in der Mitte stark radartig erweitert. Diese scharfkantige zonale Erweiterung ist vielleicht als Markierung einer Grenze zwischen zwei Mitteldarm-Abteilungen, Nachmagen und Drüsendarm, anzusehen. Enddarm scharf vom Mitteldarm abgesetzt, meist ziemlich gleichmässig weit. After mit 2 grossen, frei vorragenden Afterlippen.

Herz sehr umfangreich, im Hinterende des Postabdomens gelegen.

Geschlechtsapparat: Personen zwittrig. Gonaden im Postabdomen gelegen. Hode aus einer mässig grossen Zahl (10—16 beobachtet) ovaler bis birnförmiger Hodenblasen bestehend, die sehr locker ährenförmig mit ziemlich langen Sonderausführgängen am dünnen hinteren Teil des Samenleiters sitzen, die benachbarten meist weit voneinander getrennt. Die Hode nimmt ungefähr die hintere Hälfte des Postabdomens mit Ausnahme des vom Herzen eingenommenen äussersten Endes in Anspruch. Der aus der Hode hervorgehende, zunächst sehr dünne Samenleiter nimmt, gerade nach vorn gehend, schnell an Dicke zu. Als prall gefüllter, bis etwa 65 μ dicker Schlauch, der als Samenmagazin bezeichnet werden muss, verläuft er durch die vordere Hälfte des Postabdomens, durch das Abdomen und die hintere Hälfte des Thorax, um unter gleichmässiger, schlanker Verengung neben dem After auszumünden (Fig. 22). Ovarium in geringer Entfernung vor dem Beginn der Hodenähre, in beträchtlicher Entfernung hinter dem Wendepol der Darmschleife gelegen. Grösste Eizellen am Ovarium etwa 140 μ dick, in einem lang und schlank gestielten Follikel. Bei zwei Personen fand ich die Rückenseite des Thorax zur Bildung eines Brutraumes stark angeschwollen. Der Brutraum enthielt beidemale eine einzige geschwänzte Larve.

Erörterung: *M. hypurgon* zeigt, meines Wissens als erste Art der Synoiciden, einen Hypurgon-Zustand, wenn auch in etwas anderer Form, als wir ihn bei gewissen Didemniden und Polycitoriden (siehe oben!) finden.

In den übrigen Charakteren scheint die neue Art sich an *M. jor-*

dani (Ritter)[1]) vom Bering-Meer und *M. crater* (Verrill)[2]) von Skandinavien und Neufundland anzuschliessen. Es unterscheidet sich jedoch von beiden Arten durch die Gestalt des Magens, hauptsächlich durch die beträchtliche Verschiebung der Cardia, und durch die Samenmagazin-artige Erweiterung des Samenleiters, eine Bildung, die in gleicher Weise an allen geschlechtsreifen Personen beobachtet wurde, und die mir sehr charakteristisch erscheint.

Macroclinum arenaceum n. sp.

Fundangaben: Neuseeland, Nord-Insel, 2 Seemeilen von North Cape, 55 Faden, harter Boden; 2. Jan. 1915. — North Cape, Küste, unter Steinen; 3. Jan. 1914.

Stewart-Insel, ca. 35 Fd., Sandgrund; 20. Nov. 1914.

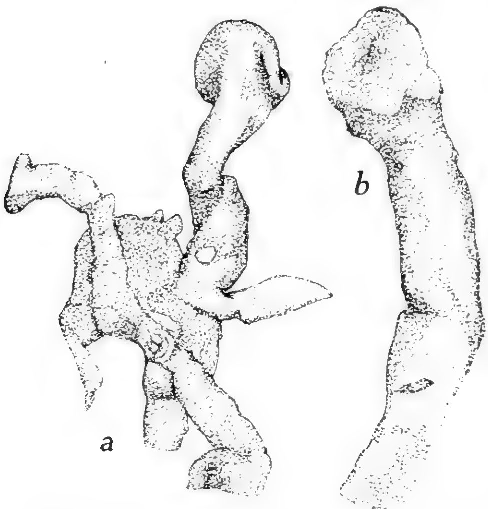

Fig. 23. *Macroclinum arenaceum* n. sp. Ganze Kolonie und Kormidium; × 2¼.

Beschreibung: Koloniegestaltung (Fig. 23): Basalmasse aus sparrig verästelten oder zusammengewachsenen, bis 3 mm dicken Balken bestehend, die stellenweise zu etwas breiterer Platte mit einander verwachsen. Es ist nicht deutlich zu erkennen, ob es sich hier um Verästelung handelt oder um nachträgliche Anastomose, wie es stellenweise den Anschein hat. Aus dieser Basalmasse entspringen einige (meist abgerissene) Kormidien von schlank oder plump keulenförmiger Gestalt. Das plumpste Kormidium ist 20 mm lang, an der apikalen Verdickung 9 mm und am Grunde 7 mm dick, das schlankste Kormidium bei

[1]) *Aplidiopsis jordani* W. R. Ritter, 1899, Tunic. Pribilof Isl., p. 521, Textfig. 19, 20.

[2]) R. Hartmeyer, 1903, Ascid. Arktis, p. 319, Taf. VI Fig. 5, Taf. XIII Fig. 6, 7.

einer Länge von 32 mm an der apikalen Verdickung 7 mm, am Grunde 5 mm dick. Stiel der Kormidien vielfach mit einer Kalkkörper-Didemnide umkrustet.

Aussehen der Kolonie infolge der Inkrustierung sandgrau; Apikalflächen der Kormidien manchmal durch Abscheuerung des Inkrustationsmaterials durchscheinend gelblich grau.

Oberfläche der Kolonie infolge der Inkrustierung im feineren sehr rauh, im übrigen an den Seitenflächen der Kormidien ziemlich eben, an den Apikalflächen infolge des Hervorragens von buckel- oder warzenförmigen Personen-Aussenflächen uneben.

Kloakenöffnungen ziemlich gross, unregelmässig umrandet, anscheinend nur je eine einzige an der Apikalfläche eines Kormidiums, das also zugleich ein System darstellt. Die zur Beobachtung gelangten Kloakenöffnungen liegen jedoch nicht im Mittelpunkt der Apikalfläche, wie bei *M. stewartensis* (siehe unten!), sondern stark excentrisch. Es ist infolgedessen auch nicht ein so regelmässig radiäres Personensystem an einem Kormidium ausgebildet, wie bei jener verwandten Art.

Branchialöffnungen ganz auf die kuppelförmig gewölbte Apikalfläche beschränkt, nur an etwas abgescheuerten Stellen der Oberfläche deutlich erkennbar, manchmal auf kleinen warzenförmigen Erhabenheiten, von 6-strahligem Bau.

Zellulosemantel im allgemeinen weich knorpelig, im Innern spärlich mit feinem Sand durchsetzt, an der Oberfläche dicht mit ziemlich grobem Sand inkrustiert und gefestigt, so dass sich die Oberflächenschicht in Form einer zäheren, aber noch lappig biegsamen Rinde abheben lässt. Blasenzellen fehlen.

Personen mehr oder weniger hell gelblich grau, regelmässig und ziemlich genau parallel der Längsachse der Kolonie gestellt, ziemlich schwer aus dem Zellulosemantel herauszulösen und infolgedessen in keinem Falle ganz heil zur Beobachtung gelangt. Eine anscheinend vollständige, wenn auch nicht unverletzte Person erwies sich als 10,2 mm lang, wovon nur 1,6 mm auf den Thorax, 1,3 mm auf das Abdomen, dagegen 7,3 mm auf das ungemein lange (vielleicht noch nicht einmal vollständige) Postabdomen entfallen. Dabei scheint diese Person noch nicht die grösste der näher untersuchten Kolonie zu sein; denn es liegt mir ein abgerissener Thorax vor, der beträchtlich grösser als der der zur Messung benutzten Person ist. Er ist nämlich $2{,}1$ mm lang. T h o r a x je nach Kontraktion verschieden schlank, etwa 2 bis 4 mal so lang wie dick.

B r a n c h i a l s i p h o gerade am Vorderende des Thorax, annähernd cylindrisch, manchmal apikal etwas enger, etwas kürzer oder etwas länger als dick, regelmässig 6-strahlig, mit 6 kurzen, stumpf zahnförmigen oder lang zipfelförmigen Lappen, mit ziemlich kräftiger, fast in ganzer Länge des Siphos eine gleichmässig dicke, mehrfache Schicht bildender Ringmuskulatur.

A t r i a l s i p h o in geringer Entfernung vom Branchialsipho vorn am Rücken gelegen, sehr kurz, manchmal etwas in den Atrialraum eingedrückt, mit breiter, nicht immer ganz glattrandiger, meist ziemlich weit vorragender Hinterlippe und undeutlicherer Vorderlippe. Dicht vor der Vorderlippe, bei mehr gestreckten Atrialsiphonen anscheinend eine unmittelbare Verlängerung der Vorderlippe des Siphos bildend, entspringt eine meist sehr lange, schmal oder breit bandförmige, parallelrandige A t r i a l z u n g e, die apikal entweder einfach gerundet endet, oder hier in 2 oder 3 (wenn nicht 4?) papillenförmige Vorsprünge ausläuft. Die Ringmuskulatur des Atrialsiphos ist ungefähr ebenso kräftig ausgebildet wie die des Branchialsiphos.

A b d o m e n in der Fortsetzung des Thorax gerade nach hinten ragend, annähernd cylindrisch, bei ziemlich stark geschrumpften Personen ein wenig länger und deutlich dünner als der Thorax, von dem es durch eine ziemlich scharfe Einschnürung abgesetzt ist.

P o s t a b d o m e n die gerade Verlängerung des Abdomens bildend, von dem es manchmal ziemlich scharf, manchmal nur unscharf durch mehr oder weniger schnelle Verengung abgesetzt ist, abgesehen von der Verbreiterung am Übergang in den Thorax und von gelegentlichen Anschwellungen der Ovarialpartie, viel dünner als das Abdomen, ungemein lang gestreckt, mehr als doppelt so lang wie Thorax und Abdomen zusammen, bis in die Basalpartie der Kormidien hineinreichend. Ein solches mehr als 7 mm langes Postabdomen misst meist nur etwa $0{,}18$ mm in der Dicke, bei einer besonders schlanken Person nur etwa $0{,}12$ mm. Das Hinterende des Postabdomens (bei 4 Personen beobachtet, Fig. 24 *a—d*) ist einfach gerundet. (3 Personen von der Stewart-Insel, Fig. 24 *a—c*) oder kurz gegabelt mit gerundeten Gabel-Ästen (Person von North Cape, Fig. 24 *d*) und trägt meist einen einzigen anscheinend unverzweigten, doppelröhrigen Gefässanhang (Fig. 24 *a*, *b*, *d*), dessen beide Röhren aber streckenweise (Fig. 24 *b*, *d*) sich von einander trennen können. Bei einer Person (Fig. 24 *c*) entspringen aus dem Postabdomen zwei vom Beginn an getrennte einfachröhrige Gefässanhänge, von denen aber einer sehr kurz, anscheinend rudimentär, vielleicht aber nur noch nicht ausgewachsen ist (Fig. 24 *c*). Ich vermute, dass diese beiden völlig getrennten einfachen Gefässanhänge die noch auf niedriger Entwicklungsstufe stehenden Teil-

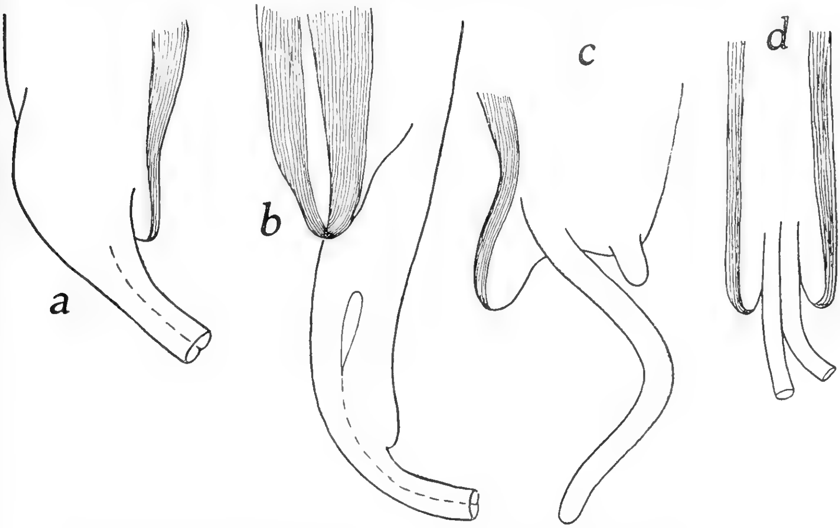

Fig. 24. *Macroclinum arenaceum* n. sp. Hinterende des Postabdomens von 4 verschiedenen Personen; × 90.

stücke eines einzigen Doppelröhren-Gefässanhanges darstellen. Die Gefässanhänge entspringen übrigens nicht am äussersten Ende des Postabdomens, sondern stets etwas vor dem Ende.

Leibeswand mässig zart, an den Siphonen derber. Ringmuskulatur nur an den Siphonen deutlich erkannt. Längsmuskulatur sehr zart, am Thorax jederseits etwa 5 sehr weitläufig und unregelmässig gestellte, manchmal sich gabelnde zarte Längsmuskelbündel, die sich gegen das Hinterende des Thorax jederseits einander nähern und als breite, sehr lockere Längsbandgruppe jederseits das ganze Abdomen und Postabdomen entlang ziehen. Am Hinterende des einfach spitzigen Postabdomens stossen die beiden Längsmuskelbänder an einander, bei gegabeltem Postabdomen enden sie gesondert in den beiden Gabel-Ästen.

Branchialtentakel anscheinend verhältnismässig gross und in ziemlich geringer Anzahl (etwa 12 oder 16?), abwechselnd verschieden gross.

Flimmerorgan ein niedriges Polster mit anscheinend einfacher Durchbohrung.

Kiemensack bei drei Personen (1 von der Stewart-Insel, 2 von North Cape), an denen er deutlich erkennbar war, mit 15 Kiemenspalten-Zonen. (Bei den anderen Personen wenigstens anscheinend mit nahezu gleichkommenden Zahlen). Ca. 12 im allgemeinen längliche Kiemenspalten in der Halbzone. Kiemenspalten-Felder ventral gerundet in ziemlich weiter Entfernung vom Endostyl endend (zu äusserst ventral stehende Kiemenspalten stark verkürzt), dorsalmedian ohne Unterbrechung in die der Gegenseite übergehend. Endostyl breit, fast gerade gestreckt, hinten in eine quer abgebogene, die Hinterwand des Kiemensackes überspannende Retropharyngealrinne übergehend. Dorsalfaltenzüngelchen etwas zur Seite geschoben, etwas kürzer als die Kiemenspalten-Zonen, hakenförmig, dorsalwärts stark eingebogen, fast eingerollt. Schlundeingang hinten-dorsal am Kiemensack.

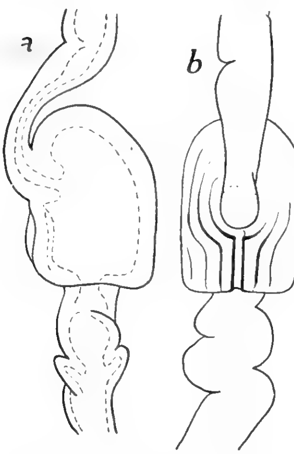

Fig. 25. *Macroclinum arenaceum* n. sp. Magen und angrenzende Darmteile, *a* von der rechten Seite, *b* von der Rückseite: × 48.

Darm eine einfache, nur wenig gedrehte, in ganzer Länge ziemlich eng geschlossene, gerade nach hinten ragende Schleife bildend. Ösophagus mässig lang, dünn, stark hakenförmig gebogen, sodass sein Hinterende horizontal gegen die dorsale Längsseite des Magens stösst. Magen (Fig. 25) etwas vor der Mitte des hinlaufenden Darmschleifen-Astes gelegen, sehr charakteristisch gestaltet, von der Form einer hohen, hinten quer abgestutzten Kuppel, deren vordere Wölbung etwas dorsalwärts gedrängt ist. Der hakenförmige Ösophagus tritt ein sehr Geringes vor der Mitte (fast in der Mitte) der dorsalen Längsseite in den Magen ein und bildet dabei einen Cardiawulst, der wie ein hoher Ringwall in das Lumen des Magens hineinragt. Der Mitteldarm entspringt scharf abgesetzt aus der Mitte der hinteren Abstutzungsfläche des Magens ohne Bildung eines deutlichen Pyloruswulstes. An der Rückenseite des Magens zieht sich eine tiefe, von zwei schmalen, ziemlich stark erhabenen Wulsträndern eingefasste Längsfurche median vom Hinterrande nach vorn gegen die Ösophagus-Einmündung hin. Hier scheint diese Längsfurche nach links hin vor dem Ösophagus-Ende auszuweichen und es zu umfassen, um sich dann zu verlieren. Manchmal aber schien es mir auch, als erweitere sich die Längsfurche hier und nehme die Ösophagus-Einmündung in sich auf, oder als gabele sie sich, die Ösophagus-Einmündung auch nach rechts hin umfassend. Jedenfalls ist die rechtsseitige Umfassung nicht so deutlich wie die linksseitige. Bei einer Person glaubte ich annähernd parallel der dorsalmedianen Längsfurche noch einige wenige (rechts eine, links zwei?) sehr zarte Längsfurchen zu erkennen, die einen bezw. zwei weitere Längswülste lateral von den Mittelfurchen-Wülsten zwischen sich einschlossen. Doch war diese an *Amaroucium* erinnernde Bildung sehr undeutlich und beruhte vielleicht nur auf unwesentlicher Kontraktion. Im übrigen ist die Magenwandung glatt. Bei einer Person von North Cape zeigt sie die gleiche zarte Felderungsstruktur wie bei *Macroclinum stewartense* (siehe unten); bei den Personen von der Stewart-Insel konnte ich diese Felderung nicht deutlich erkennen. Zu erwähnen ist noch, dass die Form des Magens häufig durch teilweise Kollabierung der Magenwand missgestaltet ist. Mitteldarm bei dem vorliegenden Material stets sehr stark verschrumpft, viel dünner als der Magen, von dem er scharf abgesetzt ist. Manchmal schien es mir, als sei die vordere Hälfte des Mitteldarms trompetenförmig, als Nachmagen von der hinteren Hälfte des Mitteldarms, einem Drüsendarm, zu unterscheiden; doch war eine derartige Bildung in keinem Falle deutlich zu erkennen. Enddarm etwas dicker als der Mitteldarm. After etwas hinter der Mitte des Thorax, etwa über der neunten Kiemenspalten-Zone gelegen, mit zwei kurzen, wulstigen, anscheinend glattrandigen Afterlippen.

Herz verhältnismässig umfangreich, in der spindelförmigen Anschwellung des Postabdomens, dicht vor dessen Hinterende gelegen.

Geschlechtsorgane: Personen zwittrig. Ovarium im vorderen Teil des Postabdomens, jedoch eine beträchtliche Strecke hinter dem Wendepol der Darmschleife. Diese gonadenlose Strecke des Postabdomens vor dem Ovarium ist fast halb so lang wie das Abdomen. Das Ovarium, das aus Eizellen verschiedenster Grösse (bis etwa zu 0,2 mm Dicke) besteht, verursacht eine starke, bruchsackartig in den Zellulosemantel vorspringende Ausbauchung der Leibeswand. Hode aus zahlreichen (z. B. bei einer Person 32) birnförmigen oder ovalen, etwa 50 μ dicken Hodenblasen bestehend, die unregelmässig zweizeilig ährenförmig am Samenleiter sitzen. Je nach dem sehr verschiedenen Kontraktionszustand des Postabdomens bildet die Hode eine gedrängte oder eine sehr lockere Ähre, die unmittelbar hinter dem Ovarium beginnt und fast bis an die spindelförmige Anschwellung am Hinterende des Postabdomens reicht. Der Samenleiter ist bei den untersuchten Personen stets prall mit Samenmassen gefüllt, im Bereich der Hode und des Ovariums, das er von aussen eng umfasst, mässig dick, weiter vorn, zumal im vorderen Teil des Postabdomens, häufig mit dicht aufeinander folgenden ovalen Anschwellungen, fast rosenkranzförmig. Er ist je nach dem Kontraktionszustande der Person gerade gestreckt oder unregelmässig geschlängelt. Als Brutraum dient der mehr oder weniger angeschwollene dorsale Raum des Thorax, entweder nur der hintere Teil desselben oder bei stärkerer Inanspruchnahme fast der ganze Raum bis zur Atrialöffnung. Ich fand in den Bruträumen bis 8 Embryonen und geschwänzte Larven; die am weitesten entwickelten Larven, deren Rumpf bis $^1/_2$ mm lang war, lagen in der Regel im vorderen Teil des Brutraumes, die jüngeren Embryonen in den hinteren Teilen desselben.

Erörterung. *M. arenaceum* ähnelt in manchen Hinsichten dem unten beschriebenen *M. stewartense*, in dessen Gesellschaft es auch gefunden wurde, so in der Gestalt und dem Aussehen der Kormidien und in der Länge des Postabdomens. Es unterscheidet sich von jener Art aber nicht nur durch die Systembildung, sondern auch durch die Farblosigkeit der Personen, durch die beträchtlich geringere Zahl der Kiemenspalten-Zonen, durch die Gestaltung des Magens und durch die Lage des Ovariums.

Andererseits ähnelt *M. arenaceum* in vielen Punkten einer antarktischen *Amaroucium*-Art, nämlich dem *A. coeruleum* Sluit.[1]) von der Insel Booth Wandel. Die Kolonie- bezw. Kormidien-Form und die Systembildung sind annähernd die gleichen, ebenso die Struktur des Zellulosemantels. Doch weicht die antarktische Art in einigen Punkte der inneren Organisation von der neuseeländischen ab, so in der Gestaltung des Kiemensackes, der bei *A. coeruleum* nur 10 Kiemenspalten-Zonen aufweist, in der Bildung des Brutraumes, der bei *A. coeruleum* als eng gestielte, kugelige Bruttasche ausgebildet ist, und vor allem in der Gestaltung des Magens, der bei *A. coeruleum* in typischer *Amaroucium*-Weise deutliche Längswülste zeigt, 8 in ganzer Länge des Magens verlaufend, dazu einige verkürzte am hinteren Teil des Magens. Aber auch *Macroclinum arenaceum* zeigt mehr oder weniger deutlich einige Längswülste am hinteren Teil des Magens und damit wenigstens den Beginn einer zu *Amaroucium* hinüberführenden Längsfältelung der Magenwandung. Ich vermute, dass wir es hier mit einer zwischen *Macroclinum* und *Amaroucium* vermittelnden echten Verwandschaftsgruppe zu tun haben. *Macroclinum arenaceum*, anscheinend ein Zwischenglied zwischen *Macroclinum* und *Amaroucium*, steht in Hinsicht auf die Gestaltung des Magens (und des Kiemensackes) zwischen dem unten beschriebenen *Macroclinum stewartense* n. sp. und dem *Amaroucium coeruleum* Sluit.

Macroclinum stewartense n. sp.

Fundangabe: Stewart-Insel, ca. 35 Fd.; 20. Nov. 1914.

Beschreibung. Koloniegestaltung (Fig. 26): Abgesehen von einer starken Inkrustierung mit Sand ähneln die Kolonien der neuen Art sehr denen des arktischen *Synoicum turgens* Phipps. Meist bestehen die Kolonien aus mehreren, nach dem vorliegenden Material bis 5 Kormidien, die bis zur Basis von einander getrennt sind und dicht neben einander auf einer kleinen gemeinsamen, manchmal stielförmigen Basalmasse sitzen. Einige anscheinend nur aus einem Kormidium bestehende Kolonien mögen abgerissene Teilstücke von Kolonien sein. Die meisten Kormidien enthalten

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[1]) *A. coeruleum*, C. Ph. Sluiter, 1906, Tunic.; in: Exp. antarct. Franç., p. 16, Taf. I Fig. 13—16, Taf. IV Fig. 49.

ein einziges Personensystem. Einzelne Kormidien von ungefähr doppelter Breite zeigen jedoch 2 Personensysteme. Der Übergang von einfachen Kormidien zu Doppelkormidien wird durch ein Zwillingskormidium dargestellt, bei dem zwei einfache Kormidien seitlich bis etwa zu $^3/_4$ der Länge mit einander verwachsen sind, bezw. bei dem ein Doppelkormidium durch einen Kerbschnitt bis zu $^1/_4$ der Länge geteilt ist. Die einfachen Kormidien sind unregelmässig birnförmig bis schlank tonnenförmig mit verengter Basis. Sitzen sie am Ende einer stielförmigen Basalmasse, so ähnelt die ganze Kolonie einer einfachen Dolde. Die Apikalfläche des Kormidiums ist abgestuzt mit gerundetem Rande.

Fig. 26. *Macroclinum stewartense* n. sp. Ganze Kolonie; $\times 1^1/_2$.

Grössenverhältnisse der Kolonie: Die einfachen Kormidien sind apikal etwa 9 bis 11 mm dick bei einer Länge von etwa 18 bis 22 mm.

Aussehen der Kolonie infolge der starken Inkrustation entsprechend dem Aussehen des Inkrustationsmaterials, beim vorliegenden Material dunkel sandgrau.

Oberfläche im feineren infolge der starken Inkrustation sehr rauh, im gröberen ziemlich eben.

Personensysteme und Körper- bezw. Kloakenöffnungen: Bei einfachen Kormidien findet sich im Mittelpunkt der Apikalfläche eine ziemlich grosse, unregelmässige Kloakenöffnung auf einer hügelartigen Erhöhung, die ihrerseits in einer ziemlich tiefen, einen grossen Mittelteil der Apikalfläche einnehmenden Einsenkung steht. Der diese Einsenkung umgebende breite Randwulst der Apikalfläche des Kormidiums ist mehr oder weniger deutlich durch mehrere seichte radiäre Kerbschnitte geteilt. Die zwischen diesen Kerbschnitten liegenden Radiärwülste entsprechen wohl den Personenaussenflächen, und tragen mutmasslich je eine Branchialöffnung. Die Branchialöffnungen sind jedoch ganz unscheinbar und konnten nicht klar gestellt werden; auch scheint die Zahl der Personen eines Personensystems bezw. eines Kormidiums grösser zu sein als die Zahl der Radiärwülste, deren ich im Höchstfalle 9 erkannte. Wahrscheinlich liegen nur die Branchialöffnungen des innersten Personen-Kreises auf diesen Radiärwülsten und die der weiter aussen stehenden Personen auf kleinen, nur selten deutlich ausgeprägten Erhabenheiten, die sich mehr oder weniger regelmässig interradiär zwischen die Radiärwülste einschieben. Häufig ist diese ganze Radiärstruktur undeutlich. Bei Doppel- bezw. Zwillingskormidien verdoppelt sich mit dem Personensystem diese um die Kloakalöffnungen gebildete Radiärstruktur.

