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Indhold.

Forfatterne alfabetisk ordnede.

Uber die chemische Zusammensetzung des Xenotim.

Von

Professor Dr. W. C. Brøgger.

In einer vor etwa zwei Jahren erschienenen Abhandlung: „Hussakit, ein neues Mineral, und dessen Beziehung zum Xenotim“[1] haben die Verfasser derselben, E. H. Kraus und J. Reitinger die Vermuthung ausgesprochen, „dass das, was man Xenotim nennt, weiter nichts ist, als ein Hussakit, aus welchem durch Einfluss der natürlichen Wässer die Schwefelsäure ausgelaugt und der so in das Yttriumphosphat übergeführt wurde“; der sogenannte Xenotim wäre somit nur „eine Pseudomorphose nach dem Hussakit“, dessen Zusammensetzung nach einem analysirten Vorkommen von Dattas bei Diamantina in Brasilien aus $3\,R_2\,O_3 .\ 3\,P_2\,O_5 .\ SO_3$ besteht.

Diese Auffassung der Zusammensetzung des Xenotim wurde von den Verfassern dadurch begründet, dass alle bisjetzt analysirten Xenotime an mehr oder weniger zersetztem Material ausgeführt gewesen wären, allein mit Ausnahme einer Analyse von Blomstrand an dem von mir beschriebenen Xenotim von Arø, bei Langesund, Norwegen; für diese Analyse wurde aber an-

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[1] Groth's Zeitschr, f. Krystallographie und Mineralogie, B. 34, P. 268 ff. (1901).

genommen, dass die Schwefelsaure übersehen worden sei, indem der Nachweiss derselben, bei der von BLOMSTRAND angewandten analytischen Methode (Aufschliessung mit Schwefelsäure) nicht möglich war. Die Verfasser fanden auch eine Stütze ihrer Auffassung darin, dass in einem Xenotim von Hitterø Schwefelsäure durch qualitative Prüfung nachgewiesen wurde; die Abwesenheit von Schwefelsäure in anderen norwegischen Xenotimen (von Arendal, Raade bei Moss und Hitterø) wurde durch die oben genannte Hypothese von einer Auslaugung früher vorhandener Schwefelsäure erklärt.

Diese Hypothese über die Zusammensetzung des Xenotim scheint mehreren späteren Verfassern als bewiesen zu gelten; so identificiert z. B. H. RÖSLER[1] ohne weiteres den in Gesteinen vorkommenden Xenotim mit Hussakit. Da diese Hypothese über die wahre Zusammensetzung des Xenotim mir aber ziemlich fraglich vorkommen musste, schien es mir wünschenswerth dieselbe wenn möglich genauer zu prüfen.

Von dem von BLOMSTRAND analysirten Krystall des Xenotim von Arø hatte ich noch eine kleine Quantität übrig; dieselbe wurde nach der von REITINGER angewandten Methode auf Schwefelsäure geprüft. Die Bestimmung wurde von Herrn Dr. O. HEIDENREICH ausgeführt. Es wurde dabei nur äusserst geringe Spuren von Schwefelsäure vorgefunden, jedenfalls bedeutend weniger als 0.1 % wahrscheinlich kaum mehr als 0.01 %. Da für diese Prüfung nur 0.2 Gram angewandt werden konnte, war eine genauere Bestimmung ausgeschlossen; es schien in Betracht der ganz geringen Spur von Schwefelsäure, welche bei dieser Prüfung vorgefunden wurde, auch nicht ausgeschlossen, dass dieselbe vielleicht von einer Verunreinigung der Reagentien herrühren könne.

Es schien deshalb wünschenswerth eine zweite Bestimmung

[1] Über den Hussakit (Xenotim) und einige andere seltene gesteinsbildende Mineralien, Z. K. B. 26, P. 258, ff.

mit sorgfältig geprüften Reagentien auf einer grösseren Quantität von Substanz zu erhalten. Glücklicher weise war nun vor einigen Jahren eine geringe Anzahl von Krystallen herstammend aus demselben Vorkommen, als das von BLOMSTRAND untersuchte, einem der Inselchen bei Arö, für die Mineraliensammlung der Universität Kristiania erworben, und von diesen Krystallen wurde nun ein vollständig frisches Bruchstück für die Analyse aufgeopfert; im Ganzen wurde dabei etwas mehr als 2 Gram für die Bestimmung gebraucht. Dieselbe, welche ebenfalls von Herrn Dr. O. HEIDENREICH ausgeführt wurde, gab das Resultat, dass *keine Spur von Schwefelsäure in dieser Probe nachgewiesen werden konnte.*

Das Material dieser beiden Proben war, wie gesagt, vollkommen frisch, bräunlich durchsichtig bis durchscheinend; das sp. Gew. war früher von mir für die von BLOMSTRAND untersuchte Probe zu 4.62 bestimmt[1]. Der ganz kleine von BLOMSTRAND nachgewiesene Wassergehalt (Glühverlust) von 0.23 % dürfte nach dem Befund der mikroskopischen Untersuchung von mechanisch eingeschlossenen Flüssigkeitseinschlüssen herrühren können.

Nach dieser Revision der BLOMSTRAND'schen Analyse ist es somit *sicher bewiesen, dass der Xenotim von Arø aus* YPO_4 *ohne Beimengung eines Sulphates besteht* und dass der Xenotim somit *nicht als eine Pseudomorphose nach Hussakit aufzufassen ist,* sondern eine selbständige gut charachterisirte Mineralspecies bildet.

Nachdem dies als sicher festgestellt angesehen werden muss, fragt es sich dann ferner wie demnach das Verhältniss zwischen dem Xenotim und dem Hussakit aufzufassen sein dürfte. Die Krystalle des frischen unzersetzten Xenotimvorkommens von den Arø-Inselchen zeigt dasselbe Axenverhältniss als der gewöhnliche Xenotim von den zahlreichen Vorkommen der südnorwegi-

[1] Für den *Hussakit* nach KRAUS und REITINGER 4.587.

schen granitischen Pegmatitgänge[1], obwohl die Messungen keine sehr genauen Resultate erlaubten, da die Flächen meistens ganz matt sind; nur die Ausbildung ist etwas verschieden, indem die Krystalle von dem Inselchen bei Arø einen ausgesprochen prismatischen Typus aufweisen, mit vorherrschenden Flächen von {110}, theils mit {001} allein, theils mit {001} und {111} am Ende. Es muss demnach angenommen werden, dass der typische Xenotim, das heisst das reine Yttriumorthophosphat, und der Hussakit sehr nahe dieselbe Krystallform besitzen. Da beide in ganz frischem Zustande bekannt sind, kann der eine nicht als eine Pseudomorphose nach dem anderen aufgefasst werden, weder der Xenotim nach dem Hussakit, noch der Hussakit nach dem Xenotim. Beide Mineralien müssen deshalb in Betracht der nahe verwandten chemischen Zusammensetzung und der völligen Übereinstimmung in physikalischer Beziehung (Krystallform, Spaltbarkeit, optische Eigenschaften, sp. Gewicht etc.) als *verschiedene Glieder derselben Mineraliengattung betrachtet werden;* der Hussakit ist somit wohl am einfachsten als ein Xenotim, in welchem dem Orthophosphat ein Sulphat in untergeordneter Menge beigemischt ist, aufzufassen.