Zellulosemantel weich knorpelig, ziemlich zäh, in der Oberflächenschicht sehr dicht, im Innern locker mit ziemlich grobem Sand durchsetzt. Infolge dieser dichteren Inkrustierung stellt sich die Oberflächenschicht als zähere Rindenschicht dar. Blasenzellen fehlen. Zahlreiche sehr zarte Spindel- und Sternchenzellen sowie grob granulierte, hellgraue Rundzellen (Pigmentzellen?) vorhanden. Die Grundmasse des Zellulosemantels ist fast wasserhell, durch die eingebetteten Zellen nur schwach getrübt, schwach violett gefärbt.

Personen mit Ausnahme des langen, dünnen, leicht abreissenden Postabdomens im allgemeinen ziemlich leicht aus dem Zellulosemantel herauszulösen, im ganzen sehr dunkel purpurrot bis purpurbraun, fast schwarz gefärbt, sehr verschieden lang, bei mässiger Dicke wohl bis 20 mm lang, wenn nicht noch länger. Da es mir in keinem Falle gelang, das Postabdomen unzerstückelt heraus zu präparieren, so kann ich über die ganze Länge der Personen nur eine Mindestangabe machen. Da einzelne Personen aber mit dem Postabdomen bis in die Basalmasse herabreichen, so darf das Höchstmass wohl noch etwas grösser angenommen werden. Die Taille zwischen Thorax und Abdomen wird durch eine deutliche kurze Verengung gebildet. Das in der geraden Verlängerung des Abdomens liegende Postabdomen ist durch eine unmittelbar hinter dem Wendepol der Darmschleife einsetzende Abnahme der Dicke vom Abdomen gesondert.

Thorax lang gestreckt, bis etwa 6 mm lang, im Vorderteil etwa bis 1,2 mm dick, nach hinten meist deutlich an Dicke abnehmend, meist etwas gebogen, ventral schwach konvex, dorsal schwach konkav.

Branchialsipho (Fig. 27) gerade am Vorderende des Thorax gelegen, im zusammengezogenen Zustande gerundet kegelförmig, ungefähr so lang wie am Grunde dick, im gestreckten Zustande fast cylindrisch, ungefähr doppelt so lang wie am Grunde dick, im Basalteil etwas an Dicke zunehmend. Der Apikalrand des Branchialsiphos ist in einige verschieden grosse gleichschenklich dreiseitige Zipfel zerschlitzt, der Regel nach wohl deren 6, doch bei keiner der wenigen Personen mit unverletztem Branchialsipho regelmässig 6-lappig. Ringmuskulatur ziemlich kräftig, zu einem zumal hinten ziemlich dicken Sphinkter zusammengeschlossen.

A t r i a l s i p h o (Fig. 27) vorn an der Rückenseite in geringer Entfernung vom Branchialsipho, sehr verschieden weit vorragend,

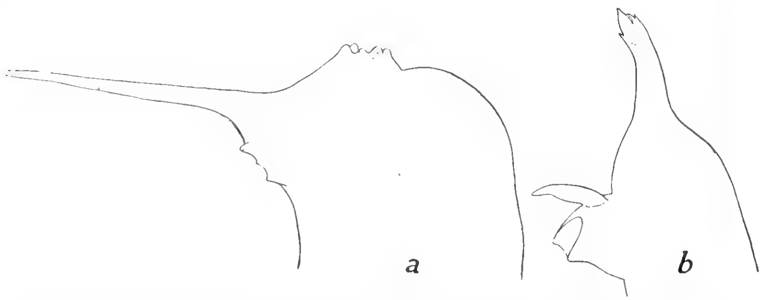

Fig. 27. *Macroclinum stewartense* n. sp. Umriss des Vorderendes des Thorax von 2 verschiedenen Personen; × 25.

in dem einen Äusserstfalle (Fig. 27 *b*) sehr kurz abgestutzt kegelförmig, in dem anderen Äusserstfalle sehr lang gestreckt, schornsteinförmig, schräg nach hinten oder etwas nach vorn hin abragend. Er ist basal etwas erweitert, am Apikalrande mit 2 oder 3 unregelmässig gestalteten, meist stumpfen Zähnen und mit einer in der Regel ganz einfachen, mässig lang zungenförmigen bis sehr lang und schlank lanzettlichen Atrialzunge, die bei kurzem, eingezogenem Atrialsipho eine sehr kurze Strecke vor dem Sipho zu stehen scheint, bei lang ausgestrecktem Sipho aber aus dessen Vorderlippe entspringt, oder an seiner Vorderwand etwas unterhalb des Randes der Vorderlippe steht. Ich mutmasse, dass diese Verschiedenheiten der Hauptsache nach Kontraktions- bezw. Erektionsverschiedenheiten sind; doch mag auch die Entfernung der Person von der gemeinsamen Kloakenöffnung einen Einfluss auf die Länge des Atrialsiphos und der Atrialzunge haben. Ringmuskulatur des Atrialsiphos sehr kräftig, zu einem sehr dicken Sphincter zusammen geschlossen. Auch Atrialzunge mit verhältnismässig kräftiger Muskulatur.

Abdomen gerade nach hinten hinragend, seitlich abgeplattet, bei gut gestreckten Personen beträchtlich kürzer, bei stark zusammengezogenen Personen kaum kürzer als der Thorax, nicht ganz so dick wie der Thorax, von dessen Hinterende er scharf abgesetzt ist.

Postabdomen die gerade Verlängerung des Abdomens bildend, von diesem durch eine ziemlich schnell vor sich gehende, aber nicht plötzliche Verengung abgesetzt, im allgemeinen viel dünner als das Abdomen, länger als Thorax und Abdomen zusammen, lang gestreckt walzenförmig, gegen das Hinterende höchstens sehr langsam an Dicke abnehmend. Da es mir nicht gelungen ist, ein Postabdomen vollständig herauszulösen, so kann ich über die Gestaltung seines Hinterendes und einen etwaigen Gefässanhang an demselben keine Auskunft geben.

Leibeswand im allgemeinen zart, nur an den Siphonen derber. Ringmuskulatur nur an den Siphonen (siehe oben!) kräftig ausgebildet, am Thorax ungemein zart, locker angeordnet. Längsmuskulatur am Thorax jederseits in etwa 9 bis 11 weitläufig gestellten, mässig dicken oder dünneren Bündeln, die zum Teil, nämlich die am weitesten ventral gestellten, nicht ganz genau parallel der Längsachse des Thorax verlaufen, sondern etwas ventralwärts hingeneigt sind. Im allgemeinen sind die mehr dorsal verlaufenden Längsmuskelbündel kräftiger als die mehr ventralen; doch kommen vielfach Unregelmässigkeiten vor. Vorn entspringen die Längsmuskelbündel grösstenteils am Branchialsipho, zum kleineren Teil (die zu äusserst dorsal verlaufenden) am Atrialsipho. Nach hinten verlieren sich die weitest ventral verlaufenden Muskelbündel, allmählich zarter werdend, mehr oder weniger dicht hinter der Mitte des Thorax; die übrigen, mehr lateral und dorsal verlaufenden gehen bis an das Ende des Thorax und weiter, als jederseits ein lockeres, zartes, breites Muskelband über das ganze Abdomen und auch das Postabdomen, wenigstens soweit das Postabdomen untersucht werden konnte, mutmasslich bis an dessen Hinterende.

Branchialtentakel fadenförmig, nicht ganz regelmässig abwechselnd etwas verschieden lang, etwa 16 an Zahl (nicht ganz sicher festgestellt).

Flimmerorgan anscheinend mit einfacher Durchbohrung.

Kiemensack mit 23 bis 25 Kiemenspalten-Zonen (nach genauer Auszählung von 8 günstig präparierten Personen); ungefähr 24 lange, schmale, parallelrandige Kiemenspalten in einer der breiteren, normalen Halbzonen. Gegen den Endostyl nimmt die Länge der Kiemenspalten schnell und stark ab, sodass hier eine gleichmässige Rundung der Kiemenspalten-Felder auftritt, deren ventrale Enden, repräsentiert durch die kleinste, lochförmige oder kurzovale äusserste Kiemenspalte, in beträchtlicher Entfernung vom Endostyl bleibt. Andererseits geht die Reihe der Kiemenspalten dorsal median ohne Verkürzung der Kiemenspalten und ohne Unterbrechung in die der Gegenseite über. Quergefässe gleich breit, mit je einem mässig starken, im allgemeinen einfachen Muskelbündel, das sich am ventralen Ende, gegen den Endostyl zu, spitzwinklig in 3 feinere Äste spaltet, einem sehr feinen mittleren und zwei etwas dickere äussere. Parastigmatische Quergefässe sind nicht vorhanden. Endostyl ziemlich breit, schwach gebogen. Dorsalfalten-Züngelchen im ganzen tentakelförmig, basal ziemlich dick, apikal schlank fingerförmig, ungefähr so lang wie eine gut gestreckte Kiemenspalte, hakenförmig gebogen.

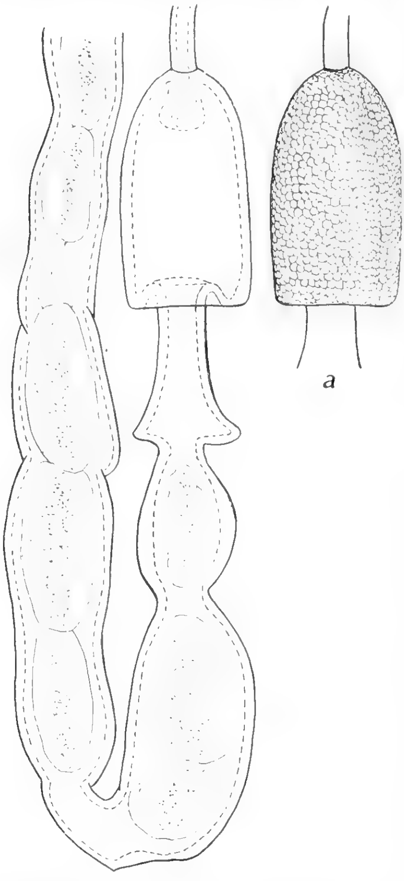

Fig. 28. *Macroclinum stewartense* n. sp. Mittlerer und hinterer Teil der Darmschleife in der Durchsicht, a = ein Magen in der Aufsicht; $\times$ 28.

Darm (Fig. 28) eine in ganzer Länge eng geschlossene, einfache, nicht gedrehte Schleife bildend. Ösophagus ziemlich kurz.

Magen im vorderen Teil des hinlaufenden Darmschleifen-Astes gelegen, gerade von vorn nach hinten gerichtet, seitlich abgeplattet, sein seitlicher Umriss dem eines länglichen Bogenfensters gleichend, Vorderrand gerundet vorspringend, Seitenränder parallel, Hinterrand in der Mitte eingesenkt. Der Magen ist oberflächlich glatt, ohne eigentliche Wulstbildung, höchstens gelegentlich (offenbar infolge von Kollabierung) mit unregelmässigen, manchmal in der Längsrichtung verlaufenden Falten. Es sind dagegen am Magen mehr oder weniger deutlich zwei sich gegenüberstehende Leitrinnen zu erkennen, denen eine Verdünnung des Wandungsepithels entspricht, und die manchmal auch äusserlich als Längsfurchen in die Erscheinung treten. Bei der Flächenansicht erscheint die Magenwandung unter starker Vergrösserung zart und ziemlich regelmässig polygonal gefeldert (Fig. 28*a*). Diese Felderung beruht auf besonderer Gruppierung der Epithelzellen. Wenn die Innenseite der Magenwandung auch nicht ganz so glatt ist wie die Aussenseite, so ist doch kein regelmässiges Vorspringen der einzelnen Felder nachzuweisen. Keinenfalls kann diese Felderung der Magenwandung mit der beim Typus der Gattung *Synoicum* (*S. turgens* Phipps) beobachteten, äusserlich vortretenden Wulstbildung, die zur Maulbeerform des Magens führt, gleich gestellt werden. Es ist augenscheinlich eine Sonderbildung. Die Felder der Magenwandung bei *Macroclinum stewartense* sind auch viel kleiner, im Durchschnitt etwa 30 μ breit, als die äusserlichen Wulstpapillen von *Synoicum turgens*, die bei einem von mir untersuchten Stück durchschnittlich etwa 200 μ breit sind. Das Hinterende des Ösophagus ist bei *Macroclinum stewartense* zur Bildung eines scharf ausgeprägten Cardiawulstes weit in das Vorderende des Magens eingedrückt und springt stummelförmig in dessen Lumen ein. Durch Einsenkung des mittleren Teils der Hinterwand des Magens wird andererseits ein weniger scharf ausgesprochener, niedriger Pylorusswulst gebildet. Der Mitteldarm ist kurz, nur gut halb so lang wie der Magen, seitlich abgeplattet, im Umriss ungefähr trompetenförmig, anfangs sehr schmal, nur etwa $^1/_4$ so breit wie der Magen, von dem er sehr scharf abgesetzt ist, parallelrandig. Am Hinterende erweitert er sich wie der Schalltrichter einer Trompete, um sich dann plötzlich unter Bildung einer scharfen Ringkante wieder zu verengen. Ausser dieser verschiedenen Gestalt des Vorder- und Hinterteils ist eine weitere Sonderung dieses

Mitteldarms nicht erkennbar, doch erscheint es mir fraglich, ob nicht auch der nächstfolgende, meist ziemlich deutlich als länglich ovaler Abschnitt gesonderte Darmteil zum Mitteldarm zu rechnen sei. Bei dieser letzteren Annahme würde der trompetenförmige Teil als Nachmagen, der länglich ovale Teil als Drüsendarm anzusprechen sein. Der Enddarm bildet den hinteren Teil des hinlaufenden Darmschleifen-Astes und den ganzen rücklaufenden Darmschleifen-Ast. Er ist mässig weit und zeigt in der Regel mehrere scharfe Einschnürungen. Die darmumspinnende Drüse besteht aus sehr dünnen, anscheinend netzartig zusammengefügten Schläuchen. Ich zählte ungefähr 30 Schlauchquerschnitte im Umkreis eines Enddarmquerschnittes. Der After liegt weit hinter der Mitte des Thorax, bei mehreren näher untersuchten Personen gleicherweise über der sechstletzten Kiemenspalten-Zone. Er ist mit zwei scharf abgesetzten, im allgemeinen glattrandigen, aber etwas unregelmässig welligen Afterlippen ausgestattet.

Geschlechtsorgane in annähernder Vollständigkeit nur an einer einzigen Person gesehen, in einem Bruchstück, das aus dem Hinterende des Abdomens und einem grossen Vorderteil des Postabdomens besteht. Gonaden sämtlich im Postabdomen. Ovarium vorn im Postabdomen, eine sehr kurze Strecke hinter dem Wendepol der Darmschleife, gelegen. Eine hervorragend grosse, fast 0,6 mm lange und 0,4 mm dicke noch am Ovarium haftende Eizelle hat eine bruchsackartige Vorwölbung der Leibeswand verursacht und ragt somit weit in den Zellulosemantel hinein. Eileiter nicht deutlich erkannt. Hode aus einer ziemlich grossen Zahl (etwa 20?) unregelmässig birnförmiger Hodenblasen bestehend. Die Hodenblasen bilden eine unmittelbar hinter dem Ovarium beginnende und von hier nach hinten gehende, nicht ganz einfache gedrängte Reihe. Die einzelnen Hodenblasen oder kleine Gruppen von 2 oder 3 Hodenblasen verursachen ähnliche, mehr oder weniger deutlich ausgeprägte bruchsackartige Hervorwölbungen der Leibeswand wie die grosse Eizelle. Es erscheint mir fraglich, ob diese Hervorwölbungen einen normalen, auch am lebenden Tier vorhandenen Zustand darstellen. Vielleicht handelt es sich hier nur um eine postmortale Schrumpfungserscheinung. Samenleiter als mässig und gleichmässig dicker, prall mit Sperma gefüllter Strang in fast gerader Erstreckung nach vorn gehend, eng an den Enddarm angeschmiegt, durch das ganze Abdomen hindurch und in den Thorax hinein.

Erörterung. Diese neue Art erinnert durch ihre äussere Tracht sehr an *Synoicum turgens* Phipps[1]; doch kann sie bei dem jetzigen Stande unserer Wissenschaft nicht mit dieser Art in einer Gattung vereinigt, also nicht zu *Synoicum* gestellt werden, da die Gestaltung des Magens wesentlich von der bei *Synoicum* abweicht (siehe oben!).

Vielleicht steht *Macroclinum stewartense* dem *M. pyriforme* (Herdm.)[2] von den Kerguelen nahe, das ebenfalls birnförmige Kolonien bezw. Kormidien bildet. *M. pyriforme* zeigt jedoch mehrere Systeme in je einem Kormidium und scheint auch jeglicher Inkrustierung zu entbehren.

Wie oben auseinandergesetzt, scheint *M. stewartense* durch Vermittlung von *M. arenaceum* auch zu einer *Amaroucium*-Art, *A. coeruleum* Sluit., in verwandtschaftlicher Beziehung zu stehen.

Macroclinum fungosum (Herdm.)?

? 1886, *Polyclinum fungosum* Herdman, Rep. Tunic. Challenger II, p. 1901, Taf. XIV Fig. 15—23.

1900, *Polyclinum fungosum*, Sluiter, Tunic. Stillen Ocean, p. 10, Taf. I Fig. 6.

Vorkommen im Gebiet: Chatham-Inseln, Waitangi (Sluiter 1900).

Weitere Verbreitung: ? New South Wales, Port Jackson (Herdman 1886).

Die Richtigkeit der Bestimmung des Chatham-Materials durch Sluiter erscheint mir sehr fraglich. Bei der Lückenhaftigkeit der Herdman'schen Originalbeschreibung ist es wohl kaum möglich, ohne Vergleich mit typischem oder wenigstens lokaltypischem Material jene südostaustralische Art in Stücken aus fern gelegenen Gebieten sicher wiederzuerkennen, ist doch aus der Original-Beschreibung nicht einmal zu erkennen, in welcher Weise das Postabdomen mit dem Abdomen zusammengehangen haben mag. Vielleicht ist die Chatham-Form auch mit einer der oben beschriebenen *Macroclinum*-Arten identisch.

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[1] R. Gottschaldt, 1894, Synasc. Bremer Exp. Spitzbergen, p. 347, Taf. XXIV Fig. 2, Taf. XXV Fig. 6—8.

[2] *Polyclinum pyriforme* W. A. Herdman, 1886, Rep. Tunic. Challenger II, p. 1888, Taf. XXVI Fig. 1—4.

Gen. **Polyclinum** Sav.

Polyclinum cerebrale n. sp.

Fundangaben: Neuseeland, Nord-Insel, vor New Plymouth, 8 Fd., harter Grund; 12. Jan. 1915 (Typus).

Stewart-Insel, ca. 35 Fd., Sandgrund; 20. Nov. 1914.

Beschreibung: Koloniegestaltung (Fig. 29): Das typische Stück von New Plymouth ist kissenförmig, von ovalem Umriss, an der Unterseite in Anpassung an den gewölbten Untergrund etwas ausgehöhlt, an der Oberseite stark gewölbt, mit gerundeten Kanten, 57 mm lang, 45 mm breit und in der Mitte ca. 20 mm hoch. Einige Kolonien von der Stewart-Insel sind mehr pilzförmig, ebenso hoch, aber schmäler und basal etwas verengt.

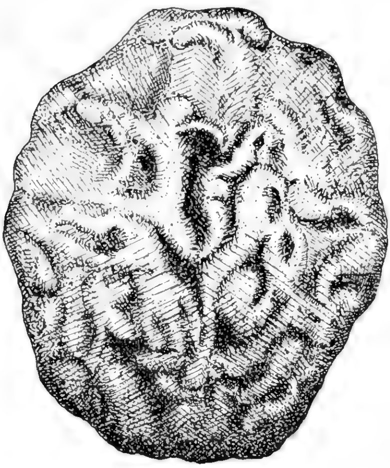

Fig 29. *Polyclinum cerebrale* n. sp. Ganze Kolonie; × 9/8.

Aussehen der Kolonie ganz abhängig von dem oberflächlich sehr dicht eingelagerten Inkrustationsmaterial, bei der Kolonie von New Plymouth dunkel sandgrau, fast schwarz, bei den Kolonien von der Stewart-Insel hell gelblich sandgrau.

Oberfläche der Kolonie (Fig. 29) infolge der Inkrustierung im feineren sehr rauh, an der Oberseite mit mäandrisch verlaufenden, stark erhabenen, schmalen Wülsten, die der Kolonie ein an das Menschenhirn erinnerndes Aussehen verleihen. Breite der Wülste durchschnittlich etwa 4 mm, Höhe ca. 2 mm. Diese Wulstbildung hängt zweifellos mit der Anordnung der Personensysteme zusammen. Einige Kloakalöffnungen von unregelmässiger Gestalt glaube ich in dem engen Furchennetz zwischen den Wülsten erkannt zu haben (an dem Austreten von Flüssigkeit bei leichter Pressung der Kolonie). Branchialöffnungen jedenfalls unscheinbar (nicht erkannt).

Zellulosemantel weich knorpelig, von Gummi elasticum-Konsistenz, im allgemeinen durchscheinend, ohne Blasenzellen, mit zahlreichen zarten Sternchen- und Spindelzellen sowie grobgranulierten, am konservierten Objekt hellgrauen Rundzellen (verblassten Pigmentzellen?). Der Zellulosemantel ist zumal in den oberen, von den Personen eingenommenen Schichten ziemlich stark mit grobem Sand und ähnlichen Fremdkörpern durchsetzt. In der Oberflächenschicht steigert sich diese Fremdkörper-Einlagerung zu einer sehr dichten Schicht, in den unteren, personenlosen Schichten ist die Fremdkörper-Einlagerung dagegen sehr spärlich, sodass der Zellulosemantel hier fast durchsichtig ist.

Personen mit Ausnahme des sehr leicht abreissenden Postabdomens ziemlich leicht aus dem Zellulosemantel herauszulösen, im allgemeinen parallel zu einander und senkrecht zur Oberseite der Kolonie gestellt, die unteren Schichten der Kolonie frei lassend, ohne Gefässanhang, aber einschliesslich des Postabdomens, falls dieses nicht zur Seite abgebogen ist, etwa 7 mm lang, wovon der lange Thorax ungefähr die Hälfte, das etwas kürzere Abdomen etwa ein Drittel einnimmt.

Fig. 30. *Polyclinum cerebrale* n. sp. Umriss der Branchialsiphonen von 4 verschiedenen Personen : × 55.

Thorax lang gestreckt, annähernd cylindrisch, vorn in kaum verminderter ganzer Breite durch den scharf abgesetzten Branchialsipho abgeschlossen, hinten ein wenig verengt und dann plötzlich gerade quer oder etwas schräge abgestutzt, in den hinteren und mittleren dorsalen Teilen zur Bildung eines unscharf begrenzten Brutraumes etwas aufgebläht.

Branchialsipho (Fig. 30) gerade am Vorderende des Thorax, bei regelmässiger Streckung von der Gestalt eines abgestutzten Kegels, dessen Böschungswinkel etwa 45° beträgt. Branchialöffnung von der etwas ausgeweiteten Abstutzungskante dieses Kegels gebildet, nicht regelmässig radiär gestaltet, nur selten annähernd gleichmässig 6-strahlig gebaut, in 6, ausnahmsweise auch 8 meist schlanke Zipfel auslaufend. Das Mindestmass der von mir angetroffenen Unregelmässigkeiten bestand darin, das einer der 6 Zipfel beträchtlich verbreitert, zungenförmig, war. Meist ragt dieser breitere Zipfel — es scheint der dorsalmediane zu sein — auch viel weiter vor als die übrigen. Es kommt auch vor, dass zwei dorsale Zipfel bis zu grösserer Höhe mit einander verwachsen sind und nun gemeinsam weiter vorragen. Die Ringmuskulatur des Branchialsiphos ist sehr schwach entwickelt. Sie besteht aus einer nicht ganz eng geschlossenen einfachen Schicht dünner Muskelbündel, die nur gegen den Öffnungsrand des Siphos etwas enger aneinander rücken und hier eine geschlossene Schicht bilden.

Der Atrialsipho sitzt vorn an der Rückenseite. Er ist nur schmal und sehr kurz, quer oval, mit ziemlich kräftiger, eine geschlossene Schicht bildender Ringmuskulatur und ungelapptem Rande. Dicht vor dem Atrialsipho steht eine bei den zur Untersuchung gelangten Personen meist an der Basis abgerissene Atrialzunge. Nur an einer Person war ein beträchtliches Stück der Atrialzunge erhalten geblieben, anscheinend das basale Rudiment eines lang zungenförmigen, an der Basis ein wenig verschmälerten Organes.

Abdomen viel kürzer und enger als der Thorax, entsprechend der charakteristischen Biegung und Drehung der Darmschleife (siehe unten!) gestaltet, scharf abgesetzt vom Thorax, von dessen dorsaler Hinterecke es nach hinten ragt.

Postabdomen lang und schlank gestielt, mit schlank birnförmigem bis dick spindelförmigem Hauptraum, im ganzen fast so lang wie der Thorax, etwas hinter der Höhe des Magens aus dem Abdomen entspringend. Von dem meist kegelförmig zugespitzten Hinterende des Postabdomens geht ein anscheinend stets unverzweigter, sehr langer und sehr dünner, durch eine Längsscheidewand zu einer Doppelröhre gebildeter Gefässanhang aus. Grösste beobachtete Länge eines Gefässanhang-Bruchstückes 1,8 mm. Ein Blindenden-Bruchstück zeigte eine birnförmige Anschwellung mit anscheinend einfachem Lumen.

Leibeswand zart, mit spärlicher, charakteristisch angeordneter Muskulatur. Ringmuskulatur anscheinend ganz auf die Siphonen beschränkt, am Branchialsipho sehr zart und im allgemeinen sehr weitläufig, nur gegen den Öffnungsrand etwas dichter und auf die Siphonenlappen übertretend, am Atrialsipho in geschlossener, mässig dicker Schicht einen schmalen Sphincter bildend, an der Basis des Atrialsiphos sowie an der Atrialzunge dagegen wieder sehr zart und sehr weitläufig. Längsmuskulatur der Hauptsache nach in etwa 24 gleichmässig und weitläufig verteilten, ziemlich regelmässig radiär angeordneten Bündeln vom Branchialsipho ausgehend und ungefähr über das vordere Drittel des Thorax verlaufend. Das Vorderende der Längsmuskelbündel verliert sich unter Zerfaserung im vorderen Teil des Branchialsiphos, dicht an der Basis der Siphonenlappen. Hinten enden die Längsmuskelbündel unter allmählicher Verschmälerung (nicht unter Zerfaserung) vor der Mitte der Thorax-Länge. Auch vom Atrialsipho gehen Längsmuskeln aus. Diese sind jedoch viel zarter und nicht zu dickeren Bündeln zusammengefasst, sondern bilden eine fast gleichmässige, nahezu geschlossene, wenn auch sehr dünne Schicht. In schräger Richtung die Längsmuskelbündel des Branchialsiphos kreuzend, verlaufen diese atrialen Längsmuskeln eine kurze Strecke über den vorderen dorsalen Teil des Thorax hin. Einige wenige zarte Längsmuskelbündel, die sich anscheinend an die atrialen Längsmuskeln anschliessen, verlaufen auf der Atrialzunge.

Branchialtentakel etwa 32, wenn nicht mehr, schlank fadenförmig, abwechselnd sehr verschieden gross, dicht in einem nicht ganz einfachen Kreise angeordnet, ihre Basis je nach der Grösse etwas weiter nach hinten, aber nicht ganz aus dem Kreise heraus gerückt.