Es fragt sich ob die Beimischung des Sulphates in dem durch die Analyse des Hussakitvorkommens von Dattas gefundenen Verhältnis $SO_3 : P_2 O_5 = 1 : 3$ eine constante stöchiometrische Verbinding repräsentirt oder nicht? Diese Frage kann selbstverständlich nicht ohne weiteres, sondern erst durch die Untersuchung mehrerer Vorkomnisse von unzersetztem Material beantwortet werden.

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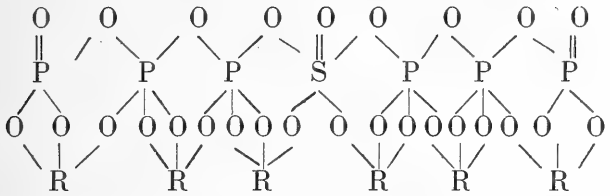
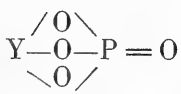
[1] Sieh meine Abhandlung über Xenotim von norwegischen Vorkommen in Geol. Fören. i Stockholm Förhandl. B. 6, P. 747 ff.

Kraus und Reitinger haben die Ansicht vertreten, dass dem Hussakit die folgende symmetrische Formel zukäme:

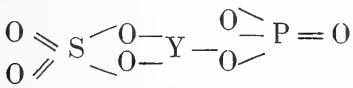


wobei zwei Phosphoratome als Bestandtheile von Pyrophosphorsäure, vier als solche von Orthophosphorsäure angenommen sind.

Es dürfte aber vielleicht wahrscheinlicher sein, dass der Hussakit von Dattas eher aufzufassen wäre als ein Xenotim, in welchem fünf Moleküle des gewöhnlichen Orthophosphates YPO_4 verbunden wären mit einem Molekül eines *Meta*phosphates eines Atoms von Yttrium, dessen zwei restirende Valenzen mit Schwefelsäure gesättigt wären, also bestehend aus 5 Molekülen



mit einem Molekül



Dies dürfte um so wahrscheinlicher sein, als wie bekannt die Metatantalate und Metaniobate von Eisen und Mangan: Tapiolit und Mossit, mit dem Xenotim geometrisch homoiomorph sind.

Wahrscheinlich bildet dann auch die Verbindung

$$5\ [YPO_4].\ [(SO_4\ Y).\ PO_3)$$

keine feste stöchiometrische Verbindung von eben 5 Orthophosphat mit 1 Metaphosphat, sondern es ist *a priori* wahrscheinlicher, dass zwischen dem wahren Xenotim (ohne Beimischung

des Sulphatmoleküls) und dem sulphathaltigen Hussakit eine vollständige Übergangsreihe vorkommen dürfte, und dass demnach das Verhältniss 5 : 1 in dem Mineral von Dattas nur zufällig gewesen ist. Wo in den genannten norwegischen Vorkommen nur Spuren von H_2SO_4 nachgewiesen wurden, braucht dies demnach vielleicht nicht auf eine eventuell stattgefundene Auslaugung bezogen zu werden, sondern es ist ebenso wahrscheinlich, dass die Beimischung, des Sulphatmoleküls auch ursprünglich ganz gering gewesen ist. Diese Auffassung wird auch gestützt dadurch, dass gewisse unverkennbare, durch Morphotropie verständliche, krystallographische Verwandschafsbeziehungen zwischen dem Yttriumphosphat, dem Xenotim, und dem Ceriumphosphat, dem Monazit, bestehen, wobei an der Monazittafel die Flächen von {100} den Flächen von {001} des Xenotim entsprechen.

Als ein einigermassen obwohl nicht genau analoges Beispiel einer der Xenotim-Hussakitreihe entsprechenden Mischungsreihe dürfte an die Reihe der Alkaligranate hingewiesen werden; auch in dieser Reihe sind Glieder bekannt *mit* beigemischtem, angehängtem Sulphatmolekül (Nosean-Haüyn-Reihe) und solche *ohne* Sulphatmolekül (Lagoriolit); diese beiden Verbindungen sind geometrisch homoiomorph und dürften sich wahrscheinlich, wie die Untersuchungen von *J. Morozewicz* (sich Ref. in Z. K. B. 33, P. 510) lehren, in ganz beliebigen Proportionen mischen können; vielleicht findet somit ein ähnliches Verhältniss auch statt zwischen dem Xenotim und dem Hussakit.

Von dem oben angefürten erhellt dann auch, dass es keineswegs berechtigt sein dürfte, die gewöhnlichen braunen Xenotime, welche z. B. an norwegischen granitischen Pegmatitgängen ja sehr verbreitet sind[1] ohne weiteres als Hussakite, welche durch

[1] Seitdem meine Abhandlung über das Vorkommen des Xenotim an norwegischen Pegmatitgängen erschien (*l. c.* 1883) ist eine grosse Anzahl neuer norwegischer Vorkommnisse dieses Minerals bekannt geworden. Ich werde dieselben bei späterer Gelegenheit erwähnen.

Zersetzung ihren Schwefelsäuregehalt eingebüsst haben, zu betrachten. Ich möchte es im Gegentheil als wahrscheinlicher ansehen, dass sie in den meisten Fällen auch *vor* der Zersetzung schwefelsäurefrei gewesen sind. Mehrere Vorkommen können übrigens, wie die mikroskopische Untersuchung zu zeigen scheint, jedenfals nur wenig durch Zersetzung geändert sein.

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Beitrag zur Pilzflora der Umgebung Christianias (Halbinsel Bygdø).

Von

P. Hennings.

Im Juni 1902 wurden von mir in der Umgebung *Christianias* nur eine Anzahl Micromyceten gesammelt, da bei der anhaltenden Dürre nur ganz vereinzelte Hymenomyceten angetroffen wurden. Desto reicher zeigte sich von Mitte bis gegen Ende August 1903 in Folge andauernder feuchter Witterung die Agaricinenflora daselbst entwickelt. Besonders zahlreich traten fleischige Hutpilze im Kongeskoven auf der Halbinsel *Bygdø*, in dessen unmittelbarer Nachbarschaft ich Wohnung genommen hatte, auf. Wegen des unbeständigen Wetters musste von ausgedehnteren Ausflügen in der Umgebung Christianias Abstand genommen werden, um die unfreiwillige Musse auszufüllen sammelte, beobachtete und notierte ich die besonders auf *Bygdø* vorkommenden Pilzarten. Es sind ausserdem nur vereinzelte Ausflüge nach Holmenkollen, Voxenkollen, Sarabraaten, Nordstrand von mir ausgeführt worden. Doch fand sich hier bei weitem nicht der Pilzreichthum wie im Kongeskoven und den benachbarten Waldbeständen. Auf Herrn Professor Wille's freundlichen Wunsch habe ich alle Pilzarten, welche ich besonders auf Bygdø beobachtet und gesammelt habe, im nach-

stehenden Verzeichnisse systematisch zusammengestellt. Selbstfolglich giebt dasselbe nur ein sehr unvollständiges Bild der Flora, zumal ich manche Pilze, so verschiedene *Inocybe-*, *Cortinarius-*, *Russula-*, *Mycena-*Arten ohne entsprechende Hilfsmittel nicht am Ort und Stelle sicher zu bestimmen vermochte. Verschiedene anderswo gemeine Pilze z. B. *Amanita muscaria*, *A. phalloides*, *A. Mappa*, *A. rubescens*, *A. pantherina* etc. habe ich nirgends angetroffen, obwohl dieselben sicher auch hier vorkommen dürften. Im Ganzen wurden vor mir ca. 375 Pilzarten beobachtet und ca. 240 Arten gesammelt, darunter 12 neue *Fungi imperfecti*. Von dem Präparieren grösserer fleischiger Hutpilze musste mit Rücksicht auf die feuchte Witterung abgesehen werden.

Myxomycetes.

Ceratiomyxa mucida (Pers.). Oscarshall auf einem Baumstumpf bei der Wirthschaft.

Tubulina cylindrica (Bull). Ebendort.

Perichaena corticalis (Batsch.). Daselbst auf einem Pappelstumpf.

Hemitrichia clavata (Pers.). Daselbst auf Baumstumpf.

Lycogala epidendron (Lin.). Kongeskoven auf Nadelholzstumpf.

Fuligo septica (Lin.). Daselbst auf Nadeln und Holz.

Peronosporaceae.

Cystopus candidus (Pers.). Auf Capsella bursa pastoris, Sinapis arvensis an Wegen u. s. w.

C. Tragopogonis (Pers.). Auf Tragopogon pratensis beim Folkemuseet, auf Centaurea Scabiosa am Strande im Kongeskoven nach dem Seebad.

Phytophthora infestans (Mont.). Auf Kartoffeläckern beim Folkemuseet.

Plasmopara nivea (Ung.). Auf Pimpinella Saxifraga bei Oscarshall.

Bremia Lactucae Reg. Auf Lampsana communis, Oscarshall.

Peronospora conglomerata Fuck. Auf Geranium pusillum beim Seebad.

P. effusa (Grev.). Auf Atriplex patulum im Schlosspark in Christiania Juni 1902.

P. Urticae (Lib.). Auf Urtica dioica bei Oscarshall.

P. sordida (Berk.). Auf Scrophularia nodosa in Kongeskoven beim Seebad.

P. Rubi Rabenh. Auf Rubus fructicosus in Kongeskoven.

P. alta Fuck. Auf Plantago major an Wegerändern Furubaken.

Protomycetaceae.

Protomyces macrosporus Ung. Auf Aegopodium Podagraria in Gärten Furubaken.

Ustilaginaceae.

Ustilago Avenae (Pers.). Getreidefeld beim Folkemuseet auf Avena sativa.

U. Hordei (Pers.). Daselbst hinter Oscarshall auf Hordeum vulgare.

U. Scabiosae (Sow.). Auf Knautia arvensis daselbst.

U. Tragopogonis (Pers.). Gemein auf Tragopogon pratensis beim Folkemuseet u. s. w. Juni 1902.

Urocystis Anemones (Pers.). Anemone nemorosa bei Holmenkollen Juni 1902.

Entyloma Ranunculi (Bon.). Ranunculus repens. Kongeskoven.

E. Calendulae (Oudem.). Calendula officinalis in Furubaken im Garten.

Tuburcinia Trientalis (Berk. et Br.). Trientalis europaea bei Holmenkollen Juni 1902, Conidienstadium: Ascomyces Trientalis Berk.

Uredinaceae.

Uromyces Fabae (Pers.). Lathyrus montanus bei Holmenkollen. Aug. 1903.

U. Alchemillae (Pers.). Alchemilla vulgaris. Daselbst Juni 1902.

U. Polygoni (Pers.). Polygonum aviculare auf Bygdø überall, Nordstrand.

U. Geranii (De Cand.). Geranium palustre? Kongeskoven beim Seebad.

U. Valerianae (Schum.). Valeriana officinalis daselbst.

U. Ervi (Wallr.). Ervum hirsutum bei Fredriksborg.

U. Aconiti lycoctoni (D. C.). Accidium auf Aconitum septentrionale bei Sarabraaten. Juni 1902.

Puccinia Galii (Pers.). Galium verum bei Oscarshall.

P. Lactucarum Syd. Lactuca muralis. Kongeskoven, Oscarshall.

P. Lampsanae (Schultz). Lampsana communis bei Oscarshall, Nordstrand.

P. Crepidis Schröt. Crepis tectorum bei Fredriksborg.

P. Violae (Schum.). Viola hirta, V. silvatica in Kongeskoven, Holmenkollen.

P. Pimpinellae (Strauss). Pimpinella Saxifraga bei Oscarshall.

P. Menthae Pers. Mentha arvensis an Aeckern Furubaken, Calamintha Acinos daselbst u. s. w.

P. graminis (Pers.). Aecidien vereinzelt auf Berberis; Puccinia gemeiner, besonders auf Secale cereale, dessen Halme stets sehr stark mit Rost bedeckt waren. Es ist überraschend dass die zahllosen Berberissträucher, wie ich sie zahlreicher als auf Bygdø nie gesehen, nicht ausgerottet werden, da doch ausgedehnter Getreidebau stellenweise stattfindet.

P. coronata Cord. Phalaris arundinacea am Strande nach den Seebad.

P. rubigo — vera (D. C.). Accidien auf Lycopsis bei Frederiksborg.

P. Poarum Niels. Accidien auf Tussilago Farfara überall auf Bygdø, Holmenkollen o, s. v.

P. Magnusiana Körn. Phragmites communis am Strande zum Seebad.

P. suaveolens (Pers.). Cirsium arvense auf Bygdø häufig.

P. Hieracii Schum. Hieracium umbellatum häufig an Wegen, H. vulgatum Kongeskoven.

P. Cirsii Lasch. Cirsium oleraceum bei Oscarshall.

P. Taraxaci. Taraxacum officinale überall gemein an Wegen auf Bygdø u. s. w.

P. Carduarum Jacky. Carduus crispus in Furubaken.

P. Echinopis Hazsl. Echinops sphaerocephalus Fredriksborg am Tivoli.

P. bullata Pers. Libanotis montana bei Frederiksborg.

P. Polygoni Pers. Polygonum amphibium bei Oscarshall.

P. Centaureae Mart. Centaurea Jacea u. Centaurea Scabiosa am Strande im Kongeskoven.

P. argentata (Schulz). Impatiens noli tangere auf Oscarshall spärlich.

P. fusca Relh. Anemone nemorosa bei Holmenkollen. Juni 1902.

P. Aegopodii (Schum.). Aegopodium Podagraria bei Oscarshall.

P. Arenariae (Schum.). Moehringia trinervia auf Bygdø, Holmenkollen.

P. Valantiae Pers. Galium Mollugo hinter Oscarshall.

P. Malvacearum Mont. Malva neglecta. Furubaken, Nordstrand.

P. Glechomatis De Cand. Glechoma hederaceum, Kongeskoven.

Phragmidium Potentillae (Pers.). Potentilla argentea auf Bygdø, Nordstrand an Wegen.

Phr. subcorticium (Schr.). Rosa sp. im Garten am Kongeskoven.

Melampsora Helioscopiae (Pers.). Euphorbia Helioscopia auf Aeckern bei Folkemuseet.