Flimmerorgan nicht ganz sicher erkannt (nur im optischen Längsschnitt), anscheinend mit einfacher Öffnung.

Kiemensack lang gestreckt, mit 16 bis 18 Kiemenspalten-Zonen und etwa 14—17 lang gestreckten Kiemenspalten in einer Halbzone. Quergefässe ziemlich breit und annähernd gleich breit, mit je einem schmalen Muskelbündel, das sich sowohl am dorsalen wie am ventralen Ende gabelt, und an der Innenseite mit einer ziemlich eng geschlossenen Reihe warzenförmiger, basal in der Querrichtung etwas breiter ausgezogener Papillen, deren Zahl nur wenig geringer ist als die der Kiemenspalten, nämlich etwa 12 oder 13 in einer Halbzone beträgt. Parastigmatische Quergefässe fehlen gänzlich. Endostyl sehr schmal, fast gerade gestreckt, an den Enden kaum merklich eingebogen, am Hinterende in eine verhältnismässig ziemlich breite Retropharyngealrinne übergehend, die in scharfer Abknickung fast senkrecht zum Endostyl verläuft und in geradliniger Erstreckung parallel der letzten Kiemenspalten-Zone die Hinterfläche des Kiemensackes durchsetzt. Dorsalfalten-Züngelchen ziemlich kurz und plump, kürzer als die normalen Kiemenspalten, scharf hakenförmig gebogen, dicht neben (wenn nicht gerade in?) der dorsalen Medianlinie stehend, jedenfalls nicht beträchtlich weit aus derselben heraus gerückt.

Darm eine enge, in ganzer Länge geschlossene Schleife bildend; die Schleife macht im Anfangsteil eine einfache Krümmung, sodass der Magen aus der Längsrichtung mehr oder weniger herausgebogen erscheint; der hintere Teil der Schleife mit dem Wendepol bildet die charakteristische Drehung um die Längsachse, manchmal zugleich auch eine mehr oder weniger starke Krümmung. Magen olivenförmig, glattwandig; Cardia und Pylorus nicht genau an den Polen, sondern einander etwas genähert. After mit zwei grossen, gerundeten, glattrandigen Lippen, ungefähr in der Mitte des Thorax gelegen.

Geschlechtsorgane: Personen zwittrig. Hode aus einer grossen Zahl (durchschnittlich etwa 30?) von dicken, ballenförmigen Hodenblasen bestehend, die den grössten Teil der spindelförmigen Anschwellung des Postabdomens einnehmen. Samenleiter ziemlich dick, bei den untersuchten Personen stets in ganzer Länge prall mit Samenmassen gefüllt. Ovarium im vorderen Teil der Anschwellung des Postabdomens neben der Hode. Eileiter zartwandig, eng an den Samenleiter angeschmiegt. Als Brutraum dienen die etwas aufgeblähte Atrialhöhle und die Peribranchialhöhlen. Ich fand bis 34 Embryonen und geschwänzte Larven in einem solchen Brutraum. Die verhältnismässig kleinen, anscheinend ausschlüpfreifen geschwänzten Larven erreichen eine Rumpflänge von etwa $^1/_2$ mm. Es fanden sich in einem Brutraum gleichzeitig Embryonen bezw. Larven verschiedener Entwicklungsstadien. Die weiter entwickelten liegen in der Regel weiter vorn, näher der Atrialöffnung, doch kommen stets auch Unregelmässigkeiten der Anordnung vor.

Erörterung. *P. cerebrale*, ein *Polyclinum* im engeren Sinne Hartmeyer's, steht anscheinend dem *P. isipingense* Sluiter[1]) von Natal nahe, unterscheidet sich aber von diesem unter anderen durch die

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[1]) C. Ph. Sluiter, 1897, Tunic. Süd-Afrika, p. 21, Taf. II Fig. 1, Taf. IV Fig. 3.

viel grössere Zahl der Kiemenspalten, nämlich in einer Halbzone 14—17, gegen 7 bei *P. isipingense.* Nach Sluiter sollen zwar "gewöhnlich 14 von letzteren in einer Reihe" stehen. Aus der Abbildung Taf. IV Fig. 3 geht aber hervor, dass unter "Reihe" eine "Ganzzone" zu verstehen ist, denn es finden sich 5—7, meist 7 Kiemenspalten in den gezeichneten Halbzonen. In der Gestaltung der Kolonie zeigt *P. isipingense* (l. c. Taf. II Fig. 1) eine gewisse Ähnlichkeit mit der neuen Art; doch sind bei *P. isipingense* die Lappen und Wülste der Kolonie im allgemeinen viel breiter. Es sind hier offenbar unregelmässige und morphologisch unwesentliche Bildungen, anscheinend keine charakteristischen, auf der Anordnung von Personensystemen beruhende Oberflächenbildungen wie bei *A. cerebrale.*

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Verzeichnis der im beschreibenden Teil angeführten Gattungen und Arten.

Mitteilungen über neue Organisationsbefunde, so auch Beschreibung neuer oder ungenügend bekannter alter Arten, sind durch Fettdruck der betreffenden Seitenzahlen hervorgehoben, ebenso Diagnosen neuer Gattungen und geänderte Diagnosen alter; Synonyme und fragliche Arten durch eckige Einklammerung gekennzeichnet.

10—11—1924.

Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XXIII.

Sponges from New Zealand. Part I.

By

H. V. Brøndsted, Birkerød.

This paper is the first part of a treatise on the sponges collected by Dr. Mortensen at New Zealand in 1914—15. It contains a report on the Tetraxonida; a second and concluding part will deal with the groups Euceratosa and Calcarea; Hexactinellida are not represented in the collection. In the second part, which is in preparation, a general discussion of the sponge-fauna of New Zealand will be given.

The material is, as most material from expeditions, in a state of preservation only permitting coarser investigations; it is partly preserved in rather thin formaline, and specimens thus preserved are nearly all slimy and a good deal macerated; also Dendy has had the same experience (7,[1]) pag. 272).

I take the opportunity here to express my deep sense of gratitude towards Dr. Mortensen for handing me over this most interesting collection. It forms a very important supplement to the report on the sponges of the "Terra-Nova" Expedition, so admirably dealt with by Dendy 1924 (7), and very considerably increases our knowledge of the New Zealand sponge fauna.

Order **Tetraxonida**.

Suborder **Astrotetraxonida**.

Myriastra biformis nov. spec.

(Fig. 1, a—e.)

Off New-Plymouth. 8 fathoms. Hard bottom. 12/I.1915.

One little specimen, globular, 23 mm in diameter; surface strongly hispid; one osculum (?) at the side of the body, flush with the surface.

[1]) The numbers correspond to the literature-list.

There is a not very distinct cortex, about 0,25 mm thick. Consistence hard, colour grey and white.

The *skeleton* is typically radiate, the primary fibres are mostly built up of triaenes; they are running perpendicularly towards the surface. The spicules are not densely packed, hence the groundsubstance must be very tough, as the consistence of the sponge appears rather hard; the outermost placed triaenes are mainly orthotriaenes with recurved cladi; long dermal oxea are projecting out from the sponge body, being placed perpendicularly towards the surface between the dermal brushes of the primary fibres. Chiasters are found everywhere in the body.

Spicules: 1. Orthotriaenes (fig. 1 a, b), shaft straight, thickest at the base, tapering evenly towards the generally sharp-pointed apex; about $2000 \times 42\ \mu$; the cladi are straight or more or less recurved, tapering towards the sharp-pointed or somewhat blunt apices; width of cladome about $320\ \mu$. 2. Anatriaenes (fig. 1 c); shaft straight, slender, generally sharp-pointed; length up to $2000\ \mu$, thickness $24\ \mu$; cladi short, width of cladome ca. $92\ \mu$. 3. Oxea, (fig. 1 d); slender, thickest in the middle, evenly tapering, sharp-pointed or a little blunt; about $1700 \times 29\ \mu$. 4. Cortical oxea; of the same shape as 3, but only ca. $1100 \times 17\ \mu$; intermediate sizes between the two forms occur. 5. Chiasters (fig. 1 e); with numerous comparatively short tylote rays; total diameter about $10\ \mu$.

Stelletta novae-zealandiae nov. spec.

(Fig. 2 a—e.)

2 miles East of North Cape, N. Z. 55 fathoms. Hard bottom. 2/I. 1915. One specimen.

The body is nearly spherical, though provided with a ridge half way round; greatest diameter 19 mm; surface hispid. No oscula are to be seen. There is a dense and hard cortex, ca. 1 mm thick, very fibrous, of whitish colour. Numerous lacunes, up to 1 mm in diameter are situated just beneath the cortex, leading into wide canals; there are many more canals in the outer part of the sponge-body than in the interior. The dermal-membrane is densely packed with an one-layered crust of oxyasters. Colour dark grey. Consistence hard.

The *skeleton* is distinctly radially arranged; bundless of triaenes and oxea are running vertically towards the surface from the centre of the sponge-body; there are no special cortical brushes of megascleres; the fibres of the interior run right through to the surface; the big dichotriaenes are, however, mainly restricted to the

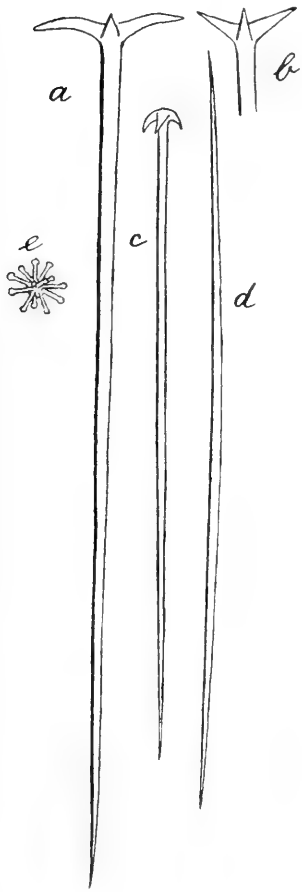

Fig. 1. *Myriastra biformis* nov. spec. *a*. Orthotriaene with recurved cladi. *b*. Orthotriaene with straight cladi. *c*. Anatriaene. *d*. Oxeote. *e*. Chiaster.

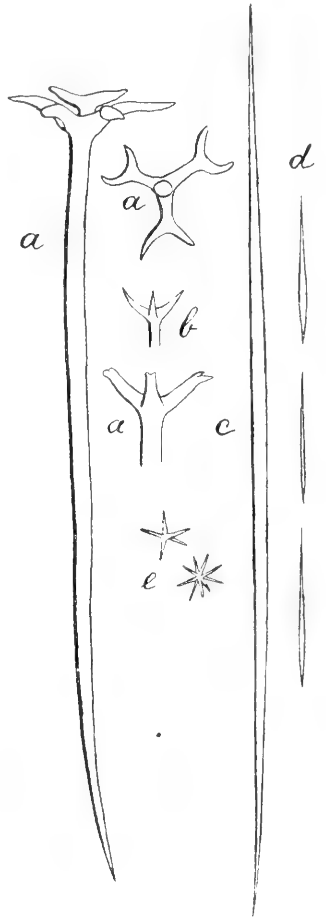

Fig. 2. *Stelletta novae-zealandiae* nov. spec. *a*. Dichotriaenes. *b*. Plagotriaene. *c* Large oxeote of the main skeleton. *d*. Small oxea of the cortex.

distal part of the fibres, the cladome of those outermost placed often pierce the dermal-membrane; this latter is sustained by a single layer of densely packed oxyasters; small cortical oxea, mainly placed vertically towards the surface, contribute to make the sponge hispid; several of the oxea are also placed pell-mell in the cortex, tending, however, to form brushes. In the interior of the sponge-body oxyasters are assembled in greater numbers, especially in places, where megascleres are only scantily found.

Spicules. 1. Dichotriaenes (fig. 2 a); shaft generally thickest at the base, then for a smaller part even, and then again tapering towards the sharp-pointed apex; length varying from, say, 1500—3000 μ by a thickness of about 50 μ. The primary cladi are issuing from the shaft at the usual oblique angle, the secondary cladi, of about the same length as the primary ones, are mainly directed perpendicularly towards the shaft; they are conical and generally rather sharp-pointed; entire width of the cladome about 350 μ; some of the dichotriaenes, however, have cladomes, which are only very slightly branched, and, as a matter of fact, all intermediate forms between dichotriaenes and plagotriaenes occur. 2. Plagotriaenes (fig. 2 b); generally more slender than the dichotriaenes; length the same, but thickness only 30—40 μ. 3. Oxea (fig. 2 c); slightly curved, thickest in the middle, tapering evenly to the sharp-pointed apices; 1200—3000 × 45 μ or less. 4. Cortical oxea (fig. 2 d); straight, thickest near the middle, rarely just in the middle, tapering evenly to the sharp-pointed apices; 200—400 × 10 μ. 5. Oxyasters (fig. 2 e); with from 4—10 long, sharp-pointed, conical rays, only a small body; entire diameter 26—32 μ.

Stelletta sandalinum nov. spec.

(Fig. 3, a—e.)

Slipper Island; the coast, at low water. 20/XII.1914.

2 specimens, only fragments, flesh-coloured, somewhat flattened, 55 mm in largest diameter, about 15 mm thick. The sponges are unfortunately preserved in formaline, therefore rather macerated. Where the surface is intact it is coarsely hispid. No oscula are to be seen. Through the dermal-membrane are seen the ends of numerous narrow canals giving the sponge an appearance, when seen through a pocket lens, as if it were pricked with a needle all over. The cortex is thick and rather hard, being built up of the densely packed brushes of plagotriaenes; it is up to 2 mm thick.

The *skeleton* is rather lax in the interior, consisting of rather irregularly placed spicule-tracts; the external skeleton is, as said before, made up of cortically placed brushes of plagotriaenes so densely packed together, that they form a crust; the cladomes are placed just beneath the dermal membrane, which is sustained by a single layer of small spherasters; these latter together with the oxyasters also occur in great numbers in the interior of the sponge.

Spicules. 1. Plagotriaenes (Fig. 3 a); shaft stout, long conical, tapering evenly to a very sharp point, straight or a little curved; the cladi are placed obliquely to the shaft; they are short, conical, sharp pointed or blunt; shaft about 2000—2500 × 80 μ at the base; the cladi are about 160 μ long, at the base just as thick as the shaft. 2. Dichotriaenes (fig. 3 b); of the same shape and dimensions as the plagotriaenes; the cladi often several times bifurcated. 3. Oxea (fig. 3 c); rather slender, fusiform, slightly bent at the middle, sharp-pointed, 2000—3000 × 52 μ; they are mainly restricted to the interior of the sponge, but may also partake in the building up of the cortex, being intercalated between the plagotriaenes. 4. Oxyasters (fig. 3 d); with rather few slender, sharp-pointed rays; no sphere; about 50 μ in greatest diameter. 5. Spherasters (fig. 3 e); with relatively big centra and short truncated rays, about 8 μ in total diameter.

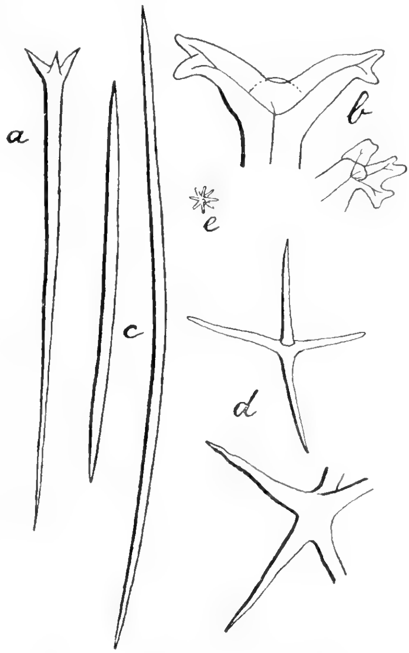

Fig. 3. *Stelletta sandalinum* nov. spec. *a.* Plagotriaene. *b.* Dichotriaenes. *c.* Oxea. *d.* Oxyasters. *e.* Spheraster.

Ancorina alata, Dendy.

Dendy (7), p. 298. Pl. V, figs. 1—2; Pl. VIII, figs. 1—7.

We have this beautiful and well marked sponge from two localities: New-Plymouth. 8 fathoms. Hard bottom. 12/I.1915. — North

Channel, Kawaii Isl., Hauraki Gulf. 10 fathoms. Hard bottom. 29/XII.1914. The specimen from the first locality is massive in outer form, not lamellar; the surface exhibits all over subglobular prominences as seen on Dendy's fig. 2, Pl. V to the left. The specimen from the second locality is only a fragment; the sponge has apparently been lamellar. General structure, skeletal arrangement, and spicule-measurements agree closely with the type.

Hitherto known from 7 miles E. of North Cape, N. Z.

Penares tylotaster Dendy.

Dendy (7) pag. 303, Pl. VII, figs. 16—19.

Three specimens, the two only fragments, somewhat macerated; all from Slipper Isl., the coast, at low water. 20/XII.1914.

The cortex is very distinct, may easily be peeled off from the soft choanosome. The skeleton agrees very well with that of the type. There are rather few dichotriaenes, the tetractines mostly being orthotriaenes of the same size and situated in the same manner as the former. As the two spicula-forms may substitute one another in the same individual, and none of them are very numerous, I see no necessity for laying any stress upon this divergence from the type as being of any taxonomic value. The oxea only attain a length of ca. 1000 μ and there are all intermediate stages between these and the small ones of ca. 25 μ; some of them have the apex narrowly constricted. The tylasters are here about 12—14 μ in total diameter. Some styli of about 800 μ occur; they are mostly a little pathologic in structure, f. i. exhibit beginnings to twin structures.

Hitherto known from 7 miles E. of North Cape, N. Z.

Geodia regina Dendy.

Dendy (7) pag. 308, pl. V, fig. 5; pl. VIII, fig. 16—22.

Slipper Isl. The coast, at low-water. 20/XII.1914.

Two specimens of somewhat irregularly subspherical outline, attached with a broad base to a stone. The structure agrees pretty well with that of the type. The spicule-measurements are: Dichotriaenes 2000—3000 μ; anatriaenes and protriaenes 4000—5000 μ; oxea 2000—3000 μ; cortical oxea about 250 μ; sterrasters 110—160 μ; oxyspherasters 12—30 μ. I have not seen the cortical anatriaenes.

Hitherto known from 7 miles E. of North Cape, N. Z.

Geodinella vestigifera Dendy.

Dendy (7) pag. 313, Pl. VIII, figs. 29—37.

2 miles East of North Cape. 55 fathoms, hard bottom, 2/I.1915.

Outer appearance and skeletal arrangement agree very well with the type. The same spiculation is also found and of nearly the same dimensions; it is very curious that the styli are here likewise often abnormal; several of them bear the mark of being of tetraxonoid origin, which is proved by their having the axial canal split up into three branches at the base; other indications of the same fact are given by Dendy, and are also seen here. The choanosomal oxea are often centrotylote. The short curved oxea measure down to about 200 μ, and transitory stages between these and the bigger ones are found.

Hitherto known from Spirits Bay, near North Cape, N. Z,

Monosyringa nov. gen.

Stellettidae with the body produced into a special cloacal tube, which has its own special skeleton built up of orthodiaenes. The microscleres are oxyasters, chiasters, and trichodragmata.

This is an extremely interesting new genus; as will be seen from the description of the species it comes very near to *Tribrachium* and *Disyringa,* mainly differing from these in having chiasters and no sanidasters. There are now two possibilities: 1. *Monosyringa* is a converging genus, which has developed the curious cloacal tube independently; this view is sustained by the fact, that the genus does not possess sanidasters, but chiasters. Or 2. *Monosyringa* is really closely related to the two mentioned genera; this view is sustained by the construction of the tube, which is nearly identical with that of the two others; but if there is a close relationship, then the occurence of sanidasters is of no far-reaching taxonomic value. The question cannot be solved as yet. I should, however, think, that the former view is the right one: A cloacal tube should, I think, more easily be produced, than a new type of aster, involving a lesser alteration of the genotypical construction; at least it seems that the cloacal tube may be an answer to environmental influence[1]) while we can hardly imagine environmental influences to alter the asters; consequently an alteration of the asters must evidently be due to a higher degree of germinal variation than the production of the cloacal tube.

Monosyringa Mortenseni nov. spec.
(Fig. 4 a—g.)

10 miles N.W. of Cape Maria van Diemen. 50 fathoms. Hard bottom, 5/I.1915. One specimen, but only the cloacal tube, 30 mm long, 3 mm thick. Three Kings, 65 fathoms, hard bottom, 5/I.1915. One specimen, likewise only the cloacal tube. Colville Channel, 35 fathoms, sand and mud. 5/I.1915. One beautiful specimen.

The body is spherical, 20 mm in diameter; the surface of the body is completely covered with sand, fragments of shells, etc.; the sandgrains can only with difficulty be removed from the sponge; where they have been there are seen small corresponding hollows in the surface of the sponge; other orifices than those at the top of the cloacal tube could not be detected; the cloacal tube is distinctly set off from the main body; it is completely free from foreign particles at the surface, white of colour, cylindrical, curved, ca. 30 mm long, 4.5 mm in diameter; the outermost part of the tube in all three specimens is, unfortunately, damaged, perhaps torn off. Consistence hard.

The *skeleton of the body* is distinctly radially arranged; it consists of long spicula-fibres running from the center of the sponge to the surface, projecting a little beyond this; the fibres are composed of oxea and orthotriaenes, the latter mainly restricted to the outermost part of the fibres; there is a distinct fibrous cortex, about 0,5—1 mm thick, and of a somewhat bluish colour, resembling porcelain; all the sponge-tissues are crowded with microscleres; in the cortex the asters and trichodragmata are often lying in definite strands; both forms of microscleres, especially the tricho-

[1]) Perhaps even many tetraxonoid sponges may be able to produce such a tube when covered by sediments, which has evidently been the case with the specimens found of the three mentioned genera.

dragmata, also lie packed close together in the septa, which divide the several subcortical crypts from one another.

The *skeleton of the cloacal tube* consists of an axis composed of shafts of stout orthodiaenes and oxea; the stronger cladus of the orthodiaenes projects vertically outwards from the axis; they are placed in stories in the same plane, one above another, connected with thin lamellae of organic tissues, thus building septa dividing the entire cloacal tube into 4—6 canals; the outer walls of these canals are made up of a dermal-membrane suspended between the apices of the overgrown cladi of the orthodiaenes from row to row; the dermal-membrane and the lamellae separating the clocal canals are sustained by microscleres. The cloacal canals are only prolonged a few mm into the sponge-body, they are here in connection with numerous finer canals lying in the sponge-body itself.

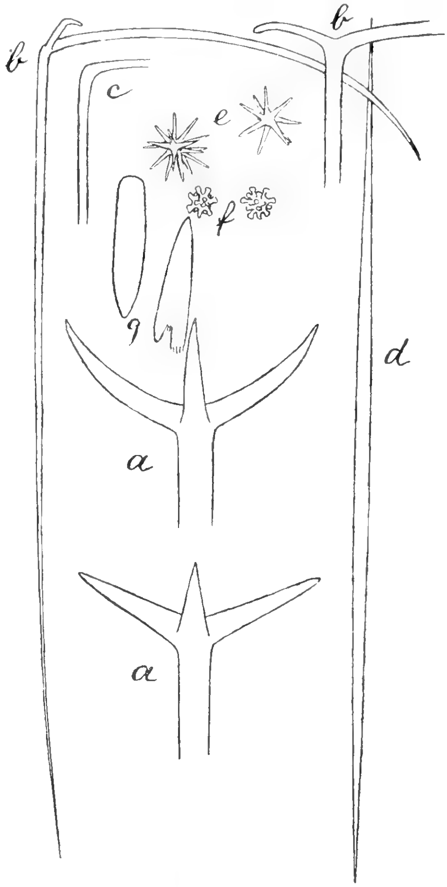

Fig. 4. *Monosyringa Mortenseni* nov. spec. *a*. Orthotriaenes. *b*. Orthodiaenes. *c*. Orthomonaene. *d*. Oxeote. *e*. Oxyasters. *f*. Chiasters. *g*. Trichodragmata.

Spicules. 1. Orthotriaenes (fig. 4 a), in the main body; shaft straight or slightly bent near the base, evenly tapering to the sharp-pointed apex up to 4000 × 60 μ; cladi straight or a little upwards curved; width of cladome about 430 μ. 2. Orthodiaenes (fig. 4 b) of the cloacal tube; shaft straight, up to 4500 × 45 μ, thickest near the base, tapering evenly to the very sharp-pointed apex; the stronger cladus is a little backwards curved, nearly as thick as the shaft, tapering to a fine point, up to 1700 μ in length; the other cladus is inserted between the spicules in the axis, adding to the strength of this latter; it issues from the shaft at about a right angle to this and to the bigger cladus; it is a little backwards curved, only about 400 μ long; it is nearly always thinner than the bigger cladus, about 30 μ; in a few spicules it is entirely missing, thus giving rise to orthomonaenes (fig. 4 c). 3. Oxea (fig. 4 d), long slender, thickest in the middle, tapering to fine points, about 4000 × 52 μ; they are found both in the main and the cloacal skeleton. 4. Oxyasters (fig. 4 e) comparatively few in number; rays rather slender, conical, ca. 16 μ in total diameter. 5. Chiasters (fig. 4 f) with comparatively large sphere and short rays, which are not always distinctly tyloted, 7—8 μ in total diameter; they are exeedingly numerous. 7. Trichodragmata (fig. 4 g), resembling scales of butterflies, more or less truncated at one end, more or less pointed at the other; about 28 × 6,5 μ.

Donatia japonica (Soll.).

Tethya japonica Sollas 1888 (16).
For further synonyms vide Dendy 1916 (3) p. 262.

As I have no wish to accumulate the number of more or less ill-defined species of the greatly varying genus *Donatia,* I have tried to insert the several specimens of the collection from New-Zealand in the specific limits given by Dendy in 1916 (3); as a result of this all specimens seem to belong to *Donatia japonica* (Soll.).

The diameter of the specimens ranges from 5—90 mm. I shall give here som details of spicula-sizes, as it is of great interest to know the variational range of a given species. It is an interesting fact, that the styli are generally bigger in the larger, that means older, specimens, ranging up to ca. 4000 μ in the largest ones.

Paterson Inlet, Stewart Island, The coast. 18/XI.1914. Styli up to 1300 μ, asters 19 μ and 40—45 μ. — Halfmoon Bay, Stewart Island, the coast. 19/XI.1914. Styli up to 1700 μ, asters 45 μ and 40 μ. — Rangitoto, Auckland. The coast, under stones. 27/XII.1914. Styli up to 1400 μ, asters 15 μ and 60 μ. — Bay of Islands. The coast. 31/XII.1914. Styli up to 1000 μ, asters 15 μ and 45 μ. — 2 miles East of North Cape. 55 fathoms. Hard bottom. 2/I.1915.

Styli up to 1200 μ, asters 16 μ and 30 μ. — 10 miles N.W. of Cape Maria van Diemen. 50 fathoms. Hard bottom. 5/I.1915. Styli up to 700 μ, and asters 16 μ, (I have found no big asters). Another specimen from the same locality, but much larger, has: Styli up to 4000 μ, asters 12—15 μ, and 70 μ (scarce). — Off New Plymouth. 8 fathoms. Hard bottom. 12/I.1915. Styli up to 1800 μ, asters 15 μ, and 40 μ.

Hitherto known from several localities ranging from the Mediterranean to the Philippines; (vide for details Dendy 1916).

Suborder **Sigmatotetraxonida.**

Cinachyra novae-zealandiae nov. spec.

(Fig. 5 a—f.)

Hen and Chicken Island, Hauraki Gulf, 50 fathoms. Hard bottom. 30/XII.1914. 5 specimens.

Globular or somewhat elongated, largest specimen 15 mm in diameter. The surface is strongly hispid on account of the spicula-fibres lifting the dermal-membrane up into small conical elevations, and piercing these at the top; this feature is easily seen with the naked eye, as the spicula-tufts outside the sponge-surface reach a length of one mm, or even more; small orifices in the dermal-membrane, occur here and there, mostly hiding under an overshading spicula-tuft; they are leading into spacious cavities lying just under the dermal-membrane, but over the cortex; these cavities often appear as small tents between the spicula-tufts. Consistence of the sponge hard; colour whitish. The ectosome is ca. 0,5 mm thick, in a section it appears bluish against the yellow choanosome.

Skeleton typically radiate, consisting of long spicula-fibres running from the center of the sponge towards the surface right through the dermal-membrane, making the surface strongly hispid; in the interior the fibres are mainly made up of long slender oxea, while the dermal-tufts are mainly made up of triaenes; in the ectosome are placed shorter curved oxea, arranged almost perpendicularly towards the surface as rows of palisades; the before mentioned dermal conical elevations, raised by the projecting main fibres, are to a great extent filled up with small curved oxea, which are so placed, that they lean towards the main fibres with their distal ends and with their convex sides towards the fibres; they resemble piles of arms, lending a very characteristical appearance to a vertical

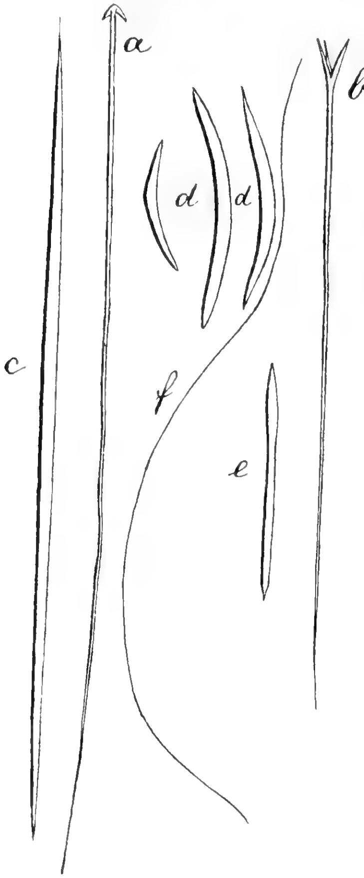

Fig. 5. *Cinachyra novae-zealandiae* nov. spec. *a.* Anatriaene. *b.* Protriaene. *c.* Big oxeote. *d.* Smaller oxea. *e.* Bayonetformed oxeote. *f.* Siliceum-thread.

Fig. 6. *Gellius regius*, nov. spec. *a.* Oxea. *b.* Sigmata. *c.* Toxa.

section of the sponge. Small oxea and curved siliceum-threads occur everywhere in the sponge.

Spicules. 1. Anatriaenes (fig. 5 a). Shaft very slender, straight or curved in the distal part, about 2500 × 18 μ. Cladi short, conical, curved, width of cladome about 68 μ. 2. Protriaenes (fig.

5 b). Shaft slender, generally straight, about the same dimensions as the anatriaenes, though often somewhat shorter. 3. Oxea (fig. 5 c). Straight, slender, thickest in the middle, tapering towards a sharp point; ca. $2200 \times 24\ \mu$. 4. Oxea (fig. 5 d). Stout, curved, thickest in the middle, tapering more or less evenly towards the sharp points; varying from ca. $150—800 \times 20—28\ \mu$; length in the ectosome commonly about 650 μ, in the dermal tufts about 400 μ; a few bayonet-like oxea (fig. 7 e) are seen, perhaps of foreign origin, perhaps pathological forms. 5. Curved siliceum-threads (fig. 5 f), up to 3000 μ in length, but may be much smaller; sometimes they are assembled in bundles; I regard them as degenerated anatriaenes, since anatriaenes are met with, the cladomes of which are very feebly developed, the shaft thin and curved, closely resembling the siliceum-threads.

Gellius regius nov. spec.

(Fig. 6 a—c.)

Three Kings. 65 fathoms. Hard bottom. 5/I.1915.

One specimen forming a cake-like expansion with somewhat irregular outlines; largest diameter ca. 65 mm, thickness ca. 4 mm; a lobe of the sponge is rising perpendicularly to the main body, ca. 20 mm high, 8×14 mm thick and broad. Dermal-membrane thin, shaggy from the numerous piercing spicules; big dermal cavities and irregular canals are seen through it. Oscula numerous, only situated at one side of the cake, $0{,}5—1$ mm in diameter; no surrounding elevations. Consistence hard, brittle. Colour (formaline) greyish, with a reddish tint.

The *skeleton* is halichondroid; the spicules are lying pell-mell in every direction, and rather dense, no indication of fibre-formation being recognizable; no special dermal skeleton, not even so that the spicules here may lie tangentially, but they are lying in every direction, thus making, as before said, the surface shaggy. The microscleres are found everywhere in the choanosome; the toxa are rather scarce.

Spicules. 1. Oxea (fig. 6 a), stout, a little curved, sometimes only in the middle, sometimes the curvature may reach over the entire length of the spicule; tapering gradually to the elegantly pointed apices, only rarely the oxea are blunt; length varying, about 560 μ; thickness about 27 μ. 2. Sigmata (fig. 6 b), very regularly curved, seldom contorted, delicate, the apices rather abruptly inwardly curved; 10—18 μ from curvature to curvature, thickness 1 μ. 3. Toxa (fig. 6 c), elegantly arrowshaped, rather sharply bent in the middle, apices a little recurved; ca. 55 μ.

Gelliodes strongylofera nov. spec.

(Fig. 7 a—b).

Little Barrier Island. 30 fathoms. Shell-bottom. 29/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914. (The type). Three specimens.

Typically barrelshaped; in all specimens several barrels are, by a budding-process, issuing from the more or less lump-shaped basis; largest specimen ca. 70 mm in its greatest extension; the barrels up to ca. 35 × 18 mm, all bearing an osculum at the top; oscula from 1 to 5 mm in diameter; the numerous subdermal cavities are seen as dark spots through the dermal-membrane; they are up to 1 mm in diameter, giving the sponge a characteristic appearance. Texture tough, elastic. Colour dark, with a reddish tint.

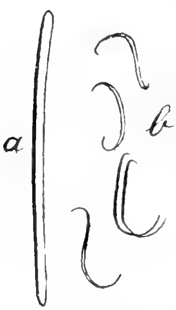

Fig. 7. *Gelliodes strongylofera* nov. spec. *a*. Strongylote. *b*. Sigmata.

The *skeleton* is a coarse network of stout spicula-fibres and spicula-lamelles, i. e. broad flat fibres; the spicules are lying very densely, and cemented together by a little amount of very pale inconspicuous spongin; the network is very irregular; the meshes, or rather the interstices between the fibres, are up to ca. 600 μ in diameter; primary and secondary fibres cannot be distinguished; the fibres and lamelles are up to ca. 400 μ thick; they reach the dermal-membrane perpendicularly as well as obliquely at any angle. Everywhere in the choanosome spicules are scattered, both strongyla and sigmata. The dermal-membrane is sustained by autogenetic spicules lying tangentially, as well as by imbedded foreign particles; also the fibres and choanosome contain foreign matter.

Spicules. 1. Strongyla (fig. 7 a), straight or slightly curved, cylindrical, with evenly rounded ends; 170—190 × 6—8 μ. 2. Sigmata (fig. 7 b), very numerous, often contorted, 10—20 × 1 μ.

Gelliodes biformis nov. spec.

(Fig. 8 a—c.)

Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

Two specimens, both with long, branching, cylindriform bodies, one ca. 220 mm, the other 270 mm in length, at a diameter of 4—7 mm; one is attached to a shell with an irregular root-network, the other torn loose from the attachment; this latter specimen has a curious outer aspect: the oscula are nearly all situated on one side of the body, with a mutual distance of 10—30 mm; they are ca. 2 mm in diameter, and situated on the top of conical elevations varying in length up to 6—7 mm; these elevations may give origin to new branches; at least one of the three branches is situated exactly as the oscular elevations issuing from the stem at exactly the same angle as these obliquely upwards. The former specimen also has oscula, but of a smaller diameter, and lying in a level with the surface of the sponge, not situated on elevations, and not so regularly arranged, though one side of the cylinder is more richly set with them. Surface very finely hispid from spicules piercing the dermal-membrane perpendicularly. Texture soft, elastic. Colour (formaline) light yellowish, stem darker, greyish on account of incorporated foreign matter.

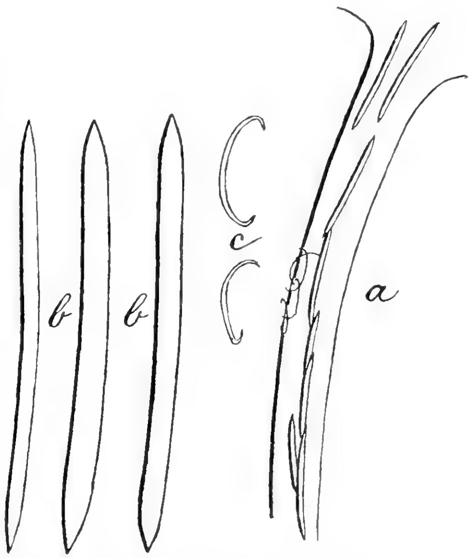

Fig. 8. *Gelliodes biformis* nov. spec. *a.* Connecting fibre. *b.* Oxea. *c.* Sigmata.

The *skeleton* is a coarse reticulation of spongin-fibres cored with oxea; the meshes are more or less irregular, up to 650 μ in width; the main fibres are only slightly thicker than the connecting ones (ca. 52 μ as against ca. 40 μ), but they are generally polyspicular, whereas the connecting fibres are one- to bispicular (fig. 8a), the main fibres are on a transverse section seen to radiate towards the surface in a more or less pronounced perpendicular way, but they never run unbroken from the center to the surface, they are always here and there bent and fusing into secondary ones.

Spicules. 1. Oxea (fig. 8 b), slightly bent, cylindrical for the greater part; the apices sharp-pointed, rather abruptly set off. Length from 78—91 μ often 81 μ, thickness ca. 6 μ. 2. Sigmata (fig. 8 c), evenly C-shaped, seldom a little contorted, rather scarce; 26—34 μ from curvature to curvature, ca. 2 μ thick.

This species is closely related to *G. flagelliformis* Brstd., and *G. filiformis* Brstd., both from the South Sea (Auckland- and Campbell Islands) (Brøndsted 1923. (1)); the oxea are pointed as in the latter, of even thickness as in the former, a little larger than in both forms. Perhaps they will prove to belong to the same species when more extensive material is at hand.

Halichondria reticulata nov. spec.

(Fig. 9.)

Wellington Harbour. 5—10 fathoms. Hard bottom. 16/II.1915.

One specimen, lumpshaped; growing on a little stone and a shell. 5 mm high. Dark-brown. Surface glabrous. With a pocket-lens one can see the very beautiful reticulate dermal-skeleton through the thin dermal-membrane. Numerous oscula are spread over the surface; they are from $^1/_4$—1 mm in diameter; the oscular rim is slightly elevated, made firm by the densely packed spicules in it. Consistence firm.

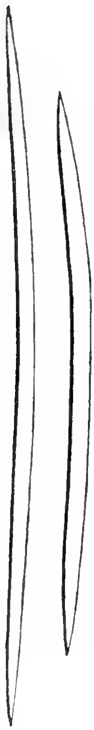

Fig. 9. *Halichondria reticulata*, nov. spec. Oxea.

Skeleton. The main skeleton consists of fairly well developed spicular-fibres running in every direction, though tending to reach the surface under more or less right angles; the distal ends of these fibres embrace the very numerous dermal-cavities. The fibres are of various thickness, the spicules lying in rows of one to, say, ten, side by side. Many isolated spicules lying pell-mell give, however, the typically Halichondrioid aspect to the skeleton. The dermal skeleton is supported by the main one; it is beautifully developed; the oxea are lying paralell with the surface in fibres splitting out and crossing each other so as to form a polygonal network; also here, however, are isolated spicules veiling the picture.

Spicules. Oxea (fig. 9), slightly and evenly curved, typically in the middle; from here the spicules taper very evenly to the very sharp points. Dimensions: $150-500 \times 8-14\ \mu$; typically $450 \times 12\ \mu$.

The species comes very near to *H. panicea*, but is clearly distinguished by the well defined spicular-fibres, especially those of the dermal-membrane.

Halichondria panicea Johnst.

This cosmopolitan sponge we have from two localities: Bay of Islands. The coast, under stones. 1/I.1915. Several damaged speccimens. Off New Plymouth. 8 fathoms. Hard bottom. 12/I.1915.

Reniera pulcherrima nov. spec.

(Fig. 10.)

Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914. One specimen.

Erect, branched, hollow cylinders, 30 mm high, ca. 4 mm in diameter; wall only ca. 0,5 mm thick. Oscula, ca. 1 mm in diameter, at the top of the cylinders. Dermal-membrane thin, supported by a beautiful dermal reticulation of spicules. If the sponge be held against the light, one may easily with a pocket-lens see the fibres of the main skeleton running in the wall of the cylinders from base to summit.

Fig. 10. *Reniera pulcherrima* nov. spec. Oxea.

Fig 11. *Reniera scyphanoides* Lam. Oxea.

The *skeleton* consists of 1. the main skeleton, just mentioned, composed of longitudinal, stout, polyspicular fibres, every now and then connected by fibres at acute angles, and by unispicular fibres at every angle; main fibres $150-200\ \mu$ thick and ca. $300\ \mu$ apart; and of 2. the before mentioned dermal-skeleton; this consists of spicules forming a Renieroid reticulation with irregular meshes; the layer is very thin.

Spicules. Oxea (fig. 10), evenly curved in the middle third, cylindrical; only the apices are conically set off, very sharp-pointed; size rather constantly $260 \times 13\ \mu$.

In external form this specimen resembles *R. aquaeductus* Schm. (15), but it is strongly marked off from that species by the construction of the skeleton. In its spiculation it also comes near to *R. clavata* Levins. (10) and *R. hyalina* Ldbck. (12), but the fibres are very different in construction.

Reniera cinerea Grant.

This cosmopolitan sponge we have from two localities. Port Pegasus, Stewart Island, the coast, under stones. 22/XI.1914. Slipper Island, the coast, at low water. 20/XII.1914. The length of the oxea varies from 125—160 μ.

Reniera scyphanoides Lamk.

(Fig. 11).

Spongia scyphanoides Lamarck. Ann. Mus. Hist. Nat. V. 20, p. 437.
Reniera scyphanoides Lindgren (12), p. 7.

Off New Plymouth. 8 fathoms. Hard bottom. 12/I.1915.

This is apparently a very heterogeneous species, and is very probably to be divided up into two or three distinct species. Provisionally I incorporate our specimens into the species, as they all fall within the variations given by Lindgren 1909 (12). There are three specimens, erect, hollow cylinders, up to 15 mm high, 2—3 mm in diameter, walls ca. $0{,}5$ mm thick. White; resembles a calcareous sponge. Dermal-membrane very thin.

Skeleton. The main skeleton consists of densely packed spicula-fibres, ca. 60—70 μ thick, which support the body-wall, partly running parallel with the long axis of the sponge, partly perpendicularly to the surface as short thick bundles of spicules. The dermal-skeleton is a one layered reticulation supporting the dermal membrane, and resting upon the points of the transverse bunches from the main skeleton.

Spicules. Oxea (Fig. 11), ca. $160 \times 13\ \mu$; rather stout, cylindrical, tolerably evenly curved in the middle part; apices short, conical, sharp-pointed. As will be seen, the oxea are here a little longer than in Lindgren's specimen (130 μ) and thicker (Lindgren 6 μ). Ridley (13) has 210×11 μ.

Hitherto known from the Red Sea, South China Sea and Australia.

Reniera clathrata Dendy.

Reniera clathrata Dendy (2), p. 237.
„ „ Brøndsted (1), p. 125.

Queen Charlotte Sound. 3—10 fathoms. Hard, in places soft bottom. 19—20/I.1915. Also from Long Reef, N. of Port Jackson; at low water. 29/X.1914.

From the first locality we have one specimen covering a shell, from the second several specimens. Dimension of the oxea, first locality, $90—105 \times 6$ μ, second locality, $80—95 \times 4$ μ.

Hitherto known from Port Philip Heads and Campbell Island.

Reniera laxa Ldbck.

Reniera laxa Lundbeck (12), p. 46, Pl III fig. 6, Pl. XI fig. 13.
„ „ Brøndsted (1), p. 124, fig. 6.

Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

One damaged specimen, encrusting as a 1—3 mm thick layer on a shell; *R. laxa* seems otherwise typically to be barrelshaped. Skeleton fibres hardly to be seen, the skeleton consisting of a rather irregular reticulation; in the typical form the fibres are easily to be seen; I think, that the lack of clearly marked fibres is due to the encrusting habit of our specimen. The shape of the oxea is identical with that of the specimen from the Campbell Isl. (Brøndsted (1)); size $190—200 \times 7—8$ μ, a little more slender than the type.

Hitherto known from North of Iceland and the Davis Strait (Lundbeck) and Campbell Isl. (Brøndsted).

Petrosia coralloides Dendy.

Petrosia coralloides Dendy (7), p. 324, Pl. XI fig. 1 and 1 a.

2 miles E. of North Cape. Hard bottom. 55 fathoms. 2/I.1915.

There is one fragment of this beautiful and interesting sponge agreeing in every respect with the description given by Dendy; the fragment seems to be a piece of just such a shallow cup as figured by Dendy. The fragment in hand is $50—80 \times 6$ mm.

Hitherto known from near Three Kings Isl.

Pachychalina conica nov. spec.

(Fig, 12.)

Slipper Isl. The coast, at low water. 20/XII.1914.

Several fragments consisting of irregular, cylindrical branches, sometimes fused into one another. 8—18 mm in diameter, largest dimension in length ca. 50 mm. Dermal-membrane exceedingly fine and delicate, with numerous small ostia; oscula ca. 2 mm in diameter, with a mutual distance of ca. 8 mm; they are situated on small conical elevations leading into the cylindrical cloacal cavities of the same width. Colour yellowish, texture soft, elastic; surface smooth, but not quite glabrous.

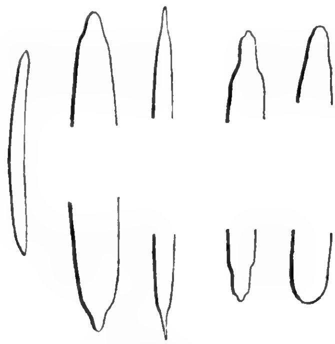

Fig. 12. *Pachychalina conica* nov. spec. Variously ended Oxea.

Fig. 13. *Pachychalina affinis* nov. spec. Oxeote.

Skeleton consists of spongin-fibres building a network with rather irregular meshes; the spongin is very pale; it contains the spicules which are generally completely enveloped therein; they are lying rather densely, overlapping one another, 1—5 or 6 in the row; one can scarcely speak of main and connecting fibres, though as a matter of fact, the fibres running towards the surface, taken as a whole, are a little heavier than the other fibres; the meshes are from ca. 15 μ to ca. 55 μ broad. No special dermal-skeleton is to be seen.

Spicules. Oxea (fig. 12), of a peculiar form, slightly curved, thickest in the middle; the apices are more or less conically set off. Some strongyla of the same dimension as the oxea are found. Ca. 130 - 12 μ.

Pachychalina affinis nov. spec.

(Fig. 13).

Little Barrier Island. 30 fathoms. Shellground. 29/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 20/XII.1914.

Three specimens, the one very beautiful; copiously ramified with cylindrical branches, total length ca. 420 mm, diameter of branches ca. 8 mm. Numerous oscula on a level with the surface, 1—1,5 mm in diameter, occurring mainly on one side of the branches, although some may be found on the opposite side. Texture tough, elastic. Colour (formaline) yellowish grey.

The *main skeleton* consists of a rather dense reticulation of stout spongin-fibres, of a thickness of about 60—80 μ; this holds good for both primary and secondary fibres; the only difference between the two sorts of fibres being that of the spicules enveloped in the fibres: the oxea are polyserially arranged in the main fibres, mono- or biserially in the secondary fibres. The meshes are tolerably rectangular, width about 500 μ. The primary fibres are running perpendicularly towards the surface, so that in a transverse section of the sponge they roughly resemble spokes in a wheel. The dermal-skeleton forms a more irregular network of fibres, which are, as a whole, a little narrower than the fibres in the main skeleton, and always with only uni- or biserially arranged oxea.

Spicules. Oxea (fig. 13), about $70 \times 6 \mu$, cylindrical, with rather sharply set, pointed apices.

This species comes very near to *Euchalina exigua* Lendf. (Dendy 4 & 7); it differs from that species in having slightly stouter fibres (*exigua* 40 μ), larger diameter of the meshes (*exigua* 100 μ), and the spicules somewhat shorter but thicker (*exigua* $90 \times 2 \mu$). It is also related to *Chalina ramosa* Gray, which forms, together with *Euchalina exigua* Lendf. and *Pachylina elongata* Ridl. and Dendy, a little group of nearly allied species.

Pachychalina lunae nov. spec.

(Fig. 14.)

Halfmoon Bay, Stewart Island. The coast. 19/XI.1914. Puhoi Rock, Hauraki Gulf. The coast, under stones. 29/XII.1914.

Three specimens; only fragments, which are of irregularly roundish appearance; ca. 25 × 15 × 15 mm. Dermal-membrane very delicate, pierced by small, numerous ostia, ca. 0,15 mm in diameter; oscula situated at one side, ca. 2 mm in diameter, surrounded by a low crater wall; cloacal cavities ca. 2 mm in width. Surface slightly granulose, on account of the numerous primary fibres raising the dermal-membrane. Texture soft, elastic. Colour light grey or yellowish.

Fig. 14. *Pachychalina lunae* nov. spec. Oxea.

Skeleton consists of an irregular reticulation of fibres up to ca. 100 μ thick; one can scarcely distinguish between primary and secondary fibres; only just beneath the surface are fibres to be discerned running distinctly perpendicularly towards the surface, raising it into the before mentioned small granules. Width of meshes varying about ca. 250 μ. The fibres contain only comparatively little spongin; the spicules in the outer layer are often almost free from spongin, which is, besides, very pale and difficult to observe; thus the spicules are everywhere forming the greater part of the fibres. Many spicules, especially developmental forms, are lying scattered in the choanosome between the fibres. No special dermal-skeleton is to be seen.

Spicules. Oxea (fig. 14), ca. 120 × 9—10 μ; they are slightly curved, the grown-up spicules cylindrical, tapering in the last fourth into the sharp points.

This species comes very near to *Pachychalina conica*, though distinctly marked off from that species by the form of the spicules.

Tetrapocillon nov. gen.

Esperellinae with peculiar microscleres (tetrapocilli). Megascleres monactinal. No special dermal-skeleton. Isochelae may occur.

I propose to include in this new genus sponges with Esperelline skeleton possessing the very interesting and characteristical tetrapocilli. I have not been able to find these peculiar spicules mentioned anywhere in the literature. The following species is not unique; I have at my disposal a sponge from Port Western, Victoria, containing just the same tetrapocilli, and also in any other respect this sponge may be referred to the new genus; (I hope in a future paper to have the opportunity of taking the question up again in dealing with sponges collected by Dr. Th. Mortensen in the Australian seas). It is very interesting that the tetrapocilli are found as foreign bodies in several sponges from the locality: 2 miles E. of North Cape, N. Z. 1915.

Tetrapocillon novae-zealandiae nov. spec.

(Fig. 15 a—f.)

Slipper Isl. The coast, at low water. 20/XII.1914.

One fragment; seems to have been encrusting and then torn loose from the body of attachment; it is forming a cake-like expan-

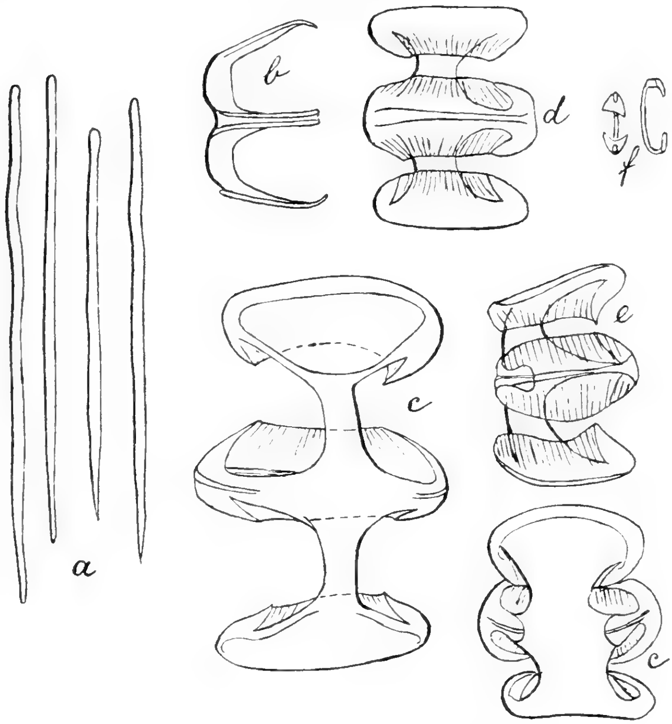

Fig. 15. *Tetrapocillon novae-zealandiae* nov. spec.
a. Styli. *b—e*. Tetrapocilli. *f*. Isochelae.

sion, ca. 3 mm thick, 30 mm and 25 mm in the other dimensions. Consistence like felt. Surface finely granular. Colour black, though the interior of the sponge light grey. Some few openings, ca. 0,8 mm in diameter are seen, but I think they are made by foreign organisms.

The *skeleton* consists chiefly of scattered monactines, which are however here and there forming distinct fibres, ca. 60 μ thick; there is no special dermal-skeleton.

Spicules. a. *Megascleres.* Styli or subtylostyli (fig. 15 a), straight or slightly undulated; generally thickest in the middle, apex sharp-pointed or sometimes blunt; 260—325 $\times$ 10 μ. b. *Microscleres.* 1. Tetrapocilli (fig. 15 b—e). It will be convenient to start the description with the young stages (fig. 15 b); here the spicule is distinctly seen to consist of a cylindrical shaft, which appears as formed by two parts, both nearly semicircularly curved and cemented together with end towards end; it appears so, but I think, that the two parts are really one spicule built in one cell; then both ends expand, forming disc-like plates, which are placed nearly, but never quite, at right angles to the axis of the shaft, and both to the same side. Also in the middle of the shaft two plates are being formed, which, so far as I am able to see, begin as separated, but later coalesce with their outer rim; they are standing perpendicularly towards the axis of the shaft, directed towards the same side as the terminal plates. The perfect spicules (fig. 15 c—e) is then completed so, that the rim of all four plates is growing obliquely inwards as a fine lamella; thus four cups are built, situated in couples, with their hollow sides to each other, quite as if two *Iophon*-bipocilli were cemented together with the ends. Length from 40—80 μ, ca. 50 μ the most common. 2. Isochelae (fig. 15 f), of common form, very thin and delicate, ca. 15 μ long.