M. farinosa (Pers.). Salix Caprea bei Oscarshall.

Melampsoridium betulinum (Pers.). Betula alba bei Oscarshall.

Pucciniastrum pustulatum Pers. Epilobium montanum bei Holmenkollen.

Thecopsora Vacciniorum (Link.). Vaccinium Myrtillus. Kongeskoven.

Coleosporium Sonchi (Pers.). Sonchus asper am Strande nach Seebad.

C. Campanulae (Pers.). Campanula rotundifolia daselbst, auf C. rapunculoides verbreitet.

Cronartium ribicola Dietr. Ribes nigrum im Garten beim Kongeskoven.

Aecidium leucospernum D. C. Anemone nemorosa auf Holmenkollen. Juni 1902.

A. Grossulariae Pers. Ribes Grossularia beim Folkemuseet. Juni 1902.

A. strobilinum Alb. et Schw. Auf alten Zapfen von Picea excelsa überall im Kongeskoven, Oscarshall u. s. w. häufig. Ueberall findet sich hier *Prunus Padus*, die mit Accidien behafteten Zapfen fanden sich oft neben und unter diesen, aber nirgends habe ich hier, trotz vielen Suchens *Thecopsora Padi*, welches mit dem Aecidium in genetischem Zusammenhang stehen soll, gefunden.

Tremellinaceae.

Exidia plicata Klotsch. Auf Erlenstumpf bei Oscarshall.

Ulocolla foliacea (Pers.). Auf Kiefernstumpf in Kongeskoven.

Dacryomycetaceae.

Dacryomyces abietinus (Pers.). Ueberall gemein auf Fichtenstumpfen, auf Brettern u. s. w.

Calocera viscosa (Pers.). Auf Wurzeln und Stümpfen von Fichten und Kiefern im Kongeskoven, Oscarshall, Holmenkollen, Sarabraaten u. s. w.

Exobasidiaceae.

Exobasidium Vaccinii Fuck. Kongeskoven auf Vaccinium Vitis ideae; sehr spärlich auf Arctostaphylos am Strande nach dem Seebad.

Hypochnaceae.

Hypochuus Sambuci (Pers.). Am Grunde von Sambucusstamm im Garten.

Thelephoraceae.

Corticium comedens (Nees). Auf Erlenzweigen bei Oscarshall.

C. giganteum (Fries). Am Grunde eines Fichtenstumpfes? in Kongeskoven.

Peniophora incarnata (Pers.). An der Rinde eines Ulmenstumpfes am Kongsskoven.

P. quercina (Pers.). An abgefallenen Eichenzweigen Oscarshall.

Stereum hirsutum (Willd.). An Baumstumpfen, Pfählen häufig.

St. purpureum Pers. c. form. lilacina. An Stumpfen von Birken, Ulmen, Pappeln daselbst.

St. rugosum (Pers.). An Erlenstumpfen Oscarshall.

St. sanguinolentum Fries. An Nadelholz in Kongeskoven.

Coniophora cerebella (Pers.). Am Grunde eines Pfahles bei Fredriksborg Tivoli.

Thelephora laciniata Pers. Kongeskoven am Grunde der Stämme.

Th. terrestris Ehrh. Daselbst in Wegen.

Craterellus cornucopioides (Lin.). Oscarshall vereinzelt unter Bäumen.

Clavariaceae.

Clavaria inaequalis Müll. form. Kongeskoven am Wege zw. Moosen auf Nadeln u. Zweigen.

Cl. pistillaris (Lin.). Sarabraaten auf Erdboden vereinzelt.

Cl. cristata (Holmk.). Oscarshall unter Bäumen bei Gols Kirke.

Hydnaceae.

Hydnum aurantiacum Batsch. Kongeskoven vereinzelt zw. Moosen.

H. suaveolens Scop. Sarabraaten.

Irpex fusco-violaceus (Schrad.). An Fichtenstumpf in Kongeskoven.

Polyporaceae.

Poria Radula Pers. An einen Baumstumpf Oscarshall.

Fomes ungulatus (Schaeff.). An Stämmen und Stumpfen von Picea excelsa häufig Kongeskoven, Oscarshall, Holmenkollen, Voxenkollen.

F. annosus Fr. An Wurzeln von Picea excelsa? bei Gols Kirke, Sarabraaten.

F. ulmarius (Sow.). Oscarshall an Ulmenstamm.

F. igniarius (Lin.). An Pflaumenstamm in Garten Fredriksborgvei.

Polyporus fragilis Fr. An faulendem Fichtenstumpf in Kongeskoven.

P. borealis (Wahlenb.). Ebendort an Nadelholzstumpf.

P. amorphus Fries. Ebendort an Nadelholzstumpfen.

P. adustus (Willd.). An einem Birkenstumpf im Garten am Kongeskoven.

P. fumosus (Pers.). An Laubholzstumpf bei Oscarshall.

P. radiatus (Sow.). An einem Erlenstumpf, Oscarshall, bei Gols Kirke.

P. betulinus (Bull.). An einer Birke daselbst.

P. squamosus (Huds.). An einem Salixstamm bei Holmenkollen. Juni 1902.

P. brumalis (Pers.). An einem Birkenast bei Sarabraaten. Juni 1902.

Polystictus abietinus (Dicks.). An Fichtenstumpfen in Kongeskoven, bei Voxenkollen, Sarabraaten, auch in resupinater Form an umgefallenen Stämmen.

P. versicolor (Lin.). An Baumstumpfen bei Oscarshall.

P. hirsutus (Wulf). Ebendort bei der Kirche Gol.

Daedalea unicolor (Bull.). An einem Birkenstumpf im Garten am Kongeskoven.

Lenzites heteromorpha Fries. An umgefallenen Fichtenstämmen bei Voxenkollen Juni 1902, Kongeskoven Aug. 1903.

L. abietina (Bull). An Fichtenstumpfen gemein überall.

Tylopilus felleus Bull. Kongeskoven, Oscarshall unter Fichten und Kiefern einzeln.

Boletus scaber Bull. Kongeskoven, Oscarshall u. s. w. unter Birken häufig.

B. bulbosus Schaeff. Oscarshall, Kongeskoven bei der Waldkapelle, Holmenkollen.

B. subtomentosus Lin. Ebendort vereinzelt.

B. variegatus Schwartz. Kongeskoven, Holmenkollen.

B. badius Fries. Kongeskoven, Oscarshall vereinzelt.

B. piperatus Bull. Daselbst. Holmenkollen.

B. granulatus Lin. Ueberall heerdenweise besonders in Kongeskoven. Ein guter Speisepilz, der bei der ungeheuren Menge daselbst gut verwendbar wäre.

B. bovinus Lin. Kongeskoven sehr vereinzelt.

Boletopsis luteus (Lin.). Waldrand bei der Waldkapelle spärlich.

B. flavus (Wittr.). Kongeskoven, Oscarshall, Fredriksborgvei in Gärten, Holmenkollen.

Agaricaceae.

Cantharellus cibarius Fries. Kongeskoven, Holmenkollen spärlich

C. aurantiacus (Wulff). Daselbst vereinzelt.

Paxillus Acheruntius (Humb.). Kongeskoven an einem Pfahl.

P. involutus (Batsch.). Kongeskoven, Oscarshall, botan. Garten u. s. w. unter Birken.

Coprinus plicatilis (Curt.). Kongeskoven, Oscarshall.

C. domesticus (Pers.). Auf Rasenplatz im Garten am Fredriksborgvei.

C. micaceus Bull. Oscarshall am Grunde von Stämmen rasig.

C. atramentarius Bull. Daselbst am Wege.

C. porcellanus (Schaeff.). Daselbst auf Rasenplatz.

Gomphidius viscidus (Lin.). Kongeskoven, Oscarshall, Skovkapellet, Holmenkollen u. s. w.

Hygrophorus psittacinus (Schaeff.). Kongeskoven, Holmenkollen zwischen Moosen.

H. miniatus (Scop.). Oscarshall auf Rasen.

H. ceraceus (Wulf). Kongeskoven, Holmenkollen.

H. conicus (Scop.). Kongeskoven, Oscarshall, Sarabraaten.

H. ericeus (Bull). Kongeskoven, Holmenkollen.

Limacium eburneum (Bull). Kongeskoven zw. Moosen.

L. olivaceo-album Fries. Kongeskoven zw. Nadeln.

Russula fragilis (Pers.). Kongeskoven, Oscarshall.

R. emetica (Schaeff.). Daselbst? Holmenkollen.

R. pectinata (Bull). Oscarshall unter Birken.

R. cyanoxantha (Schaeff.). Kongeskoven, Oscarshall, Skovkapellet, Holmenkollen.

R. foetens Pers. Daselbst.

R. rubra De Cand. Kongeskoven, Oscarshall.

R. lepida Fries. Daselbst.

R. furcata (Lam.). Oscarshall unter Birken, auch in Gärten.

R. depallens (Pers.). Kongeskoven.

R. adusta (Pers.) Kongeskoven in Wegen, Oscarshall.

R. integra (Lin.). Daselbst sehr häufig.

R. chamaeleontina Fries. Ebenfalls in verschiedenen Färbungen.

R. grisea Pers. Kongeskoven, Gols Kirke.

R. alutacea Pers. Kongeskoven, Oscarshall, Holmenkollen.

R. lutea (Huds.). Oscarshall.

R. xerampelina (Schaeff.). Kongeskoven, Skovkapellet.

Lactaria subdulcis (Bull). Oscarshall.

L. seriflua (De Cand. Daselbst, Kongeskoven.

L. piperata (Scop.). Kongeskoven, Oscarshall.

L. pallida Pers. Oscarshall, Skovkapellet.

L. vellerea Fries. Kongeskoven.

L. glyciosma Fries. Kongeskoven, Oscarshall, in Gärten.

L. rufa (Scop.). Kongeskoven, Holmenkollen.

L. torminosa (Schaeff.). Oscarshall unter Birken am Ausgange am Wege.

L. necator Pers. Gols Kirke, Kongeskoven unter Birken.

L. scrobiculata (Scop.). Kongeskoven am Wege zum Seebad.

L. deliciosa (Lin.). Oscarshall, Kongeskoven. Vorzüglicher Speisepilz.

Marasmius perforans (Hoffm.). Kongeskoven auf Fichtennadeln.

M. cauticinalis (Sw.). Ebendort.

M. androsaceus (Lin.). Ebendort, Holmenkollen.

M. graminum (Lib.). Waldkapelle.

M. scorodonius Fries. Kongeskoven und überall auch in Gärten in ungeheurer Menge zw. Kiefernnadeln, auch an Baumstämmen. Der stark nach Knoblauch schmeckende Pilz wird als Gewürz an Saucen, Braten benutzt und getrocknet in den Handel gebracht, in Berlin als Muscheron bezeichnet, theuer bezahlt.

M. Oreades Fries. Ueberall an Wegen, auf Rasenplätzen oft in Hexenringen heerdenweise. Guter Suppenpilz.

M. peronatus (Bolt.). Kongeskoven, Skovkapellet.

Psathyrella disseminata (Pers.). Oscarshall in ungeheurer Menge am Grunde alter Laubholzstämme, mehrere Meter hoch hinauf in Wundrissen heerdenweise.

Ps. gracilis (Pers.). Kongeskoven, in Gärten unter Gebüsch.

Panaeolus fimicota (Fries). Auf Dung an Wegen, in Gärten.

P. foenisecii (Pers.). Oscarshall auf Rasenplatz, an Wegen.

Chalymotta campanulata (Lin.). Ebendort.

Psilocybe spadicea (Schaeff.). Am Grunde eines Birkenstammes Oscarshall.

Ps. atrorufa (Schaeff.). Holmenkollen am Wege zwischen Moosen.

Hypholoma appendiculatum (Bull). Am Grunde von Weidenstämmen und Birken daselbst, in Gärten am Fredriksborgvei.

H. fasciculare (Huds.). Kongeskoven, Oscarshall nicht häufig bemerkt.

H. lateritium (Schaeff.). Oscarshall an Laubholzstumpf.

H. epixanthum Paul. Kongeskoven auf Fichtenstumpfen.

Stropharia Coronilla (Fries). In einem Garten am Fredriksborgvei.

Str. viridula (Schaeff.). Rasig an einem Fichtenstumpf in Kongeskoven.

Str. stercoraria (Fries). Kongeskoven am Wege auf Dung.

Psalliota campestris (Lin.). Am Wege bei Folkemuseet.

Ps. silvatica (Schaeff.). Kongeskoven sowie im Garten daneben.

Crepidotus calolepis (Fries). Oscarshall an Pappelstamm und Sorbus Aucuparia. Exemplare bis 4 cm. breit, oberseits braunschuppig, mit filziger Basis; Sporen ellipsoid, braun, 7—8 $\times$ 4—5 μ.

Galera Hypni (Batsch). Kongeskoven, Holmenkollen zw. Moosen.

G. tenera (Schaeff.). An Wegen und auf Rasenplätzen in Gärten am Fredriksborgvei.

Hebeloma crustuliniforme (Bull). Kongeskoven an Wegen, in Gärten.

Naucoria temulenta (Fries). Kongeskoven nach dem Seebad.

N. pediades (Fries). An Wegen, in Gärten Fredriksborgvei, Holmenkollen.

Flammula sapinea (Fries). Oscarshall an Stumpf von Picea.

Fl. carbonaria (Fries). Kongeskoven auf einer Kohlenstelle nach dem Seebad.

Inocybe geophylla (Sow.). Kongeskoven häufig, Oscarshall, Holmenkollen.

I. sambucina (Fries). Kongeskoven.

I. rimosa (Bull.). Kongeskoven.

I. cristata (Scop.). Kongeskoven, Oscarshall an Wegerändern.

I. scabra (Müll.). Daselbst.

Cortinarius (*Dermocybe*) *cinnamomeus* (Lin.). Kongeskoven, Holmenkollen.

C. (*D.*) *anthracinus* Fries. Daselbst.

C. (*Hydrocybe*) *acutus* (Pers.). Oscarshall, Skovkapellet.

C. (*H.*) *fasciatus* Fries. Kongeskoven, Holmenkollen.

C. (*H.*) *decipiens* (Pers.). Kongsskoven, auf Rasenplatz im Garten.

C. (*Telamonia*) *hemitrichus* (Pers.). Kongeskoven, Holmenkollen.

C. (*Myxacium*) *collinitus* (Pers.). Kongeskoven.

Pholiota mutabilis (Schaeff.). Kongeskoven, Oscarshall bei Gols Kirke an Baumstumpfen.