Guitarra bipocillifera nov. spec.

(Fig. 16 a—f.)

Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

Several specimens; the largest one measures 290 $\times$ 65 $\times$ 32 mm; they are all roundish lump-shaped, the smaller ones nearly globular. The surface has a very characteristic appearance: it looks as if some animal had been gnawing shallow furrows all over the sponge, these furrows now and then expanding to broad patches; in this way small and big "islands" are formed; the furrows are 0,5—1 mm deep, and from a fraction of a mm to several mm broad; the dermal-membrane is covering both furrows and "islands", it is very thin and delicate; in the furrows it covers spacious dermal cavities and canals, and only here are situated the oscula (and ostia?), which are up to 1 mm in diameter. The surface is all over very finely hispid. Texture rather firm, somewhat crumbling. Colour dirty grey with a reddish tint in the bigger specimens (formaline), light grey in the smaller ones (spirit).

The *skeleton* is a triangular reticulation of spicula-strands; the sides of the meshes are ca. 450 μ, the strands are ca. 60 μ thick; no distinction between primary and secondary fibres can be drawn; many megascleres are scattered disorderly everywhere in the soft tissues; in one of the examined specimens this condition is the prevailing one, so as to nearly extinguish the before mentioned regular reticulation.

Spicules. a. *Megascleres.* Oxea (fig. 16 a) long, slender, straight or nearly so, often a little irregularly undulated, the apices rather abruptly set off; up to ca. 450 μ in length and ca. 9 μ thick; a few styli of about the same dimensions are seen. b. *Microscleres.* 1. Plachochelae (fig. 16 b—c), the ordinary *Guitarra*-form, varying in length from 40—100 μ. 2. Bipocilli (fig. 16 d—f); seen in side-view they closely resemble sigmata, and, in fact, I first took them for sigmata, only two feeble transverse lines, dividing the shaft in three parts, show that we here have to deal with cheloid spicules. The shaft is C-shaped, the distal third expanding into a shallow cup with nearly circular margin; the cups are obliquely placed towards the middle portion of the shaft; the bipocilli are 10—14 μ long. These spicules are exceedingly delicate, and their real nature easily overlooked. It is very interesting to meet these *Iophon*-like spicules in quite another genus. Perhaps the sigmata of some of the other described *Guitarra*-species will prove to be of the same nature.

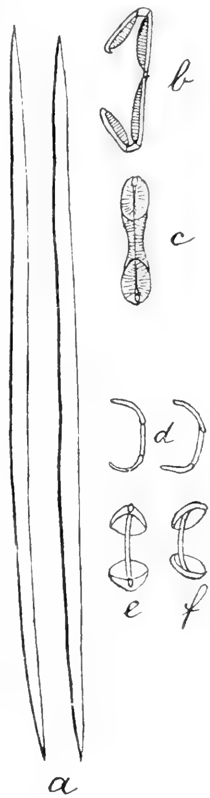

Fig. 16. *Guitarra bipocillifera* nov. spec. *a.* Oxea. *b.* Side-view of plachochel. *c.* Front-view of plachochel. *d.* Side-view of bipocilli. *e.* Front-view of bipocillon. *f.* Half front, half side view of bipocillon.

Desmacidon novae-zealandiae nov. spec.

(Fig. 17 a—d.)

Off New Plymouth. 8 fathoms. Hard bottom. 12/I.1915.

One specimen, irregularly and thickly encrusting on a shell; greatest extension ca. 30 mm, about 5 mm thick. Surface very minutely hispid. Ostia very numerous, about 40 mm in diameter; a few minute oscula with slightly elevated margins, about 0,3 mm in diameter are found. Texture tough, colour whitish.

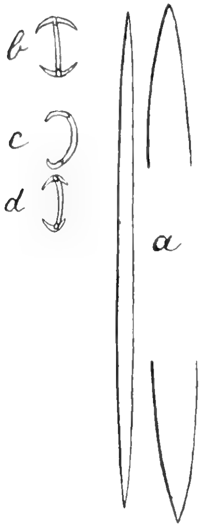

Fig. 17. *Desmacidon novae-zealandiae* nov. spec *a*. Oxea. *b*. Front-, *c*. Side-, *d*. Half front-, half side-view of Isanchorae unguiferae.

The *skeleton* consists of stout polyspicular fibres arranged more or less radially; they are somewhat serpentined, running more or less perpendicularly towards the surface, where they expand to tufts making the dermal-membrane hispid; in the interior they here and there coalesce and branch; they are up to ca. 200 μ in thickness; isolated oxea are seen throughout the choanosome.

Spicules. a. *Megascleres*. Oxea (fig. 17 a) rather slender, straight, evenly tapering towards the pointed ends, about 350 $\times$ 6 μ. b. *Microscleres*. Isanchorae unguiferae (fig. 17 b—d), very delicate, strongly curved; the lateral teeth are standing almost vertically outwards and are rather long, which fact makes the anchorae broad. 12—14 μ in length.

This species seems to be somewhat related to *Desmacidon maeandrina* Kirkp. (8), *Desmacidon intermedia* Dendy (2) and *D.* (?) *ramosa* R. & D. (14), the latter having radially arranged fibres like the species in hand.

Iophonopsis Dendy.

Iophonopsis Dendy (4), p. 348.

I follow Dendy in his establishment of this new genus. Dendy has on p. 348 "usually acanthostyles, but sometimes smooth (?)", which (?) now has to disappear.

Iophonopsis major nov. spec.

(Fig. 18 a—h.)

Stewart Island. Ca. 35 fathoms. Sand and mud. 20/XI.1914. Little Barrier Island. 30 fathoms. Shell bottom. 29/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

There are several specimens from both the North- and the South-Island, which seems to indicate, that the species may be found also in intermediate places at the coast of New-Zealand. The sponge is apparently encrusting when young, but more or less erect and branching when growing older; we have both encrusting specimens on shells, encrusting ones sending off an erect cylindrical outgrowth, and one beautiful branched specimen; this latter is the biggest one and attains a length of ca. 65 mm; the branches are subcylindrical, often somewhat flattened at the apex, 5—15 mm in diameter. The surface is smooth; the dermal-membrane tough, on account of the strongyla lying therein. Oscula few and scattered, on a level with the surface, ca. 0,8 mm in diameter. Texture soft, elastic. Colour (both spirit and formaline) dark or even black, though a little lighter in the interior. The pigment is in sections easily seen as dark branched sacks.

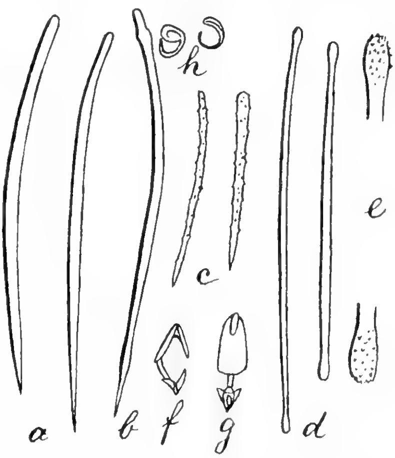

Fig. 18. *Iophonopsis major* nov. spec. *a.* Styli. *b.* Subtylostylote. *c.* Acanthostyli. *d.* Tylota. *e.* Ends of Tylote. *f.* Side-. *g.* Front-view of Anisochelae. *h.* Bipocilli.

The *skeleton* is built up of smooth styli. Main skeleton typically consists of stout primary spicula-fibres, ca. 65 μ thick, running up through the sponge and bending vertically towards the surface, connected ladderlike by transverse spicules lying in bundles of a few together; in this way a coarse reticulation is made up of rather square meshes, the sides of which are the length of one spicule; but this rather regular edification is disturbed by isolated spicules lying pell-mell, sometimes so densely, that they nearly extinguish the regular picture of the reticulation; the main fibres can, however, always be made out. The fibres are never plumose; in a few cases they are so clear-cut, that they are seen as compact spicula-columns running a rather long course without any spicule breaking out. When the main fibres reach the surface, they generally break up so as to form fan-spread spicula-tufts sustaining the dermal-membrane. The dermal-skeleton is an one-layered tangentially arranged reticulation of tylota.

Spicules. a. *Megascleres.* 1. Styli (fig. 18a—b), smooth, forming the main skeleton, more or less regularly curved, tapering evenly to the sharp-pointed apex; middle length ca. 260 μ by a thickness of 10 μ. 2. Acanthostyles (fig. 18c), very scarce, not echinating the fibres, straight or a little curved, coarsely spined all over, thickest at the base, evenly tapering to the apex; 100×6 μ. 3. Tylota (fig. 18d—e), with slightly spinous heads, straight or a little curved, slender; shaft of even thickness all over; 260×10 μ. b. *Microscleres.* 1. Anisochelae (fig. 18f—g) of the usually *Iophon*-type; 14—20 μ in length, 4—5 μ broad. 2. Bipocilli (fig. 18h), very scarce, 6—8 μ.

Iophonopsis major nov. spec., var. *tenuis* nov. var.

Port Pegasus, Stewart Island. Ca. 25 fathoms. Clayey mud. 20/XI.1914.

One specimen, encrusting on a shell. Colour light greyish. Skeleton almost as that of *I. minor.* The spicular set is the same as that of *I. major*, but the dimensions of the spicules differ in the following points: Smooth styli ca. 230 μ; tylota ca. 230 μ; anisochelae exceedingly numerous; bipocilli very numerous, ca. 10 μ.

Iophonopsis minor nov. spec.

Wellington Harbour. 5—10 fathoms. Hard bottom. 16/II.1915. North Channel, Kawaii Island. Hauraki Gulf. 10 fathoms. Hard bottom. 29/XII.1914. Little Barrier Isl. 30 fathoms. Shell-bottom. 29/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

Several specimens. Encrusting or branching, with cylindrical or flattened or irregularly formed branches, which often coalesce; largest specimen attains a length of ca. 400 mm; it consists of irregularly flattened branches growing in one plane, and coalescing in several places, provided with rounded subglobular outgrowths. Surface glabrous, though a little roughish to the touch, on account of the contracted state of the dermal-membrane, whereby this latter attains a finely granular appearance when seen under an ordinary pocket-lens. Oscules scattered, few, ca. 1 mm in diameter. Texture soft, elastic, rather tough. Colour dark brown to greyish brown.

The *skeleton* resembles that of *I. major,* but is not so regularly square-meshed; in fact, secondary fibres are only very feebly developed, in most places substituted by scattered spicules; as a whole the skeleton appears more diffuse than that of *I. major*; in the few cases where meshes are formed (this being the case mostly under the surface) the sides of these latter are two to more spicules in length. The dermal-membrane is sustained by spicula-tufts from the main skeleton, just as in *I. major.* The dermal-skeleton also like that of *I. major*: a diffuse reticulation of one-layered tangentially placed tylota.

Spicules. There is found the same spicular set as in *I. major*, except the acanthostyles, which I have not been able to find. The megascleres are all much smaller: The smooth styli about $145 \times 8\ \mu$; tylota ca. $150 \times 8\ \mu$; thus both forms of megascleres are relatively stouter than in *I. major.* The isocheles are 10—16 μ; the bipocilli, very scarce, (I have only seen a few), 6—8 μ.

This species is evidently closely related to *I. major,* and most probably the var. *tenuis* is an intermediate form, thus indicating the possibility, that all three forms may be one and the same species, which will in that case have a wide variational range.

Microcionia novae-zealandiae nov. spec.

(Fig. 19 a—e.)

Slipper Isl. The coast, by low water. 20/XII.1914.

One encrusting specimen, growing as a $0{,}_5$ mm thick brownish layer on a stone; the surface is, when seen against the light, finely shaggy, as if covered with an exceedingly fine velvet of projecting spicules.

The *skeleton* can hardly be said to consist of fibres, these being represented by plumose brushes of big styli going from the stone vertically outwards and piercing the dermal-membrane. From the base and half way up the brushes small acanthostyles are radiating horizontally outwards, with their apices nearly touching the neighbouring brushes; seen from above the skeleton therefore appears as if it were reticulated with mostly triangular meshes, the sides of which are made up of small acanthostyles. The tylostyli are dispersed through the body of the sponge seemingly without order.

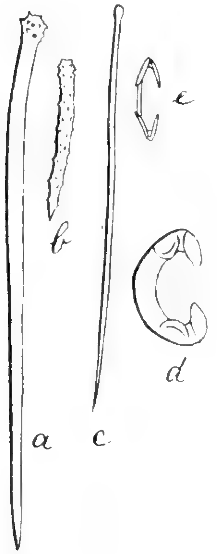

Fig. 19. *Microcionia novaezealandiae* nov. spec. *a.* Subtylostylote. *b.* Acanthostylote. *c.* Tylostylote. *d.* Isochele. *e.* Smaller isochele.

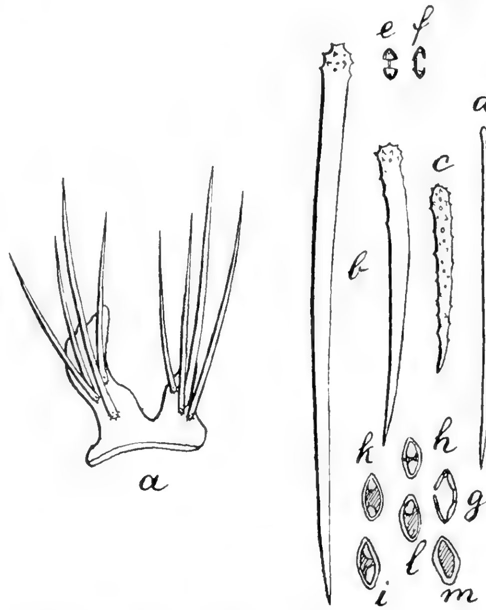

Fig. 20. *Microcionia heterospiculata* nov. spec. *a.* Spicula-tufts. *b.* Bigger acanthostyli. *c.* Small acanthostylote. *d.* Subtylostylote. *e.* Front-, *f.* Sideview of isochelae. *g—m.* Various developmental stages of abnormal isochelae.

Spicules. a. *Megascleres.* 1. Subtylostyli (Fig. 19a), with slightly spinous heads, a little curved, evenly tapering to the sharp points; 260—300 × 12 μ. 2. Acanthostyli (fig. 19b), a little curved, of even thickness in the greater part, spined all over, ca. 90—140 × 11 μ. 3. Tylostyli (fig. 19c), straight or nearly so, evenly tapering to the sharp points; heads sometimes rather feebly developed. 260 × 6 μ. b. *Microscleres.* 1. Isochelae (fig. 19d), strongly curved, ca. 30—34 μ. 2. Isochelae (fig. 19d), slightly curved, 10—18 μ.

Microcionia heterospiculata nov. spec.
(Fig. 20 a—m.)

Colville channel. 35 fathoms. Sand, mud. 21/XII.1914.

One specimen encrusting on a shell, as a 0,3 mm thin layer.

The *skeleton* consists of spicula-tufts, raising perpendicularly from the body of attachment (fig. 20 a); they are built of acanthostyli, the bases of which are imbedded in short stout spongin-columns: the tufts are standing so close to one another, that the spicules often overlap one another from neighbouring columns; the subtylostyli are for a great deal scattered irregularly throughout the body, but in many places they are arranged as small brushes together with and partly continuing the acanthostyli-tufts. Both forms of microscleres are scattered abundantly in the choanosome.

Spicules. a. *Megascleres.* 1. Acanthostyli (fig. 20 b—c), the base often subtylostylote; the bigger ones only spined at the base, the small ones spined all over; they are slightly curved, tapering evenly to the sharp points; length varying from ca. 80—400 μ, a common length is 300 μ; thickness up to ca. 14 μ. 2. Subtylostyli (fig. 20 d), or styli, with rounded base, tapering evenly towards the sharp points; straight or only a little curved; length up to 320 $\times$ 4 μ in thickness. b. *Microscleres.* 1. Isochelae (fig. 20 e—f), of the usual type, only a little curved, length 10—15 μ. 2. Abnormal Isochelae (fig. 20 g—m), these bodies are of a very strange shape; they somewhat resemble the curious microscleres figured by Dendy (6) on plate 14, fig. 4. Accordingly I have tried them with water after the method of Dendy 1916 (4), but they do not seem to be of the same nature as the colloscleres; they seem to have developed from isochelae without fimbriae or broad teeth, or even beginnings thereto. I have seen such imperfect chelae, whose teeth have not yet coalesced; and there are others the teeth of which have coalesced, so as to form oval rings; the foramen, which is being built in this way, is then filled up more or less with siliceous matter forming a more or less continuous lamella. Length 12—18 μ. These curious bodies also resemble the clavidiscs of *Merlia,* thus perhaps giving a clue to the origin of these spicules. At any rate the occurrence of degenerated chelae, as I think they are, in the genus *Microcionia* is extremely interesting.

Microcionia pyramidalis nov. spec.

(Fig. 21 a—d).

Slipper Isl. The coast, at low water. 20/XII.1914.

Encrusting as a 0,5 mm thick layer on a stone. Surface finely hispid; colour brownish.

Skeleton in places consists of brushes formed by acanthostyles, but more frequently the acanthostyli are standing isolated with the base on the stratum of the sponge-attachment, and pointing vertically upwards; sometimes many styli are standing pretty close together, the biggest ones in the middle, thus expressing a certain tendency to build brushes; in this way the skeleton becomes much more irregular in appearance than in the other two just described *Microcionia*-species. The tornota are scattered seemingly without order, but are rather abundant everywhere; the same is the case with the isochelae.

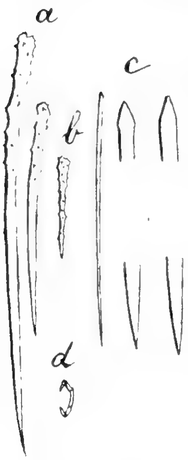

Fig. 21. *Microcionia pyramidalis* nov. spec. *a*. Big acanthostyli. *b*. Small acanthostylote. *c*. Tornota. *d*. Isochele.

Spicules. a. *Megascleres*. 1. Acanthostyli (fig. 21 a—b), evenly tapering to the sharp points, a little curved; length varying from about 90 to 300 μ, by a thickness of up to 11 μ. The larger ones (commonly about 260 μ in length) are slightly spinous, and only in the first third; the smaller ones are comparatively coarser spined, and spined all over; every intermediate form occurs. 2. Tornota (fig. 21 c), smooth, nearly straight, ca. 160—170 $\times$ 4 μ; they are the thickest in the middle, from here tapering evenly towards the one end, but only very little towards the other end, which is then conically set off, often a little head-like. Sometimes this end is blunt, so that the spicule is not to be distinguished from styli in outer appearance. b. *Microscleres*. 3. Isochelae (fig. 21 d), with evenly curved shafts, short tooth and fimbriae, 16—30 μ, often ca. 20 μ.

Anchinoë novae-zealandiae Dendy.

Anchinoë novae-zealandiae. Dendy (7) pag. 360 Pl. XII. fig. 2; Pl. XV, figs. 9—11.

Wellington Harbour. 5—10 fathoms. Hard bottom. 16/II.1915. Little Barrier Isl. 30 fathoms. Shell bottom. 29/XII.1914. Off New

Plymouth. Hard bottom. 12/I.1915. Queen Charlotte Sound. 3—10 fathoms. Hard, in places soft bottom. 19/I.1915. Paterson Inlet, Stewart Isl. 5—15 fathoms. Soft bottom. 17/XI.1914.

There is plenty of material of this beautiful sponge, all closely agreeing with the description giving by Dendy; several specimens are encrusting; the only difference is that the tornata here are up to 200—210 μ.

The name '*novae-zealandiae*' has, indeed, proved to be a very adequate one, since we have specimens from the North- to the Southend of New-Zealand, giving the evidence also, that the species is a very good and constant one.

Hitherto known from off North Cape, N. Z.

Anchinoë affinis nov. spec.

(Fig. 22 a - e).

Wellington Harbour. Ca. 5 fathoms. Mud. 16/II.1915. Off New Plymouth. 8 fathoms. Hard bottom. 12/I.1915.

Three specimens; the two encrusting as thin layers; the third (from Wellington) oblong roundish, pointed at both ends; the sponge has apparently been freely growing, only attached at one end; it is ca. 35 mm long, 13 mm thick. This specimen has a very characteristic appearance: The ostia are placed on distinct circular areas up to one mm in appearance, surrounded by a low wall; the whole figure is very much like a low crater, up to 3 mm in diameter including the walls; the ostia are 20—30 μ in diameter. The dermal-membrane is very thin, transparent; through it can be seen subdermal-cavities and canals. Colour whitish. Consistence elastic, tough.

The *skeleton* consists of long curved fibres, frequently splitting up into several branches, which join other fibres at acute angles; the fibres are up to ca. 250 μ thick, and are built up of the smooth

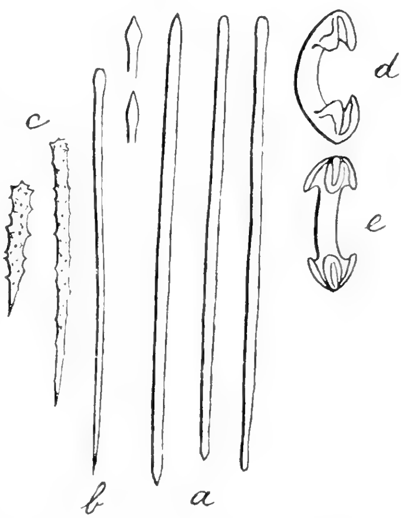

Fig. 22. *Anchinoë affinis* nov. spec. *a*, *b*. Variously ended diactines. *c*. Acanthostyli. *d*. Side-, *e*. Front-view of isochelae.

megascleres, more or less echinated by acanthostyles; spongin very scarce; the fibres are running obliquely towards the surface, there giving off tufts of smooth diactines sustaining the dermal membrane. Everywhere in the choanosome are scattered smooth megascleres. In the dermal-membrane lie several isochelae, and sometimes a good deal of acanthostyli arranged tangentially and in one layer. The above mentioned walls surrounding the ostia-areas are sustained by tangentially arranged smooth diacts, placed so as to point towards the centre.

Spicules. a. *Megascleres.* 1. Smooth, nearly straight diactines (fig. 22a—b), ca. $320 \times 5—6$, variously ended: as strongyla, tylota, tornota; sometimes the two ends are so unlike one another, and the one blunt, as not to be distinguishable from styli. 2. Acanthostyli (fig. 22c), from ca. $90—180 \times 13—14$ μ, the smaller forms very coarsely spined. b. *Microscleres.* Isochelae (fig. 22d—e), of common form, strongly curved, ca. 26 μ.

The fact that this sponge is found at two distinct localities at a comparatively long distance from one another, and in both localities together with the foregoing species, seems to justify the erection of the sponge as a distinct species, and not merely as a variation of the former.

Myxilla crelloides nov. spec.

(Fig. 23 a—d).

2 miles East of North Cape. 55 fathoms. Hard bottom. 2/I. 1915.

One large specimen. Very richly ramose; branches 3—4 mm thick, often somewhat flattened, or otherwise a little deviating from the purely cylindrical shape; total length of the specimen ca. 230 mm. Oscules very small and inconspicuous, scattered, rather scarce. Surface just a little rough to the touch. Consistence hard but brittle; colour (formaline) dirty reddish.

The *skeleton* is a dense reticulation of acanthostyles, only very faint tentatives to fibre-formation can be seen; meshes often rather triangular, the sides built up of one or a few spicules, but only of one spicule's length. Here and there are tylota found irregularly distributed; these latter spicules are forming brushes under the dermal-membrane; otherwise no special dermal-skeleton is to be found; the acanthostyles are even more scarcely distributed in the dermal- than in the main skeleton; only the isanchorae are found in a very great number in the dermal-membrane; hence no crelloid crust is built.

Spicules. a. *Megascleres.* 1. Acanthostyles (fig. 23 a), generally thickest at the base, where they are also most coarsely spined; from the base in most cases a little tapering to near the apex, which is markedly set off; the longer styli are often without spines in the last fourth; length varying from ca. 90—210 μ, commonly about 145 μ, by a thickness of ca. 12 μ. 2. Tylota (fig. 23 b), straight or nearly so, with beautiful oval heads; they are often slightly swelled in several places on the shaft; length ca. 260×4 μ. b. *Microsclera.* Isochelae (fig. 23 c—d), with strongly curved shafts, rather stout, total length ca. 28 μ, ca. 10—12 μ broad, 18 μ deep.

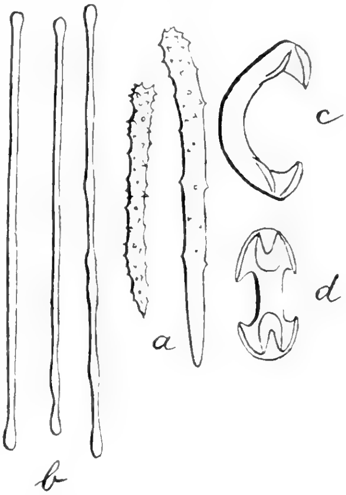

Fig. 23. *Myxilla crelloides* nov. spec. *a.* Acanthostyli. *b.* Tylota. *c.* Side-, *d.* Front-view of isochelae.

This species is very interesting; it comes very near to Dendy's *Crellomyxilla intermedia*; the external shape is nearly the same, the skeletal arrangement likewise, but no dermal crust is being built; and this point is the only real difference (save specific ones) from the said species; it strongly confirms the view set forth by Dendy, that the Crelleae are specialised Myxillae.

Crellomyxilla intermedia Dendy.

Crellomyxilla intermedia Dendy (7), p. 364, Pl. XV figs. 16—21.

Hen and Chicken Isl. Hauraki Gulf. Hard bottom. 30/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

Two specimens. Encrusting, the one specimen very irregular, seemingly corresponding in shape with the "main body of compressed flabellate form" of the specimen, which Dendy has described. In most features agreeing very well with the type specimen; only the tornota are here a little longer, up to 260 μ; the isochelae are up to 40 μ and by intermediate forms connected with small forms of ca. 12 μ.

Lissoplocamia nov. gen.

Plocamiae with a reticulation of smooth dumb-bell shaped spicules building the main skeleton, and smooth styli echinating from the surface of the sponge. Microscleres toxa.

I propose to regard the following very characteristic and interesting species as the type of a new genus; all the hitherto described Plocamia-species have spined megascleres; I therefore think it convenient to create a new genus for species with smooth megascleres. I am inclined to regard the spo ıge as a degenerate *Plocamia*.

Lissoplocamia prima nov. spec.

(Fig. 22 a—d.)

2 miles East of North Cape. 55 fathoms. Hard bottom. 2/I.1915.