Ph. destruens (Brond.). An einem liegenden Pappelstamm in Oscarshall.

Claudopus nidulans (Pers.). Kongeskoven an Fichtenstumpf.

Nolanea pascua (Pers.). Kongeskoven, Holmenkollen.

Leptonia solstitialis (Fries). Kongeskoven.

L. serrulata Fries. Holmenkollen am Wegerand.

Clitopilus prunulus (Scop.). Oscarshall auf Rasenplatz nahe dem Ausgange unweit der Gols Kirke.

Entoloma sericeum (Bull.). Kongeskoven, Oscarshall, Holmenkollen.

Pluteus cervinus (Schaeff.). Oscarshall an Baumstümpfen.

Pleurotus ostreatus (Jaqu.). Oscarshall am Sorbus Aucuparia.

Omphalia fibula (Bull.). Kongeskoven, Holmenkollen, Sarabraaten zwischen Moosen.

O. umbellifera (Lin.). Kongeskoven, Sarabraaten an feuchten Stellen.

Mycena corticola (Pers.). Oscarshall an berindetem Pappelstamm.

M. epipterygia (Scop.). Kongeskoven, Holmenkollen.

M. sanguinolenta (Alb. & Schw.). Oscarshall bei Gols Kirke zw. Laub.

M. filopes (Bull.). Oscarshall, Waldkapelle, im Garten zwischen Gebüsch.

M. stannea (Fries). Kongeskoven.

M. alcalina (Fries). Kongeskoven am Fichtenstumpf.

M. galericulata (Scop.). Kongeskoven an Birkenstumpf.

M. rugosa (Fries). Oscarshall an Baumstumpf.

M. flavo-alba (Fries). Kongeskoven, Holmenkollen zwischen Moosen.

M. rosea (Bull.). Oscarshall bei Gols Kirke, Holmenkollen.

Collybia dryophila (Bull). Kongeskoven, Oscarshall.

C. tenacella (Pers.). Kongeskoven.

C. cirrhata (Pers.). Kongeskoven, Holmenkollen aus gelben Sclerotien auf faulenden Hutpilzen.

C. butyracea (Bull.). Kongeskoven.

C. clusilis (Fries). Kongeskoven zwischen Moosen.

C. radicata (Relh.). Kongeskoven, Oscarshall.

Clitocybe laccata (Scop.). Kongeskoven, Skovkapellet, Oscarshall.

Cl. cyathiformis (Bull.). Kongeskoven.

Cl. geotropa (Bull.)? auf Rasenplåtzen im Garten am Fredriksborgvei truppweise. Fruchtkörper rein weiss, bis 25 cm. breit, fleischig, Stiel bis 15 cm. lang, 2 cm. dick.

Cl. sinopica (Fries). Kongeskoven, Holmenkollen, Sarabraaten.

Cl. infundibuliformis (Schaeff.). Kongeskoven, Oscarshall, Holmenkollen.

Cl. odora (Bull). Oscarshall in Gebüsch.

Tricholoma sordidum (Schum.). Im Garten am Fredriksborgvei.

Tr. brevipes (Bull.). Fredriksborg am Wege.

Tr. melaleucum (Pers.). Oscarshall auf Rasenplatz.

Tr. saponaceum (Fries). Kongeskoven, Holmskollen.

Tr. terreum (Schaeff.). Kongeskoven, Oscarshall, im Garten an Fredriksborgvei.

Tr. rutilans (Schaeff.). Kongeskoven an Kiefernstumpf?

Lepiota cristata (Alb. & Schw.). Kongeskoven, Oscarshall.

L. clypeolaria (Bull.). Holmenkollen.

L. procera (Scop.). Im Garten am Fredriksborgvei.

Amanita excelsa Fries? Bei der Skovkapellet.

Lycoperdaceae.

Lycoperdon pisiforme Schaeff. An Baumstumpfen Kongeskoven, Holmskollen.

L. gemmatum Batsch. Kongeskoven, Oscarshall, Holmenkollen in verschiedenen Formen.

L. pusillum Batsch. Kongeskoven am Wege, Holmenkollen.

Bovista plumbea Pers. Kongeskoven nahe dem Christian August Denkmal.

Sclerodermataceae.

Scleroderma vulgare Horn. Furubaken am Wege nach Oscarshall.

Nidulariaceae.

Crucibulum vulgare Tul. Frederiksborgvei nahe dem Tivoli an Stakettpfählen, Christiania Schlosspark an Pfählen.

Cyathus Olla (Batsch.). Fredriksborgvei im Garten an Bretträndern.

Exoascaceae.

Exoascus betulinus (Rostr.). Betula alba, im Garten Fredriksborgvei.

Rhizinaceae.

Rhizina inflata (Schaeff.). Kongeskoven auf einer kleinen Kohlenstelle mit *Pyronema omphalodes.*

Helvellaceae.

Helvella lacunosa Afz. Oscarshall unter Gebüsch.

Gyromitra esculenta (Pers.). Holmenkollen Juni 1902, soll bei Sarabraaten in grosser Menge vorkommen.

Bulgariaceae.

Coryne sarcoides Jacq. Conidienpilz auf Schnittfläche von Betula in Oscarshall.

Dermateaceae.

Dermatea Ariae (Pers.). Auf Zweigen von Sorbus Aria. Oscarshall am Parkwege.

Mollisiaceae.

Mollisia minutella (Sacc.). Auf faulenden Stengeln von Bunias orientalis, nahe dem Folkemuseet.

Pyrenopezizeae.

Pirottea veneta Sacc. Kongeskoven am Strande zum Seebad auf faulenden Stengeln von Verbascum nigrum und Arabis sp.

Helotiaceae.

Helotium citrinum (Hedw.). Auf der Schnittfläche eines Baumstumpfes bei Oscarshall.

Phialea cyathoidea (Bull.). Auf faulenden Stengeln am Strande im Kongeskoven von Libanotis, Heracleum, Ulmaria, am Wege nach Folkemuseet auf Stengeln von Bunias orientalis.

Ph. glanduliformis Rehm? Auf faulenden Stengel von Aconitum septentrionale bei Holmenkollen. Juni 1902. Etwas unreif.

Dasyscypha dryina Karst. Auf todtem Holz von Betula alba bei Holmenkollen Juni 1902.

D. calyciformis (Willd.). Auf dürrem Fichtenast im Kongeskoven.

Pezizaceae.

Pyronema omphalodes (Bull.). Kongeskoven auf kleinen Kohlenstellen beim Christian Augusts Monument.

Humaria rutilans (Fries). Holmenkollen an Wegrändern.

Plicaria pustulata (Hedw.) Holmenkollen bei den Teichen.

Hypodermataceae.

Hypoderma virgultorum (D. C). *form. Euphorbiae.* Kongeskoven am Strande unweit des Seebades auf vorjährigen Stengeln von Euphorbia palustris überall. Asken meist 70—90 × 9—10 μ,, Sporen 18—22 × $2^1/_2$—$3^1/_2$ μ, kleiner als bei der typischen Art.

Phacidiaceae.