One specimen, slender, cylindrical, richly branched, ca. 260 mm long, 4—8 mm thick. Very characteristic is the beautiful velvet

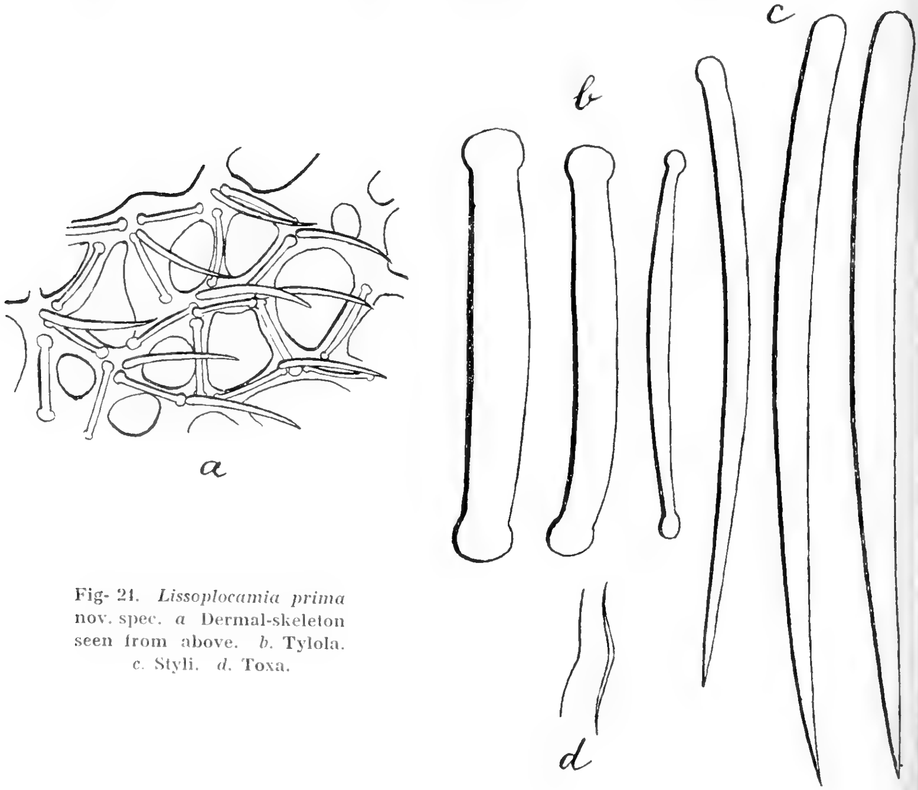

Fig. 21. *Lissoplocamia prima* nov. spec. *a* Dermal-skeleton seen from above. *b*. Tylola. *c*. Styli. *d*. Toxa.

covering the whole sponge, caused by the countless styli projecting almost perpendicularly from the surface. Oscula and ostia could not be made out. Colour dark, consistence rather hard, somewhat elastic.

The *skeleton* consists of a stout reticulation of spongin-fibres, cored by the tylota, which are in most places arranged uniserially, only rarely biserially; the sides of the meshes are generally only of ca. one spicule's length, the meshes themselves are often triangular or quadratic; the fibres are up to 130 μ thick, generally only about ca. 60 μ; primary and secondary fibres are not distinguishable. The nodes of the meshes are often rather thick, and from the dermally placed nodes styli are projecting perpendicularly outwards (fig. 24 a), only their bases are imbedded in spongin; as before said these spicules are lending the sponge-surface a velvety appearance. Everywhere in the soft tissues (or rather the remainder thereof) are found numerous toxa and foreign spicules.

Spicules. a. *Megascleres.* 1. Tylota (fig. 25 b), very stout, straight or a little curved, with short thick heads; about 270 μ long and up to 35 μ thick. 2. Styli (fig. 24 c), a little curved, sometimes a little subtylostylote, generally thickest at the base, from here evenly tapering to the sharp points; they are always longer than the tylota, reaching up to 800 μ, by a thickness of up to 35 μ. b. *Microscleres.* Toxa (fig. 24 d), slightly and beautifully curved, about 75 μ in length, 2 μ in thickness.

Tedanione connectens nov. spec.

(Fig. 25 a—d.)

Little Barrier Islands. 30 fathoms. 29/XII.1914.

Three fragments. Sponge irregularly encrusting, giving off digitiform hollow processes; the elder parts of the sponge filled up with sand; largest specimen 27 mm in greatest diameter; the processes are generally broader at the base, ca. 2—3 mm, tapering to the apex, which is ca. 1 mm broad, length up to ca. 17 mm. Colour whitish, surface smooth, consistence soft. Oscula and other orifices could not be made out.

Skeleton composed of loose strands and wisps of tylota, in the interior intermingled with a few styli, where the spicules also are lying more close together; the main direction of the spicula-wisps is obliquely upwards, reaching the dermal-membrane at nearly right angles. The dermal-membrane is very delicate, supported by rather few tangentially but irregularly placed tylota and raphides; these latter are also distributed throughout the entire body of the sponge.

Spicules. a. *Megascleres.* 1. Styli (fig. 25a), up to 430 × 11 μ, slightly curved in the first half part, evenly thick in the greater

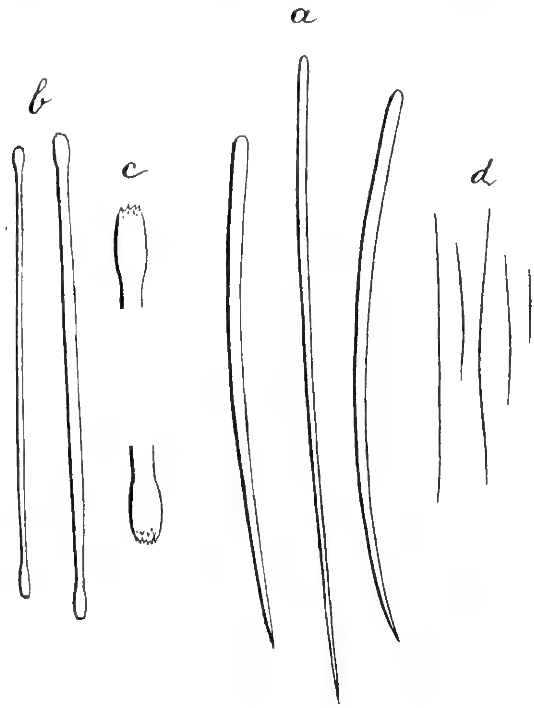

Fig. 25. *Tedanione connectens* nov. spec.
a. Style. *b.* Tylota. *c.* Ends of Tylota. *d.* Raphides.

part, apex tolerably sharp-pointed. 2. Tylota (fig. 25b—c), straight or a little (seldom strongly) curved; beautiful oval heads, which are spined at the top; about 300 × 6 μ. 3. Tornota, ca. 160 × 3 μ, very scarce, probably not belonging to the sponge. b. *Microscleres.* Raphides (fig. 25d), up to ca. 200 × 1 μ, finely spined at the ends, straight or curved, numerous.

This species is very interesting in still having stylote spicules as an integrating part of the main skeleton, thus retaining a reminiscence of the monactinal skeleton of *Tedania*; it gives the clue to the way in which *Tedanione* has probably developed from *Tedania*, viz. by an invasion of dermal diactinal spicules into the main skeleton; of course also the reversed process may have taken place: the evolution of *Tedania* from *Tedanione* by a stronger development of monactinals in the main skeleton; but a comparison with other Desmacidonidae seems to prove the other way of evolution as the more probable, since the styli in the main skeleton everywhere seem to be the more primitive state of things.

Cornulum novae-zealandiae nov. spec.

(Fig. 26 a—d.)

10 miles N.W. of Cape Maria van Diemen. 50 fathoms. 5/I.1915.

One large beautiful specimen, about 200 mm in largest diameter, formed as a somewhat oblong pillow; it is torn loose from the body of attachment. The sponge is covered with numerous fistulae up to 30 mm in length, by a thickness of ca. 4—8 mm at the base; the apex of these hollow whitish fistules is often swollen button-like. I have not been able to see any oscula. Colour (formaline) light grey with a reddish tint.

The main *skeleton* is a stout reticulation of smooth spicular fibres up to 1000 μ thick, thus easily seen with the naked eye; the fibres are branching and irregularly interwoven, often 6—8 mm apart. Under the dermal-membrane the fibres are expanding fanwise. The dermal skeleton and the skeleton in the fistulae consist of a dense feltwork of interwoven tylota, all lying tangentially.

Spicules. a. *Megascleres.* Tylota (fig. 26 a—c), slender, slightly but irregularly curved, with beautiful, oval heads, sometimes somewhat narrow just beneath the head; up to 870 $\times$ 15 μ. b. *Microscleres.* Isochelae palmatae (fig. 26 d), slender, short alae and teeth, ca. 27 μ in length.

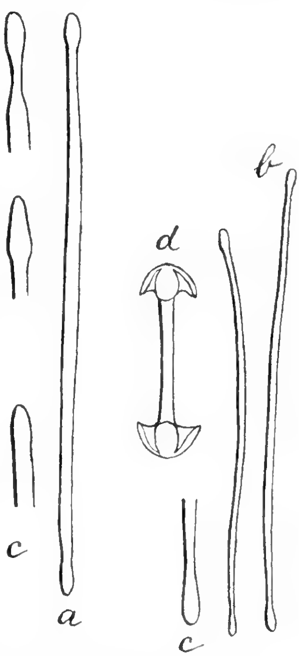

Fig. 26. *Cornulum novae-zealandiae* nov. spec. *a—b.* Tylote (b from fistulae). *c.* Ends of Tylota. *d.* Palmate Isochele.

There are also some small fistula-fragments of the species from the same locality; in these the tylota measure only up to 650 × 12 μ, and the isochelae only ca. 22 μ.

Axinella colvillii nov. spec.

(Fig. 27 a—b.)

Little Barrier Island. 30 fathoms. Shell-bottom. 29/XII.1914. Colville Channel. 35 fathoms. Sand, mud. 21/XII.1914.

Three specimens. The base is lump-shaped and encrusting with shells and sand; from this base numerous slender processes arise vertically; the largest specimen attains 95 mm in its greatest extension; the largest processes are about 12 mm in diameter at the base, apices pointed, about 55 mm high; their appearance is very characteristic: they are spined, the spines being up to 4 mm in length, and placed in longitudinal rows, here and there coalescing with the bases so as to form ridges, and a transverse section of the process will appear rather like an aster. The surface is everywhere shaggy. Numerous apertures from a fraction of 1 mm to 4 mm in diameter are seen everywhere; they are probably ostia. Consistence rather soft, but somewhat brittle. Colour of the body dirty grey, of the processes whitish with a red tint.

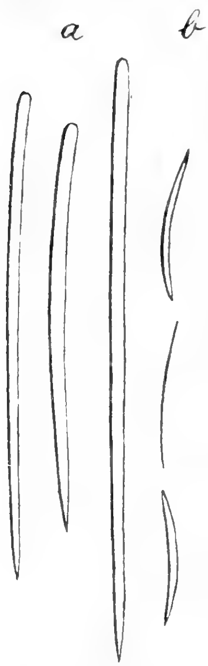

Fig. 27. *Axinella colvillii* nov. spec. *a*. Styli. *b*. Oxea.

The *skeleton* is composed of densely aggregated spicula-columns directed outwards towards the surface in the main body, longitudinally in the processes; the fibres are so densely packed, that their outer spicules, which are directed a little obliquely outwards, are partly crossing those of the neighbouring fibres; the before mentioned spines at the processes are mainly composed of spicules issuing from the main fibres at nearly right angles; many scattered spicules occur, mostly oxea, which only form a small part of the main skeleton of the fibres; they occur in greater number in the outer parts of the sponge than in the interior.

Spicules. 1. Styli (fig. 27 a), straight or slightly bent, generally thickest in the middle, sharp-pointed; sometimes beginnings to subtylostyli are found; length about 700 μ most common, but the styli may vary from ca. 500—900 μ, by a thickness of 14—25 μ. 2. Oxea (fig. 27 b), slightly and generally evenly curved, tapering from the middle towards the pointed apices, varying in length from 170—320 μ, in thickness from 7—9 μ.

Axinella globula nov. spec.

(Fig. 28.)

2 miles East of North Cape. 55 fathoms. Hard bottom. 2/I.1915.

One little specimen, hemispherical, torn loose from the body of attachment; 13 mm in largest diameter, 8 mm high; numerous small apertures up to 0,25 mm in diameter are seen everywhere on the surface, which is very hispid. Consistence nearly stony, colour grey.

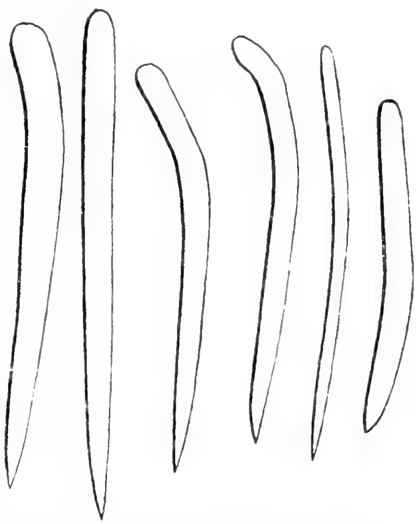

Fig. 28. *Axinella globula* nov. spec. Styli.

The *skeleton* is distinctly radially arranged; the main fibres run unbroken from the centre of the sponge vertically outwards to the surface, every now and then giving off new branches at very narrow angles to fill up the ever increasing spaces between the original fibres; most spicules in the fibres are arranged so that they point obliquely outwards in a true Axinelloid manner; some spicules, however, are placed so, that the point is directed vertically outwards from the fibre in an Ectyonine manner; these latter spicules always reach the neighbouring fibres, thus adding to the strength of the entire skeleton. No special dermal skeleton is found, the distally placed spicules in the fibres pierce the dermal-membrane, making it hispid.

Spicules. Styli (fig. 28), somewhat varying in appearance, in most cases somewhat crooked a little above the base, only rarely nearly straight; they are generally thickest at the base and at the bending, from here tapering to the sharp points; some styli, however, are of even thickness for the greater part of the spicule, only the apex abruptly and sharply set off. They vary in length from ca. 250—400 μ by a thickness up to 22 μ.

Hymeniacidon racemosa nov. spec.

(Fig. 29 a—b).

Three Kings. 65 fathoms. Hard bottom. 5/I.1915.

Several specimens, apparently fragments. The sponge seems to form branching and coalescing, more or less cylindrical stems; the

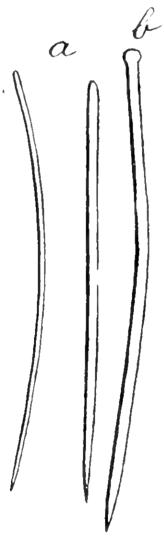

Fig. 29. *Hymeniacidon racemosa* nov. spec. *a*. Styli. *b*. Subtylostyli.

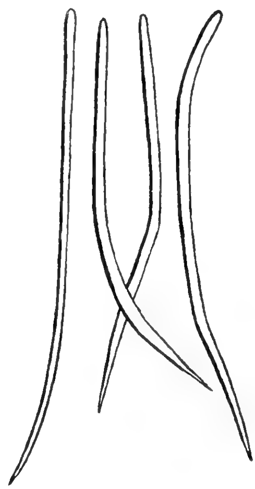

Fig. 30. *Hymeniacidon haurakii* nov. spec. Styli.

largest specimens attain a length of 18 mm, a thickness of 3 mm. The surface is hispid; the dermal-membrane thin, covers numerous small subdermal cavities; it is pierced by numerous ostia, which are just seen with the pocket lens. Oscula could not be made out. Consistence soft, a little elastic; colour yellowish.

The *skeleton* consists of a loose feltwork of spicules often forming rather distinct fibres, which do not, however, attain a great length before they dissolve, then being replaced by others; these short fibres are forming a very irregular reticulation, being connected by short whisps of spicules. When the fibres reach the surface, they split up into short tufts of spicules; such tufts are also formed by isolated spicules under the dermal-membrane, where no fibres reach this latter.

Spicules. Styli (fig. 29a) or subtylostyli (fig. 29b), nearly straight or somewhat bent, tapering to the sharp points; about 300 μ long by a thickness of 7—8 μ.

Hymeniacidon haurakii nov. spec.

(Fig. 30.)

North Channel. Kawaii Isl. Hauraki Gulf. 10 fathoms. Hard bottom. 29/XII.1914.

Encrusting. Several shells are cemented together by the sponge, so that the whole aggregation forms a lump-shaped body of ca. 45 mm in greatest extension; the surface is beset with small cones, up to 1 mm in hight, 1—3 mm apart. Spicules are piercing the dermal-membrane, especially at the top of the conuli; texture tough, elastic; colour light grey. Several small ostia, which can just be seen with a pocket lens, are leading into spacious subdermal-cavities; oscula rather numerous, 1—2 mm in diameter, not elevated over the level of the sponge-surface.

The *skeleton* consists mainly of scattered spicules, lying without order; but rather distinct fibres are met with, in a few places of tolerable Axinelloid structure. No special dermal skeleton is found; here and there, however, the fibres, which are all directed more or less perpendicularly towards the surface, are bending in a right angle when reaching the dermal-membrane, and passing tangentially along this in ca. one spicule's length.

Spicules. Styli (fig. 30), more or less irregularly curved, of even thickness for the greater part, then tapering towards the very sharp point; length varying from about 400—800 μ, by a thickness of up to 14 μ.

Hymeniacidon novae-zealandiae nov. spec.

(Fig. 31 a—d).

Little Barrier Island. 30 fathoms. Shell-bottom. 29/XII.1914.

One specimen. A long slender stalky body, near the apex dividing into two branches; length ca. 160 mm, thickness 2 mm in the first two thirds, then gradually growing thicker, to ca. 4 mm; apex of the one branch torn off; the other branch about 35 mm long, 4 mm thick. Surface strongly hispid, especially on the distal

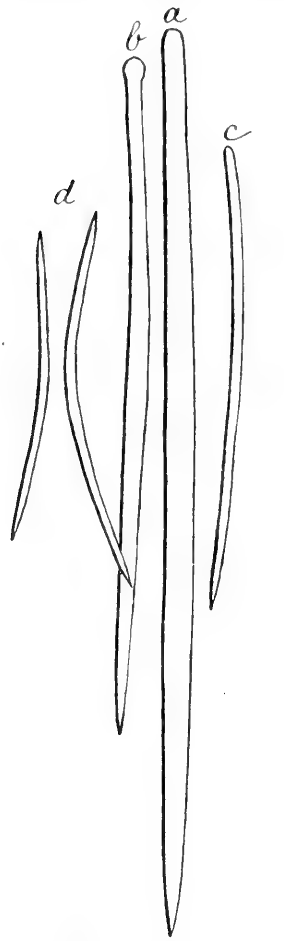

Fig. 31. *Hymeniacidon novae-zealandiae* nov. spec. *a.* Stylote. *b.* Substylotylote. *c.* Small stylote. *d.* Oxea.

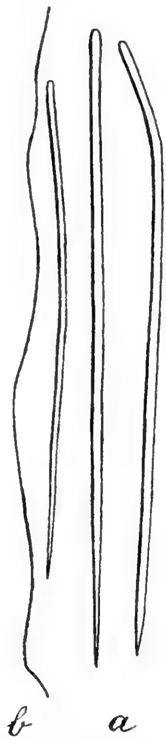

Fig. 32. *Hymeniacidon erecta* nov. spec. *a.* Styli. *b.* Siliceum-threads.

part of the body. Dermal-membrane macerated. Oscula and ostia could not be made out. The consistence of the stalk hard, of the upper parts of the sponge softer but tough. Colour dirty orange.

The *skeleton* is a dense feltwork of spicules lying pell-mell;

they are especially dense in the axis of the sponge; from here arise indistinct fibres directed obliquely upwards and outwards. Both oxea and styli are taking part in the building up of the skeleton.

Spicules. 1. Large styli (fig. 31 a—b), only few in number; straight or a little curved, of even thickness over the greater part, then tapering to the sharp apex; length varying from about 450—800 μ by a thickness of ca. 16—26 μ; a few subtylostyli (fig. 31 b) are found. 2. Smaller styli (fig. 31 c), very numerous, of the same shape as the foregoing, but only up to ca. 500 μ in length, by 7—8 μ in thickness. 3. Oxea (fig. 31 d), more or less curved in or near the middle, of even thickness over the greater part, then tapering to the sharp points; length varying from ca. 200—400 μ, by a thickness of 6—7 μ.

Hymeniacidon erecta nov. spec.

(Fig. 32 a—b).

Little Barrier Isl. 30 fathoms. Shell-bottom. 29/XII.1914.

One specimen, attached to a shell; cylindrical; ca. 45 mm long, 3—4 mm thick. Surface even, but hispid; dermal-membrane thin, covering numerous subdermal cavities; several inconspicuous apertures, ca. 0,5 mm in diameter, are found, especially on the lower half of the sponge. Colour light grey; consistence tough, only a little elastic.

The *skeleton* consists of a very dense feltwork of spicules, partly lying pell-mell, partly forming longitudinally directed fibres; these fibres cannot, however, be followed very far, as they soon dissolve, and other short fibres take up their tracts; the fibres are lying close together.

Spicules. Styli (fig. 32 a), some nearly straight, some more or less, often irregularly, curved; in the axial portion of the sponge-body many styli are elongated so as to form irregularly curved, slender siliceum-threads. The styli vary in length from ca. 250—650 μ by a thickness of up to 8 μ; the threads may attain nearly the double length; they are not numerous.

This sponge somewhat resembles *Hymeniacidon haurakii* in spiculation, but is distinctly separated from that species in outer appearance.

Latrunculia spinispiraefera nov. spec.

(Fig. 33 a—e).

2 miles E. of North Cape. 55 fathoms. Hard bottom. 2/I.1915.

One specimen; subspherical, ca. 100 mm in largest diameter, beset with numerous short funnelshaped papillae, probably contain-

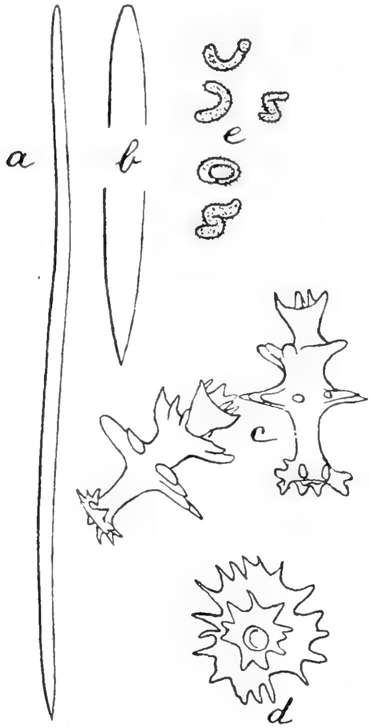

Fig. 33. *Latrunculia spinispiraefera* nov. spec. *a*. Stylote. *b*. Ends of stylote. *c*. Side-view of discorhabds. *d*. Basal-view of Discorhabd. *e*. Spinispirae.

Fig. 34. *Suberites axinelloides* nov. spec. *a*. Tylostyli. *b*. Head of tylostylote.

ing pore areas, which could not, however, be discerned with certainty, as the sponge has unfortunately been preserved in formaline, and therefore is rather macerated; the papillae are from 1—3 mm high, from 1—10 mm in diameter; they are situated all over the surface with a mutual distance of, say, 10 mm. The surface is very finely granulated on account of the discorhabds, and very firmly rough to the touch. Consistence soft, colour dark brown.

The *skeleton* consists of an irregular reticulation of thick spicula-fibres, 150—200 μ in diameter; these fibres are, however, very indistinct in most places, everywhere loose spicules lying scattered about. Throughout the body are also scattered spini-spirae and discorhabds; the latter as usual form a thin, one-layered crust, a dermal cortex.

Spicules. a. *Megascleres.* Styli (fig. 33a—b), generally slightly and irregularly curved, with narrow base, sharp point, of nearly even thickness all over; about 420×10 μ. b. *Microscleres.* 1. Discorhabds (fig. 33c—d), the base roughly spined; with three whorls, the first of the greatest diameter and placed vertically to the axis; the second is bending a little towards the apex, the third is distally placed, with spines nearly parallel with the axis; length of the whole spicule about 45 μ, largest whorl about 25 μ in diameter. Developmental forms are found, confirming the observations set forth by Dendy 1917 (5), and hence I use the new term discorhabd instead of discaster. 2. Spinispirae (fig. 33e) strongly spined all over, 10—12 μ; the occurrence of this spicule in the genus *Latrunculia* is extremely interesting, as it gives further evidence of the relationship of *Latrunculia* to other Spirastrellinae.

Suberites axinelloides nov. spec.

(Fig. 34a—b.)

2 miles East of North Cape. 55 fathoms. Hard bottom. 2/I.1915.

Several specimens encrusting on coral fragments as thin dark-coloured covers, only a fraction of a mm thick. Openings could not be detected. Surface finely hispid.

The *skeleton* is made up of almost the dermal skeleton alone, the main skeleton being reduced to a one-layered irregular felt-work of spicules close to the body of attachment. The dermal skeleton consists of brushes of tylostyles placed close together: the spicules in the brushes are arranged so that they diverge a ittle from one another with their distal ends, the brushes are accordingly much narrower at the base than at the summit, thus recalling short Axinelloid fibres. The larger spicules form the main skeleton, the shorter ones the dermal.

Spicules. Tylostyli (fig. 34a—b), straight or slightly curved, generally thickest about the middle, evenly tapering to the sharp points; the heads are beautifully marked off; they vary in length from ca. 200—700 μ by up to 21 μ in thickness.

Suberites perfectus R. & D.

Suberites perfectus, Ridley & Dendy (14), p. 200, Pl. XLI fig. 9, Pl. XLV figs. 3, 3a, 3b.

Three Kings. 65 fathoms. Hard bottom. 5/I.1915.

One fine specimen and some fragments, resembling the type in general appearance; unfortunately the specimens are preserved in formaline, therefore somewhat macerated, so that the beautiful dermal reticulation, mentioned by Ridley and Dendy, could not be seen. As in the type, the oscula are also here situated on small, thinwalled elevations. The skeletal arrangement agrees fairly well with the type. The spicules are of the same shape, varying from ca. 200—1400 μ, thus a little larger variation-range than in the type.

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Papers from Dr. Th. Mortensen's Pacific Expedition 1914—16.

XXIV.*)

Scyphomedusen von den Molukken und den Kei-Inseln.

Von

Dr. **Gustav Stiasny**, Leiden.

(Mit 7 Textfiguren.)

Die mir von Dr. Th. Mortensen zur Bearbeitung übersandte Scyphomedusen-Sammlung von den Molukken, Banda- und Kei-Inseln umfasst folgende 8 Formen:

Aurelia aurita (Linnaeus) Lam. (Amboina).
Linuche unguiculata var. *aquila* Mayer (Kei-Inseln).
Cassiopeia andromeda Eschscholtz (Banda-I.).
Mastigias papua L. Agassiz (Molukken).
Mastigias ocellata Modeer (Amboina).
Thysanostoma thysanura Haeckel (Kei-Inseln).
Lorifera lorifera Haeckel (Kei-Inseln).
Crambione mastigophora Maas (Amboina).

Diese Ausbeute bietet weder in systematischer noch in tiergeographischer Hinsicht viel Neues. Sämmtliche Formen sind

*) Although dealing only with material collected by the Danish Expedition to the Kei Islands, 1922, this paper is included in the series "Papers from Dr. Th. Mortensen's Pacific Expedition". This is done in order to avoid the complication of having two parallel running series of papers. Future papers dealing with material from the Expedition to the Kei-Islands will, for the same reasons, likewise be included in the series of Papers from the Pacific Expedition — the more so as in several cases it will be the natural course to deal with the material from both expeditions jointly. *Editorial Note.*

bereits wiederholt in den philippinischen Gewässern und jenen des malayischen Archipels nachgewiesen worden. Der Fundort Kei-Inseln ist neu. Es ist jedoch sehr unwahrscheinlich, dass die wenigen daselbst erbeuteten Exemplare ein auch nur einigermaassen erschöpfendes Bild der Medusenfauna der Kei-Inseln darstellen sollten. Viele der in den benachbarten Gebieten häufigen Scyphomedusen sind in der kleinen Sammlung nicht vertreten.

Bemerkenswert sind die zahlreichen Exemplare von *Linuche unguiculata* var. *aquila* Mayer in verschiedenen Entwicklungsstadien, ein schönes Exemplar von *Mastigias ocellata* Mod. und ein solches der seltenen *Lorifera lorifera* Haeckel. Der Erhaltungszustand ist in den meisten Fällen ein sehr guter (Formalin 5 %).

Ordo **Semaeostomeae** L. Agassiz

Fam. **Aureliidae** L. Ag.

Aurelia aurita (Linnaeus) Lamarck.

1 Exemplar: Bucht von Amboina, Oberfläche, 22.II.

Stark beschädigtes Exemplar von 150 mm Schirmbreite, rostbraun verfärbt.

Ordo **Coronatae** Vanhöffen.

Fam. **Linergidae** Haeckel.

Linuche unguiculata var. *aquila* Mayer.

(Textfig. 1).

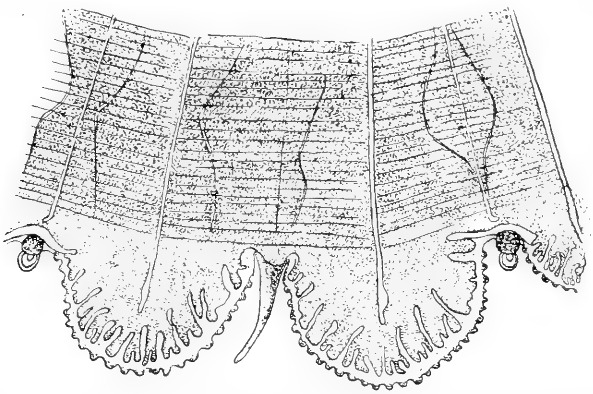
1) Einige Tausend Exemplare. Godan, Kei-Inseln, Oberfläche, 4.IV.22.
2) Ca. 80 Exemplare, Doe Roa Strasse, Oberfläche, 23.IV.22.
3) 75 Exemplare, Elat, Oberfläche, 8.V.22.

1) Zahlreiche Exemplare eines Schwarmes; von 3—5 mm Schirmbreite, noch ohne Gonadenanlagen, flach, Ephyra-artig. Ringfurche und 16 Radiärfurchen auf der Exumbrella bereits nachweisbar. Exumbrella mit kleinen rundlichen Nesselwarzen dicht bestreut. Aussackungen auf der Subumbrella noch nicht vorhanden, Ringkanal noch nicht angelegt. Tentakel ganz kurz. Die meisten Exemplare etwas jünger als das von Mayer (7, Fig. 5, Pl. 59) abgebildete Stadium. Färbung grünlich-gelblich.

Derartige Ephyren, etwa von gleicher Grösse, sind auch von Agassiz und Mayer (1) bei den Fiji-Inseln beobachtet worden.

2) u. 3) Die typische Form von ca. 13 mm Höhe und 16 mm Breite, mit 48 in 2 Reihen stehenden Protuberanzen auf der Subumbrella. Innere Reihe besteht aus 16 grösseren, die periphere Reihe aus 32 kleineren Säckchen.

Der periphere Teil des Kanalsystems (Textfig. 1) zeigt meist — wie beim Sibogamaterial von *Linerges draco* Haeck. durch Maas beschrieben (6) — ganz schmale kaum wahrnehmbare Verlötungs-



Textfig. 1. *Linuche unguiculata* var. *aquila* Mayer. Stück des Schirmrandes, von innen, etwas vergrössert.

stellen, nirgends sind breitere Verwachsungsfelder oder Streifen zu sehen, wie z. B. von Mayer in Fig. 11, Taf. 59, (7) dargestellt. Der periphere Streifen erscheint daher als fast einheitlich. "Ringkanal" vorhanden. Die Verästelungen in den Lappentaschen sind hier weniger unregelmässig und weniger zahlreich (etwa 12—15, nicht etwa 30 Terminaläste) als wie von Maas (6, Taf. 1, Fig. 2) dargestellt und beschrieben (bei *Linerges draco*). Die einzelnen Ästchen sind durch tiefere Einschnitte von den benachbarten getrennt, secundäre Verästelung bei diesen grösseren Exemplaren nur angedeutet. — Die Gonaden entweder halbmondförmig, paarweise einander genähert wie bei Maas Fig. 1, Taf. 1, weisslich oder bräunlich; oder halbmondförmige längliche, dunkelbraune, mehr oder minder gelappte Würste formend, etwa wie von Mayer (7, Fig. 7 u. 11, Taf. 59) dargestellt.

Färbung: grünlich-gelblich. Aussackungen auf der Subumbrella schilfgrün. Jüngere Gonaden weisslich, ältere Gonaden licht- oder dunkelbräunlich. Entoderm der Lappentaschen intensiv lichtgrün.

Schwarmweises Auftreten dieser Meduse ist nichts ungewöhnliches. Der Fang von Godan stellt förmlich eine Probe einer Reinkultur dar von meist gleichaltrigen Individuen.

Ähnliche Massenfänge wurden auch von Conklin (2) und Mayer (7) an verschiedenen Orten im Atlantic und Pacific gemacht.

Im Anschlusse an Mayer (7, p. 195), der die atlantische *Linuche unguiculata* und die pacifische *aquila* nur als Varietäten einer einzigen Form betrachtet, wurden die vorliegenden Medusen als "*Linuche unguiculata* var. *aquila*" Mayer bestimmt. Die von Maas im Sibogawerk als *Linerges draco* beschriebenen Medusen sind nach meiner Ansicht nichts anderes als Jugendstadien dieser Form.

Ordo **Rhizostomae** Cuvier.

Subordo **Kolpophorae** Stiasny.

Stamm **Kampylomyariae** Stiasny.

Fam. **Cassiopeidae** Claus.

Cassiopeia andromeda Eschscholtz.

33 Exemplare: Saparoea Bucht 11.III.22.
5 „ : Banda, 6.VI.22.
3 „ : Ausserhalb Neira Banda, ca. 20 m Tiefe, Sand, 10.VI.22.
1 „ : Lontor, Banda, Küste 6.VI.22.
1 „ : Station 36, 35 m Tiefe, Sand, 23.IV.22.

Sämmtliche 43 Exemplare (von 50—80 mm Schirmbreite) zeigen den Mangel der sternförmigen Zeichnung und der weissen Flecke auf der Exumbrella, wie dies nun schon bei zahlreichen *Cassiopeia*-Arten nachgewiesen wurde (11, 15); ebenso zeigen sie den von Hartlaub (5), Browne (3) und Verfasser (15) bei *C. a.* ganz verschiedener Provenienz beschriebenen Ringwulst auf der Peripherie der Exumbrella. In manchen Fällen auch Radiärstruktur.

Umbrella flach, scheibenförmig, meist mit centraler Kuppel, nur das eine Exemplar von Lontor, Banda, urnenartig vertieft mit erhöhtem Rande. Der Ringwulst stellt die höchstgelegene Partie der Exumbrella dar.

Randläppchen meist 3, aber auch 4 und 5. Rhopalien ± 16. Länge der Mundarme meist kleiner als r, in einzelnen Fällen bis $1^1/_2$ r. Mundarme dorsoventral abgeplattet, in vereinzelten Fällen lateral comprimiert. Zottenrosette bei zahlreichen Exemplaren stark entwickelt.

32 Radialcanäle; sinusartige Anschwellung im äusseren Drittel nicht immer nachweisbar, kein zuverlässiges Merkmal (14). Auffallend die grossen ovalen blattförmigen Kolbenblasen, die dunkelviolett gesprenkelt sind, in der Mitte der Armscheibe oder auf den Mundarmen den Saugkrausen aufsitzend; gelegentlich gänzlich fehlend.

Färbung: a) grünlich-gelblich mit grünlichen Saugkrausen oder b) gelblich-bräunlich mit bräunlichen bis schwärzlichen Saugkrausen. Bei einigen Exemplaren schwarzviolette Streifen auf der Subumbrella oberhalb der Interrhopalarcanäle. Gonaden weisslich. — Zottenrosette weisslich-gelblich.

Die vorliegende Exemplare stehen der durch Maas im ostindischen Archipel nachgewiesenen *C. a.* var. *malayensis* sehr nahe. Die var. *maldivensis* Browne ist, da das Hauptmerkmal (der periphere Ringwulst auf der Exumbrella nebst Farblosigkeit) in beiden Fällen nachweisbar, zweifellos damit identisch. Beide Varietäten habe ich bereits bei früherer Gelegenheit mit *C. a.* vereinigt (11, p. 67).

Stamm **Krikomyariae** Stiasny.

Fam. **Mastigiadidae** Stiasny.

Mastigias papua L. Agassiz.

2 Exemplare: Saparoea Bucht, 1—2 m Tiefe, Sandboden. 11.II.22.

Das grössere Exemplar von ca. 80 mm Schirmbreite zeigt auffallende Färbung. Die gewöhnlichen Augenflecke oder die Tüpfelung auf der Exumbrella fehlen; dafür gleichmässige Körnelung. Färbung gelblich-grünlich.

Auf der Subumbrellarseite treten die 8 Rhopalarcanäle durch ihre auffallende schwärzlich-bläuliche Färbung deutlich hervor, ähnlich wie von Maas (8, p. 66) bei *M. papua* var. *sibogae* beschrieben. Das Anastomosennetz, das zwischen den Rhopalarcanälen und dem Ringcanal ausgespannt ist, hat 8—10 Kanalwurzeln und ist leicht schwärzlich gefärbt. Schwärzliche Färbung zeigen ferner die Mundarme, besonders in den distalen Teilen, sowie die Endanhänge, die an der Basis und am freien Ende schwarz gesprenkelt sind.

Randkörper mit Spuren von rostbraunem Pigment.

Schwärzliche Färbung der Rhopalarcanäle ist auch bei *Mastigias siderea* Chun angegeben; diese Form weicht jedoch sonst in einigen Punkten ab. Das vorliegende Exemplar zeigt grössere Ähnlichkeit mit *M. papua* var. *sibogae* Maas.

Ein Jugendstadium von 25 mm Schirmbreite zeigt beginnende schwärzliche Verfärbung der Mundarme und der langen Endanhänge.

Mastigias ocellata (Modeer).

(Textfig. 2, 3.)

1 Exemplar: Amboina-Bucht, Oberfläche, II.22.

Schirmbreite ca. 190 mm. Gallerte knorpelhart, nicht schlapp.

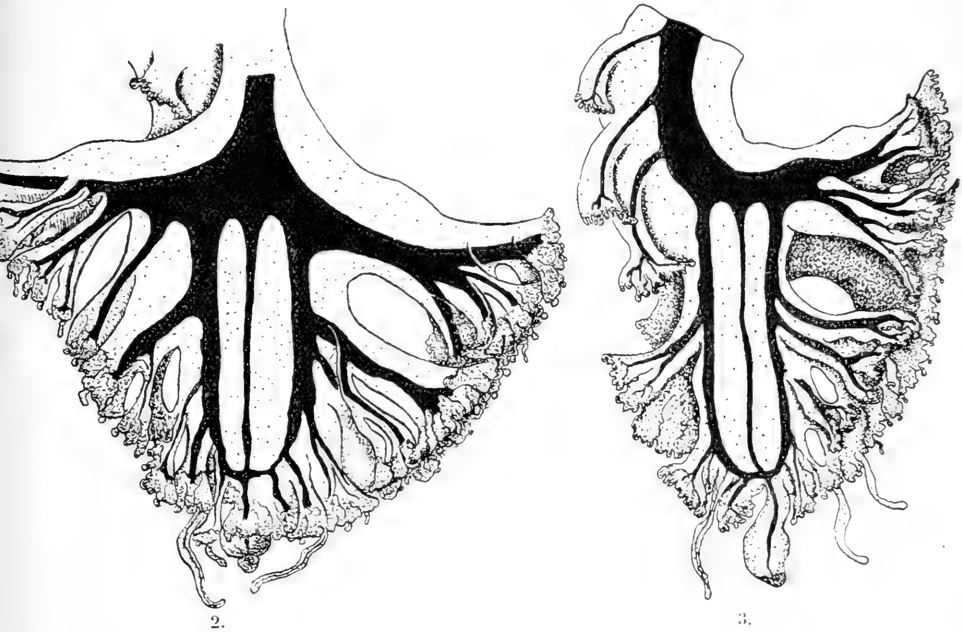
Exumbrella ohne Skulptur (Rinnen), glatt.

Der Schirmrand zeigt auf der einen Hälfte 6 Velarläppchen pro Octant, gross, rundlich, durch tiefe, weit auf die Exumbrella hinaufreichende Gallertfurchen getrennt, durch dünne Membranen mit einander verbunden. Die beiden mittleren Velarläppchen sind die breitesten (15 mm), die seitlichen schmäler (10 mm), dazwischen auch unregelmässige kleine zungenförmige Läppchen. Auf jedem der grossen Velarläppchen 1 oder 2 grosse rundliche weissliche Flecken. Auf der anderen Hälfte finden sich dagegen 12—14 kleine Velarläppchen, durch ganz kleine schmale seichte Furchen geschieden, fast ganz mit einander verwachsen, so dass der Schirmrand dieser Hälfte fast ganzrandig (bis auf ganz schwache Einkerbungen), nicht gelappt, erscheint. Rhopalarläppchen klein, spitz, schmal. Sinnesgrübchen schwach entwickelt, ohne Falten.

Subgenitalostien 55 mm breite Schlitze. Keine Papillen.

Armpfeiler 20 mm breit, also nicht einmal halb so breit als die Ostien. Muskulatur in 8 Knotenpunkten convergierend. Magenkreuzschenkel breit, gedrungen, peripher etwas breiter als central; die benachbarten fast im rechten Winkel auf einander stossend.

Das Gefässystem des Schirmes zeigt den Kanaltypus *Mastigias* mit 18—20 Kanalwurzeln. Netzmaschen rundlich, nicht gestreckt. Perradiale Rhopalarcanäle flaschenförmig, nicht direkt mit dem Anastomosennetz in Verbindung stehend. Interrhopalarcanäle in der Mitte des Verlaufes verdickt. Ringkanal breit. Nur wenige Peitschenfilamente im Centrum der Armscheibe. Gonade auffallend schwach entwickelt in Anbetracht der Grösse des Exemplars (♂?).



Textfig. 2. und 3. *Mastigias ocellata* Mod. Mundarme. 2.) von der Abaxialseite, 3.) von der Seite gesehen. Gefässversorgung nach einem Injectionspraeparat (Del. Haematoxylin) gezeichnet.

Die Mundarme sind stark seitlich comprimiert, mit langem Oberarm und breiten Unterarmflügeln (Textfig. 2 und 3). Der dargestellte Unterarm zeigt folgende Maasse:

Oberarmlänge 30 mm.
Unterarmlänge 55 mm.
Breite des Unterarmes ca. 55 mm.
„ „ Oberarmes „ 20 mm.
Spannweite der Unterarmflügel ca. 80 mm.

Die Seitenästchen sind sehr kräftig, sehr selbständig, nicht membranös, sondern solid, knorpelhart. Die obersten, proximalen Seitenästchen durch tiefe Einschnitte gänzlich vom übrigen Teile des Unterarmes getrennt, oder durch breite Fenster davon geschieden. Auch die distalen Seitenästchen ungewöhnlich stark selbständig. Die Mundarme erscheinen dadurch wie zerfetzt oder gefiedert.

Die Saugkrausen sind sehr schwach ausgebildet und sitzen fast ausschliesslich an den Seitenkanten. Endanhang kurz, keulenförmig oder langgestreckt, oder gänzlich fehlend. Faden- und bandförmige Anhänge auf Abaxial- und Axialseite der Flügel, gestielte und sitzende Saugkölbchen zwischen den Saugkrausen.

Die Mundarme erinnern im ganzen Habitus mehr an diejenigen von *Versura palmata* nach der Abbildung Haeckel's (4, Taf. XXXX, Fig. 9) als an die von *Crossostoma anadyomene* (6, Taf. VII, Fig. 56) durch Maas, oder die von *Mastigias ocellata* (12, Fig. 5 und 6) vom Verf. abgebildeten. Sie sind jedoch noch stärker zerschlitzt, die Fenster noch mehr ausgebildet, die Saugkrausen dagegen schwächer.

Die Kanalversorgung der Mundarme wird durch kräftige einfache Kanäle bewirkt, wie sie für die tripteren Mundarme charakteristisch ist; am ähnlichsten sind die Verhältnisse bei *Mastigias ocellata* (12, Fig. 5 und 6). Im unregelmässig geformten Endkolben ein einfacher Kanal — kein Anastomosennetz — der wahrscheinlich blind endet, eventuell mit einer ganz kleinen äusseren Öffnung.

Die Bestimmung des Objektes bot nicht geringe Schwierigkeit. Gegen die Zugehörigkeit zu *Versura* sprach die knorpelharte Konsistenz, die breiten, kurzen Magenkreuzschenkel, das Anastomosennetz mit nicht gestreckten, sondern rundlichen Netzmaschen, die einfachen, nicht doppelten Kanäle in den Mundarmen. Gegen die Bestimmung als *Phyllorhiza:* die mangelnde Struktur der Exumbrella und vor allem die andere Form und Beschaffenheit der Mundarme mit anderer Ausbildung der Seitenläppchen, schwachen Saugkrausen und reduciertem Endanhang. Gegen *Mastigias*: die bedeutende Grösse (190 mm), der Mangel grösserer Endkolben mit Anastomosennetz, die faden- oder bandförmigen Anhänge zwischen den schwachen Saugkrausen.

Erschwerend wirkt dabei, dass der Schirmrand nicht normal ausgebildet ist.

Für die Bestimmung als *Mastigias ocellata* waren schliesslich ausschlaggebend: die kurzen Magenkreuzschenkel, die einfachen Kanäle der Mundarme, der Kanaltypus *Mastigias*, die rundlichen Flecken auf dem Randläppchen.

Fam. **Leptobrachidae** Claus.

Thysanostoma thysanura Haeckel.

1 Exemplar: Elat, Oberfläche, 28.IV.22.

Exumbrella mit Netzwerk weisslicher Polygone zwischen vorgewölbten, unregelmässig geformten Nesselwarzen, 10—12 Randläppchen pro Octant, die mittleren meist gespalten.

Färbung der Umbrella: weisslich-gelblich-grünlich.

Mundarme distal intensiver grün als proximal.

Saugkrausen proximal weisslich.

Gonaden rosa, Randkörper mit rostbraunem Pigment.

Maasse: Schirmbreite 90, Höhe, 52 mm.

Perradialer Durchmesser der Armscheibe 70, interradialer 65 mm.

Durchmesser der Armscheibe im Niveau der Ursprungsstelle der Mundarme 45 mm. Genitalostien 36 mm breit, Armpfeiler: 14 mm.

Mundarme: 180, 150, 110, 103 mm lang!

Lorifera lorifera Haeckel.

1 Exemplar: Ohoideer, Küste, V.22.

Prachtvolles, sehr gut erhaltenes Exemplar mit lebhafter Färbung. Breite 180 mm, Höhe 50 mm.

Exumbrella fein gekörnelt. Zahl der Velarläppchen ganz unregelmässig: 4 zweigeteilte; oder 6, davon 4 zweiteilige, 2 einfache; 6, davon die beiden mittleren zweiteilig, die seitlichen einfach; meist breit, abgerundet, durch tiefere und seichtere, kurze oder lange Gallertfurchen von einander getrennt. Ocularläppchen viel kleiner, schmal, spitz. Randgrübchen glatt, ohne Falten. Subgenitalostien 60 mm, etwas mehr als doppelt so breit als die Armpfeiler. Armscheibe mit einem Filz dünner Fäden bedeckt.

Patagium sehr gut ausgebildet: ca. 10 mm hoher dicker knorpeliger Gallertwulst, vertikal auf der horizontalen Armscheibe stehend. An 8 Stellen, oberhalb der Insertionsstelle der Mundarme, mit starker rundlicher Verdickung. Von der Armscheibe durch eine ringförmige tiefe Einschnürung getrennt. Der Winkel zwischen Patagium und Armscheibe ist ein ganz ausgesprochener, eine deutliche Knickung bildend, während beide nach Haeckel's Darstellung, (4, Taf. XXXVIII, Fig. 2) ohne scharfe Grenze in einander übergehen. Ein Patagium lässt sich auch bei dem *Thysanostoma*-Exemplar feststellen, ist jedoch bei weitem nicht so kräftig und gut ausgebildet. Eine ähnliche starke Ausbildung des Patagiums habe ich nur bei dem von Schultze abgebildeten Exemplar von *Crambessa palmipes* (9, Taf. XXXIII, Fig. 1) beobachten können, das von mir als ein Jugendstadium einer Leptobrachide angesehen wurde (13, p. 69).

Mundarme: 210 mm lang, Oberarm 30, Unterarm 180 mm lang mit gut ausgebildetem Terminalknopfe. In ihrem ganzen Verlaufe tripter erscheinen sie doch in dem distalen Teil als plattgedrückt, riemenförmig. Die Saugkrausen sitzen nur auf den in den proximalen Teile stärker ausgebildeten Seitenästchen, im mittleren und distalen Teile sitzen sie direkt auf den Seitenkanten. Dadurch erscheinen die Seitenflächen als verhältnismässig breite kahle Flächen. Wenn nun zwei solche zarte Flügel sich aneinanderlegen, so erhält man den Eindruck, als wenn die Mundarme plattgedrückt wären. Dieselben sind jedoch bis ans freie Ende tripter. Auffallend ist, dass die Saugkrausen selbst nicht die amethystblaue Färbung der Mundarme aufweisen, sondern gelblich grünlich sind. Die Mundarme sehen so aus, als wenn sie mit einem dunklen, rötlichblauen Farbstoff injiciert wären. Endkolben gut ausgebildet.

Muskulatur rein circulär, die Muskelfasern im Bereich der Radiärcanäle stärker entwickelt.

Das Gefässystem des Schirms entspricht mehr der Schultzeschen (9, p. 447) als der Haeckel'schen Darstellung (4, p. 628), ist feinmaschig und ohne die Adradialcanäle der arabischen Form. Die Perradialcanäle an der Ursp ungstelle am Magen dünn, später keulenförmig angeschwollen, dann wieder dünner werdend. Die Interradialcanäle durch die beiderseitigen breiten Verlötungsstellen aus dem Queranastomosennetz heraustretend. Ca. 20 Kanalwurzeln.

Netzmaschen nicht gestreckt. Ringcanal breit, Magenkreuzschenkel lang und schmal, ca. 70 mm lang.

Gefässversorgung der Mundarme zeigt ein System doppelter Kanäle, ähnlich wie bei *Thysanostoma*.

Als Färbung gibt Haeckel für den Schirm Amethystfarbe an, Schirmrand weiss mit einem dunkelvioletten Flecken auf jedem Lappen, ferner dass die Saugkrausen der Arme dunkelviolett, die Gonaden rötlich gelblich sind (4, p. 629). Schultze (9, p. 157) beschreibt dagegen, auf Grund einer Farbenskizze Kükenthals nach dem lebenden Tiere, den Schirm als in der Mitte dunkelblauviolett, nach dem Rande zu bräunlich-weiss. Randlappen violett. Glatte Aussenseite der Oberarme und Patagium wasserhell. Unterarme (Saugkrausen oder Gallerte?) am verdickten Anfangsteil hellbraun, im übrigen vorwiegend violett. —

Das vorliegende Exemplar hat gelblich-bräunliche Färbung des Schirmes. Am Schirmrande und auf den Randläppchen breite amethystfarbene Flecken (auf jedem Läppchen 1 grosser breiter Fleck). Am Apex keinerlei Fleck.

Armscheibe, Oberarme, Patagium gelblich-bräunlich. Zottenrosette und Saugkrausen der Mundarme gelblich-grünlich. Die Membranen der Mundarme im proximalen Teile dunkelbraun, im distalen amethystfarben. Gefässversorgung als weissliches Netzwerk durchscheinend. Die Saugkrausen sind nicht violett gefärbt. —

Subordo **Dactyliophorae** Stiasny.

Stamm **Inscapulatae** Stiasny.

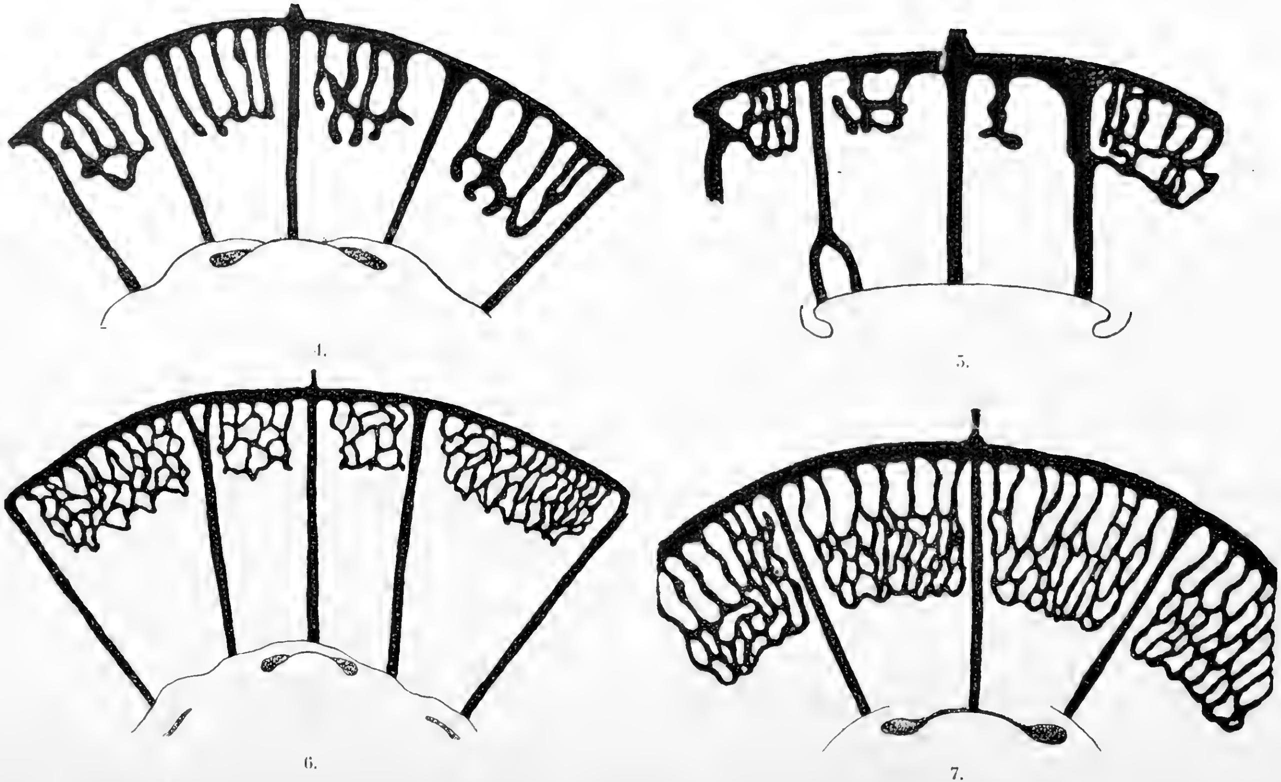
Fam. **Catostylidae** Stiasny.