Phacidium repandum (Alb. & Schw.). Bei der Skovkapellet auf Blättern von Galium Mollugo.

Coccomyces coronatus (Schum.). Auf faulenden Eichenblättern im Garten am Fredriksborgsvei.

Erysiphaceae.

Sphaerotheca panosa (Wallr.). Im Garten am Fredriksborgsvei auf Rasen.

S. Humuli (D. C.). Oscarshall auf Impatiens noli tangere.

Erysiphe Polygoni D. C. Kongeskoven auf Heracleum Sphondylium, Anthriscus silvester, Trifolium montanum u. s. w., an Wegen auf Polygonum aviculare.

E. Galeopsidis D. C. Auf Galeopsis im Garten am Fredriksborgvei.

E. Cichoracearum D. C. Auf Artemisia vulgaris, Plantago major an Wegen, auf Cirsium canum?, Valeriana officinalis im Kongeskoven.

Microsphaera Evonymi D. C. Auf Berberis daselbst sowie überall verbreitet.

Phyllactinia corylea (Pers.), Auf Betula alba, Corylus Avellana in Gärten und Oscarshall.

Uncinula Aceris D. C. Auf Acer platanoides Oscarshall.

U. Salicis D. C. Auf Populus spec. im Garten am Fredriksborgvei.

Hypocreaceae.

Nectria cinnabarina Tode.. Conidienstadien überall verbreitet.

N. episphaeria (Tode). Auf Diatrype Stigma in Gärten auf Zweigen.

Hypocrea citrina (Pers.). Auf Holz und Erde in Kongeskoven.

H. fungicola Karst. Kongeskoven auf Fomes ungulatus.

Trichosphaeriaceae.

Coleroa Chaetomium (Kunze) Auf Blättern von Rubus idaeus im Kongeskoven.

Melanommaceae.

Melanomma Pulvis pyrius (Pers). var. *Vaccinii* P. Henn. Auf dickem Wurzelstock von Vaccinium Myrtillus am Wege bei Voxenkollen Juni 1902.

Die Asken sind fast keulig, 60—80 $\times$ 5—6 μ, die Sporen schiefeinreihig, oblong, beiderseits schwach verschmälert, stumpf, braun, mit 3 Septen, eingeschnürt, 13—20 $\times$ $3^1/_2$ $4^1/_2$ μ. Vielleicht ist der Pilz besser als Art aufzustellen, da er von M. Rhododendri Rehm verschieden, ebenso von anderen Arten.

Cucurbitariaceae.

Cucurbitaria Berberidis (Pers.). An dürren Arten von Berberis hinter Oscarshall.

C. Laburni (Pers.). An Aesten von Cytisus Laburnum im Garten am Fredriksborgvei.

C. Caraganae Karst. An Zweigen von Caragana arborescens daselbst, Oscarshall.

Sphaerelloiedeaceae.

Stigmatea Robertiani Fries. Auf Blättern von Geranium Robertianum im Garten am Fredriksborgvei.

Mycosphaerella nebulosa (Pers.). An Stengeln von Solidago an Wegen.

Pleosporaceae.

Leptosphaeria Libanotis (Fuck.). Ueberall an dürren Stengeln von Libanotis montana auf Bygdø, besonders hinter Fredriksborg, Kongeskoven,

L. doliolum (Pers.). An trockenen Stengeln von Urtica dioica, Oscarshall; auf Artemisia campestris bei Seebad.

L. modesta Desm.). An Stengeln von Heracleum, Pimpinella, Agrimonia, Eupatorium am Strande nach dem Seebad u. s, w.

Pleospora vulgaris Niessl. *form. monosticha.* Auf trockenen Stengeln von Echinops sphaerocephalus am Fredriksborgs Tivoli, Hieracium umbellatum an Wegen daselbst.

Gnomoniaceae.

Gnomoniella idaeicola (Karst.). Kongeskoven auf trockenen Stengeln von Rubus saxitilis.

Valsaceae.

Maniania fimbriata (Pers.). Bei Oscarshall auf Blättern von Carpinus.

Eutypa Acharii Tul. Im Garten am Fredriksborgvei auf Zweigen von Viburnum.

E. subtecta (Fries). Daselbst auf Zweigen von Acer.

E. spinosa Pers. Daselbst auf trockenen Eichenästen.

Eutypella Sorbi (Alb. & Schw.). Am Wege hinter Oscarshall auf trockenen Zweigen von Sorbus Aucuparia.

Diatrypaceae.

Calosphaeria princeps Tul. Im Pensions-Garten am Fredriksborgvei an einem Pflaumenbaum unterhalb der aufgerissenen Rinde.

Diatrypella favacea (Fries). Daselbst am Birkenästen.

Diatrype disciformis (Hoffm.). Daselbst auf einem abgefallenen Buchenzweig.

Xylariaceae.

Hypoxylon coccineum Bull. An Haselnussästen Oscarshall.

Xylaria polymorpha (Pers.) var. hypoxylea Nits. Am Grunde eines Baumstumpfes bei Oscarshall.

Ustulina deusta (Hoffm.). Ebendort.

Dothideaceae.

Plowrightia Berberidis (Sow.). Am Fahrwege hinter Oscarshall zum Seebad vor dem Kongsgaarden auf dürren dünnen Zweigen von Berberis häufig.

Rhopographus Pteridis (Sow.). An vorjährigen Stielen von Pteris aquilina Holmenkollen. Juni 1902.

Sphaeropsidaceae.

Phoma complanata (Tode). Am Wege nach Oscarshall auf trockenen Stengeln von Bunias orientalis, Tragopogon pratensis.

Ph. Urticae Schultz. et Sacc. Kongeskoven auf Stengeln von Urtica dioica.

Ph. lirelliformis Sacc. Im Garten auf Zweigen von Viburnum Opulus.

Ph. samarum (Desm.). Auf Früchten von Acer in botan. Garten u. Oscarshall.

Ph. cryptica Sacc. Im Garten der kleinen Insel bei Fredriksborg auf Zweigen von Lonicera Periclymenum.

Ph. Viscariae P. Henn. n. sp.; peritheciis subepidermide nidulantibus, suberumpentibus, atris, poro pertusis, ca. 60—105 μ, conidiis ellipsoideis vel oblongis hyalinis, continuis, eguttulatis, $5—6^1/_2 \times 2^1/_2—3$ μ.

Kongeskoven am Strande nach den Seebad an trockenen Stengeln von Viscaria viscosa (Gill.) mit Ascohyta Viscariae.

Ph. Valerianae P. Henn. n. sp.: peritheciis sparsis, lenticularibus, poro pertusis, atris, ca. 100—120 μ, conidiis ovoideis vel ellipsoideis, hyalinis, 1 guttulatis, 3—3½ $\times$ 2—3 μ.

Kongeskoven am Strande nach dem Seebad an trockenen Stengeln von Valeriana officinalis. Von Ph. herbarum ganz verschieden.

Macrophoma? Ariae P. Henn. n. sp.; peritheciis sub epidermide gregariis, depressis, astomis, subcarbonaceis, atris; conidiis oblonge ellipsoideis, vel subclavatis, intus nubulosis, hyalinis, 18—25 $\times$ 6—8 μ, conidiophoris fasciculatis, hyalinis, 10—20 $\times$ 3—4½ μ.