Crambione mastigophora Maas.

(Textfig. 4—7).

4 Exemplare: Amboina Bucht, Oberfläche. II.22.

Ein Exemplar gut erhalten, die übrigen am Schirmrande und auf den Mundarmen stark beschädigt; grösstes Exemplar 80 mm breit, 30 mm hoch. Die Exemplare sind sämmtlich viel kräftiger, consistenter als die gleich grossen aus dem Siboga-Material; die Gallerte von Knorpelhärte. Gallertfurchen am Schirmrand ziemlich tief. 8—10 Randläppchen pro Octant. Subumbrellargallerte stark



Textfig. 4, 5, 6. 7. *Crambione mastigophora* Maas. Anomalien der Ausbildung des intracirculären Anastomosennetzes.

verdickt, in der Muskelzone nach aussen vorgewölbt, von der Armscheibe durch eine Ringfurche abgesetzt. Die Arme sind auffallend steif, wenig biegsam, die Unterarmflügel dicht aneinander geschmiegt. Alle zusammen schliessen einen trichterförmigen Hohlraum ein, wie ich es sonst nur bei *Stomolophus* gesehen habe. Saugkrausen schwach ausgebildet, fast nur auf die Seitenkanten beschränkt.

Das Kanalsystem zeigt häufig Anomalien. Dieselben sind umso interessanter als über die Entwicklung des Gefässystems, wie der ganzen Form fast nichts bekannt ist, ausser einer ganz beiläufigen Bemerkung von Maas, dass bei Jugendstadien das intracirculäre Netz "nur durch einzelne Maschen" gebildet wird (11, p. 129). Bezüglich der Bedeutung der Anomalien für die Beurteilung der Verwandschaft der verschiedenen Genera vergl. insbes. die im Druck befindl. Mitteilung 15a. Ich gebe hier einige Abbildungen solcher Anomalien in den Textfiguren 4, 5, 6, 7.

Textfig. 4. Ganz wenige langgestreckte grosse parallellaufende Längsanastomosen mit wenigen ganz kurzen Queranastomosen. Vereinzelt auch (Sector 2 von links) ein langgestreckter isolierter Centripetalcanal, der nur mit dem Ringcanal in Verbindung steht. Er ist eine Reminiscenz an das '*Lychnorhiza*'-Stadium, das in der Entwicklung von *Crambione* als höchst wahrscheinlich anzunehmen ist, in Analogie mit den Befunden bei den übrigen *Inscapulatae*.

Textfig. 5. Im Sektor rechts vom Rhopalarcanal ein isolierter am distalen Ende sich gabelnder Centripetalcanal, der vertikal auf den Ringcanal steht und nur mit diesem, nicht mit den Radialcanälen communiciert. In den seitlichen Sektoren hängt das intracirculäre Netz entweder direkt zusammen mit einem Rhopalarcanal (links) oder einem Interrhopalarcanal (rechts). Ein adradialer Radiärcanal ist an der Ursprungsstelle vom Magen gegabelt.

Textfig. 6. Breite, kurze, ganz feinmaschige Netze, die stellenweise mit ganz schmalen, halb so breiten alternieren. Ein Radiärcanal gegabelt.

Textfig. 7. Aussergewöhnlich breite und hohe feinmaschige Netze, die eine gewisse Ähnlichkeit mit der Netzarkade der *Scapulatae* zeigen und die bis über die Hälfte des Abstandes des Ringcanales von der Magenperipherie reichen. Die dem Ringcanal anliegenden Anastomosen sind langgestreckt, die übrigen viel kürzer.

Man hat den Eindruck als wenn die Tendenz bestände, dass das intracirculäre Netz den Magen erreichen würde.

Andere Anomalien, von deren Abbildung ich absehen muss, zeigen gleichfalls in manchen Sectoren direkte Verbindung des intracirculären Netzes mit dem benachbarten Rhopalar- oder Interrhopalarcanal oder mit beiden. In einem Falle liess sich eine direkte Verbindung des Netzes mit dem Magen in der Form eines eingeschobenen Radialcanals nachweisen.

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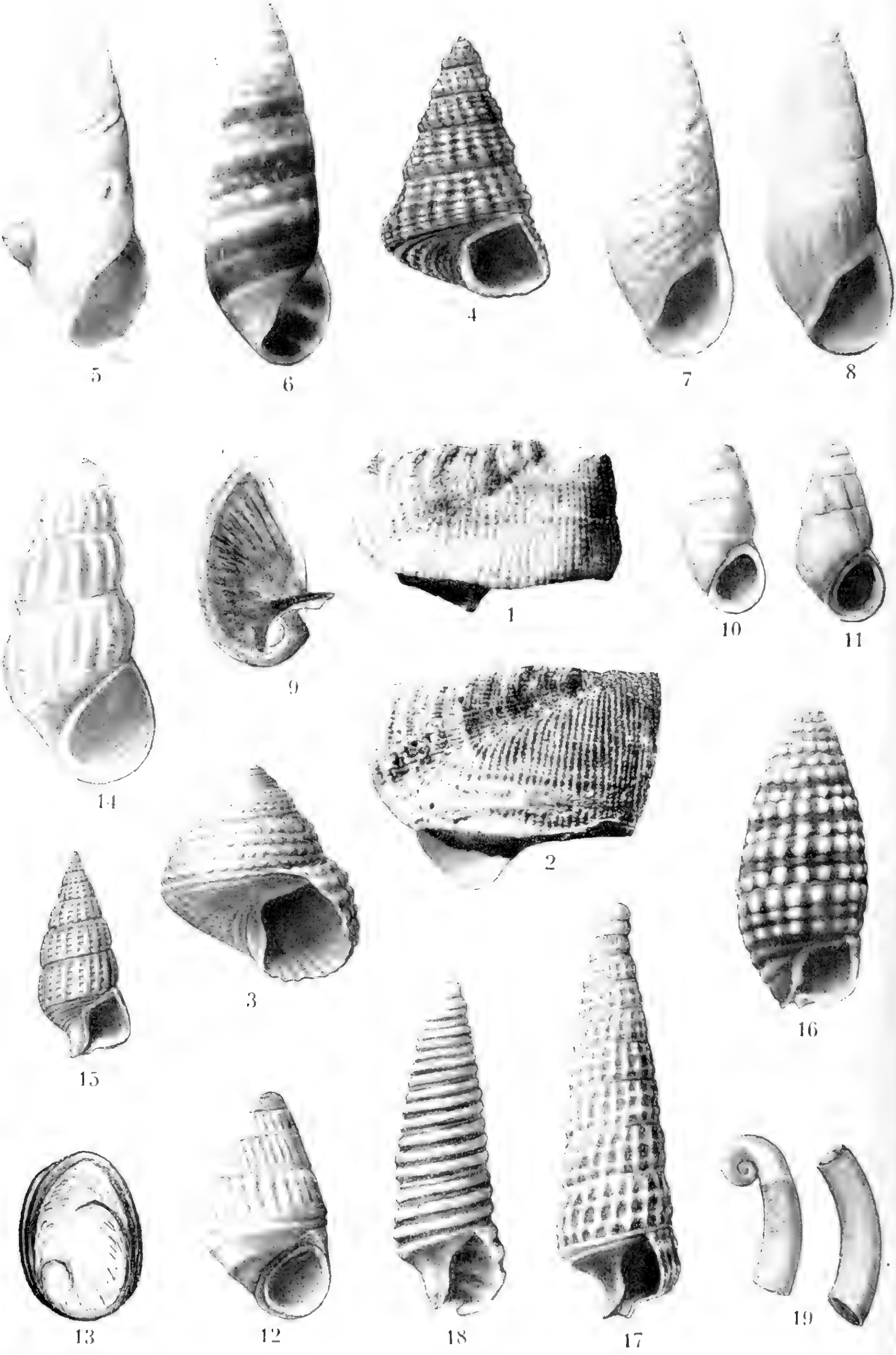

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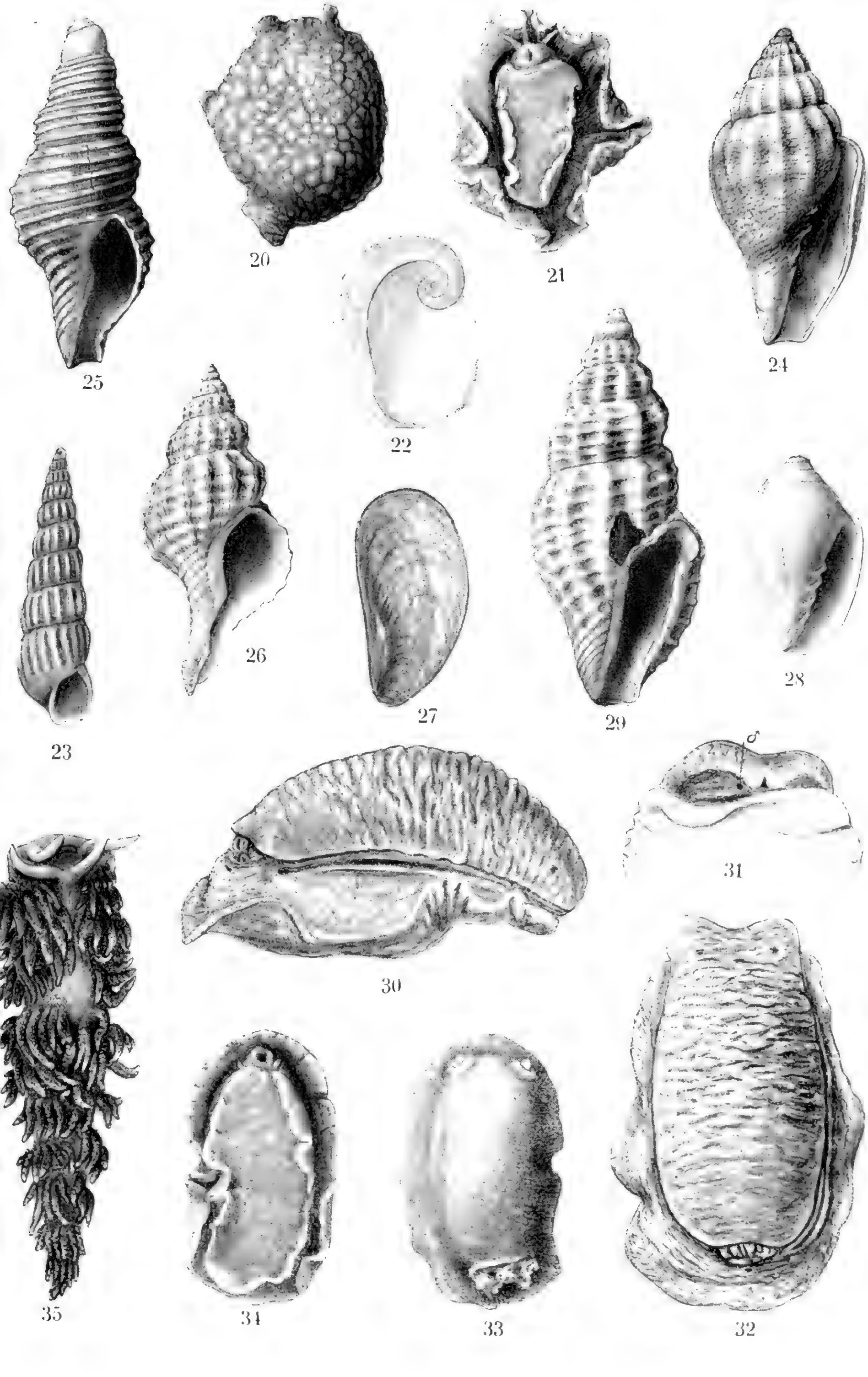

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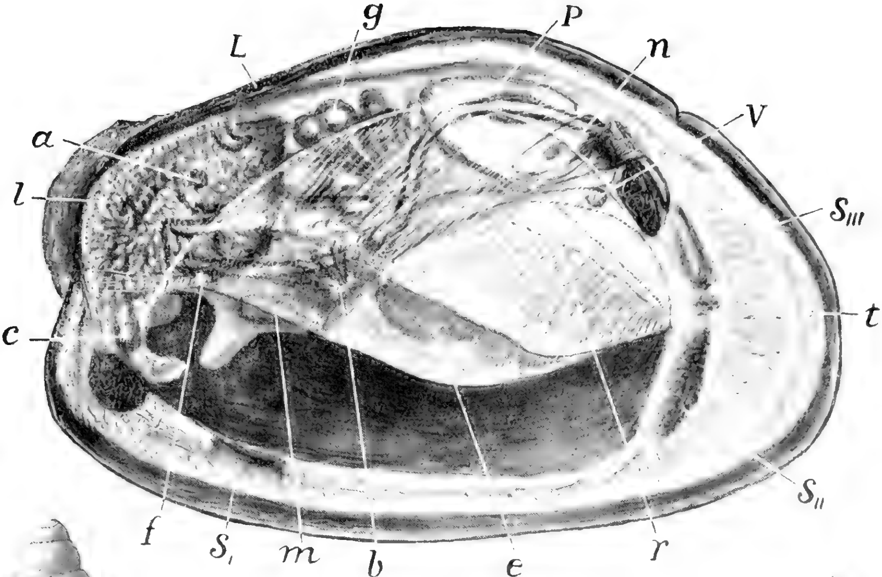

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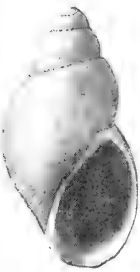

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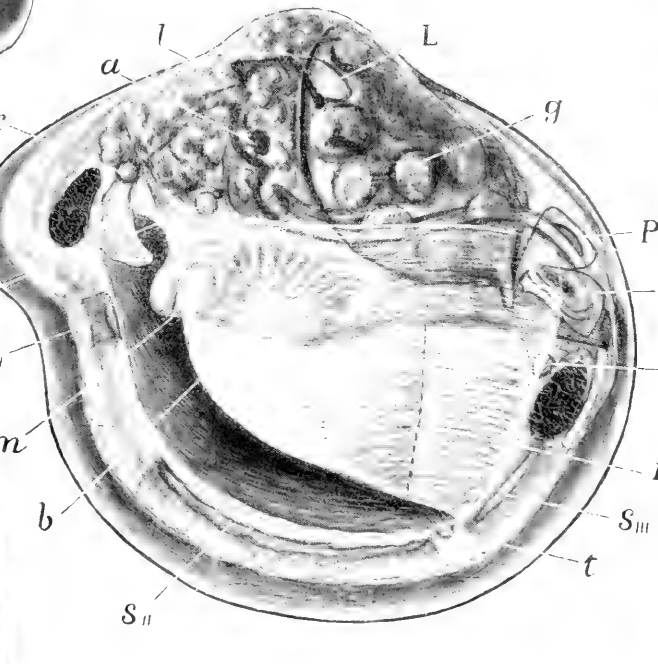

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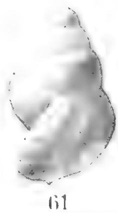

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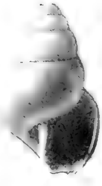

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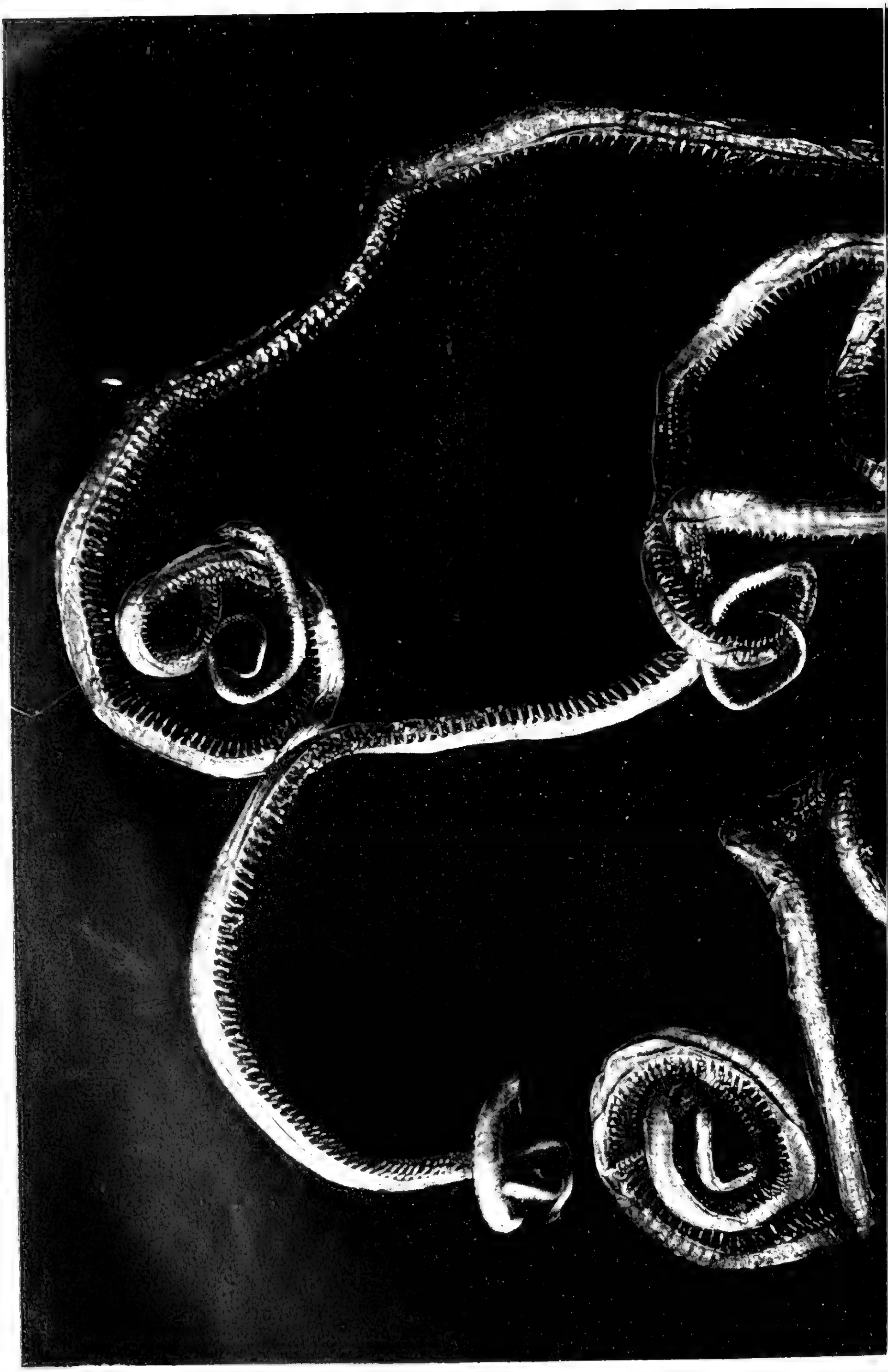

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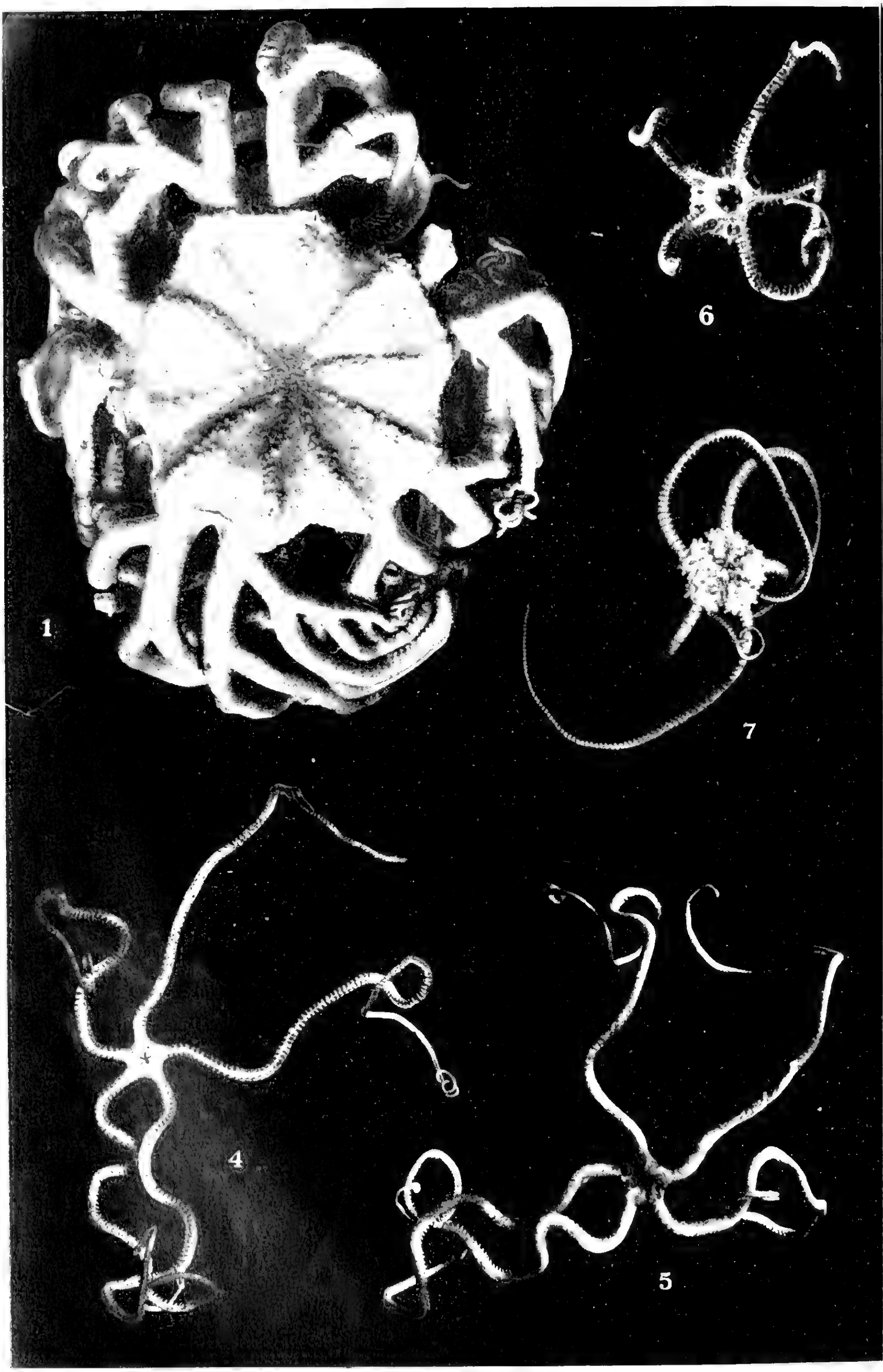
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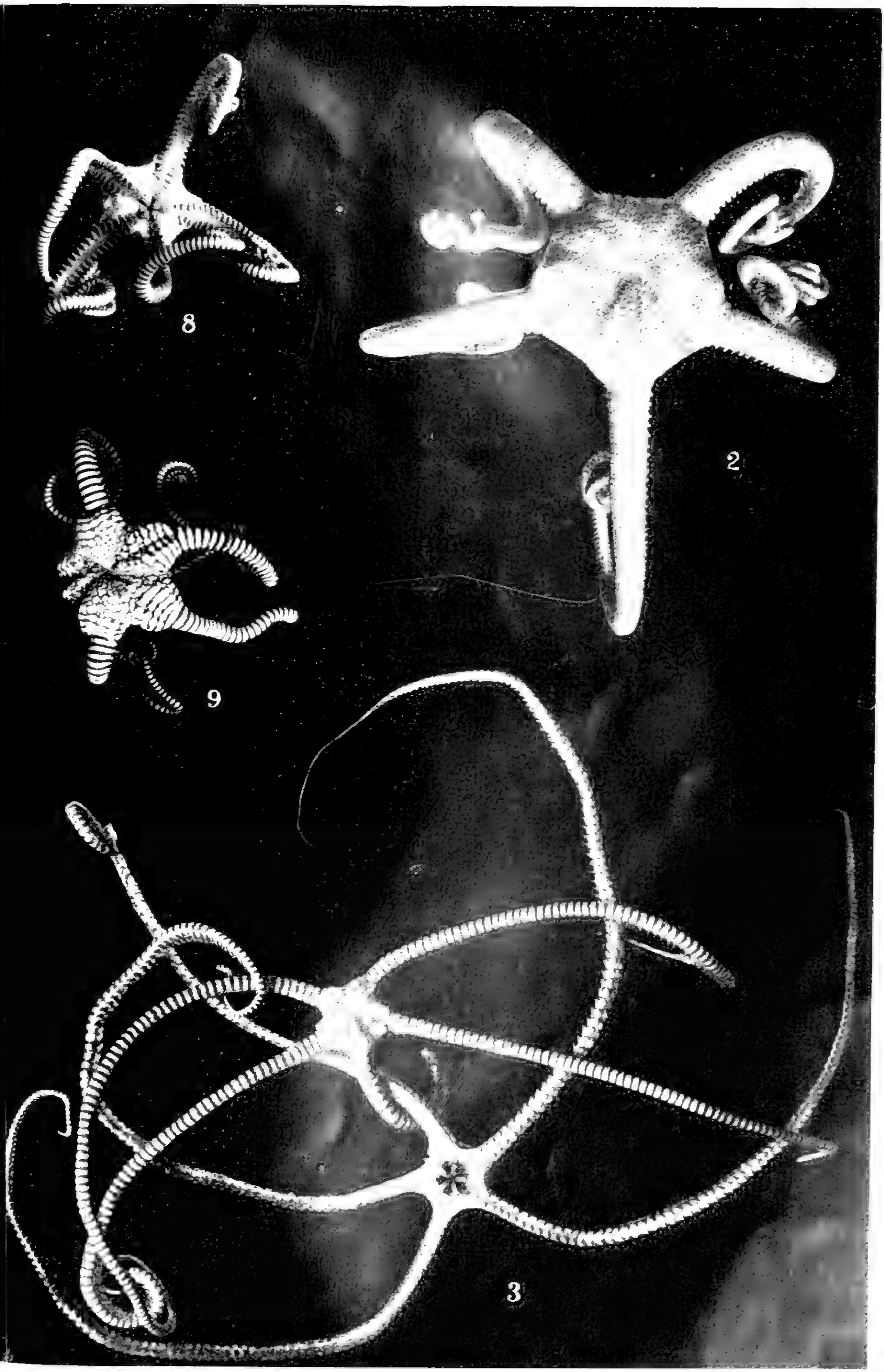
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