Oscarshall an trockenen Zweigen von Sorbus Aria in Gemeinschaft mit Dermatea Ariae. Ob der Pilz zu Macrophoma zu stellen, ist etwas zweifelhaft.

Cytospora ambiens Sacc. Im Garten am Fredriksborgvei an trockenen Zweigen von Cornus sanguinea.

C. Oxyacanthae Rab. Daselbst an Zweigen von Crataegus.

C. microsperma Sacc. Hinter Oscarshall an Zweigen von Prunus spinosa.

C. leucostoma (Pers.) *form. Cotoneastri.* An trockenen Zweigen von Cotoneaster am Strande nach dem Seebad. Conidien stäbchenförmig gekrümmt, 4—5 $\times$ 0,5—0,7 μ, farblos.

C. Syringae Sacc. Im Garten am Fredriksborgvei auf Zweigen von Syringa.

C. leucosperma (Pers.). Auf der Insel nahe Fredriksborg im Garten auf trockenen Zeigen von Pirus Malus.

C. Abietis Sacc. Am Wald nach der Skovkapellet auf abgestorbenen Zweigen von Picea excelsa.

C. Curreyi Sacc. Am Kongeskoven an trockenen Zweigen von Pinus silvestris.

Ascohyta Viscariae P. Henn. n. sp.; peritheciis gregariis, depressis globosis hypodermicis, ostiolo prominente, atris, membranaceis, ca. 100—160 μ; conidiis oblonge cylindraceis, utrinque obtusis, medio 1 septatis, haud constrictis, hyalinis, 13—18 $\times$ 4 μ.

Kongeskoven am Strande zum Seebad auf trockenen Stengeln von Viscaria viscosa mit Phoma.

Coniothyrium Cytisi P. Henn. n. sp.; peritheciis hypodermicis, sparsis vel aggregatis, lenticularibus, atris, pertusis, ca. 150 180 μ; conidiis ellipsoideis vel ovoideis, fusco-brunneis, continiis, 5—7 $\times$ 4—5 μ.

Oscarshall an trockenen Zweigen von Cytisus nigricans.

C, Grossulariae P. Henn. n. sp.; peritheciis hypodermicis sparsis vel gregariis, atris, punctiformibus, sublenticularibus ca. 130—150 μ; conidiis ovoideis vel ellipsoideis, brunneis, 5—8 $\times$ 3½—4½ μ.

Im Garten an Kongeskoven auf trockenen Zweigen von Ribes Grossularia.

Diplodia mamillana Fr. Garten am Fredriksborgvei auf trockenen Zweigen von Cornus sanguinea.

D. ramulicola Westend. Daselbst auf Zweigen von Evonymus latifolius.

Septoria virgaureae (Desm.). Anhöhen bei der Skovkapellet auf Blättern von Solidago virgaurea.

S. Lamii Pass. Auf einem Acker auf Blättern von Lamium amplexicaule.

S. Trientalis (Lash.). Kongeskoven auf Trientalis europaea.

S. Convolvuli (Desm.). Daselbst am Strande auf Convolvulus sepium.

S. Urticae Desm. Im Garten auf Urtica dioica.

Rhabdospora bygdoensis P. Henn. n. sp.; peritheciis innato-erumpentibus, punctiformibus, gregariis, atris, subglobosis, perforatis, ca. 120—160 μ; conidiis cylindraceis, utrinque

obtusis, rectis, 1—3 septatis, 16—30 × 2½—3½ μ, hyalinis.

Kongeskoven am Strande zum Seebad auf trockenen Stengeln von Artemisia vulgaris. Von R. Artemisiae Trail., R. tomispora Bres., R. Greshikei Bres. verschieden.

Camarosporium Caraganae Karst. Gärten und Oscarshall an trockenen Zweigen von Caragana arborescens.

C. bygdoense P. Henn. n. sp.; peritheciis gregariis sub epidermide nidulantibus, subglobulosis, atris, papillatis ca. 150—200 μ: conidiis ellipsoideis vel ovoideis, utrinque obtusis, 3–5 septatis, interrupte muriformibus, 12—17 × 6—9 μ.

Oscarshall sowie im Garten am Fredriksborgvei auf Zweigen von Spiraea cfr. crenata. Von *C. Spiraeae* verschieden.

Leptostromataceae.

Leptothyrium alneum (Lev.). Oscarshall, Kongeskoven u. s. w. auf lebenden Blättern von Alnus glutinosa.

L. Periclymeni (Desm.). Kongeskoven und in Gärten auf Blättern von Lonicera Xylosteum.

L. litigiosum (Desm.). Kongeskoven, Holmenkollen auf abgestorbenen Wedelstielen von Pteris aquilina.

Leptostroma Pinastri Desm. Kongeskoven auf abgefallenen Nadeln von Pinus silvestris.

Entomosporium Mespili D. C. Am Strande nach dem Seebad und bei Oscarshall auf lebenden Blättern von Cotoneaster vulgaris.

Exipulaceae.

Dinemasporium Tragopogonis P. Henn. n. sp.; peritheciis gregariis, cupulatis, atris, ca. 100—180 μ diam., setulis rigidis, erectis, aterrimis, acutis, usque 200 μ longis; conidiis elongato-fusoideis, curvulis, 2—4 guttulatis, utrinque minute setulosis, hyalinis, ca. 15—23 × 3–4½ μ.

Am Wege zum Folkemuseet auf trockenen Stengeln von Tragopogon pratensis. Mit *D. hispidulum* (Schrad.) *var. herbarum* Cook., verwandt, aber verschieden.

Melanconiaceae.

Gloeosporium Tiliae Oud. Oscarshall an Blättern von Tilia intermedia.

Gl. acerinum West. Im Garten am Fredriksborgvei auf Blättern von Acer platanoides.

Coryneum rosarum P. Henn. n. sp.: acervulis hypodermicis atris, dein erumpentibus, disciformibus, 200 μ; conidiis oblonge ovoideis vel subfusoideis, 1 dein 3 septatis, haud constrictis, fuscidulis, septis atris, 5—8 $\times$ 4—5 μ.

An Wegen nach Oscarshall auf trockenen Zweigen von Rosa sp.

Pestalozzia monochaetoidea Sacc. & Ell. Oscarshall an trockenen Zweigen von Spiraea spec. Die Conidien sind 10—12 $\times$ 4 μ, 3 septiert, an der Spitze mit fadenförmiger bis 10 μ langer Borste, an der Basis mit fast gleichlangem Stiel. Die Pilz ist bisher wohl nur aus Nordamerika bekannt.

Phragmotrichum Chailletii Kze. et Schm. Kongeskoven, Oscarshall, Holmenkollen häufig auf abgefallenen Fichtenzapfen.

Mucedinaceae.

Ramularia Geranii Westend. Kongeskoven nahe dem Strande am Wege zum Seebad auf Blättern von Geranium palustre.

R. sambucina Sacc. Im Garten am Fredriksborgvei auf Blättern von Sambucus.

R. calcea (Desm.). Kongeskoven auf Blättern von Glechoma hederacea.

R. Primulae Thüm. Oscarshall auf einem Blatte von Primula.

R. Urticae Ces. Oscarshall und im Garten am Kongeskoven auf Urtica dioica.

Dematiaceae.

Cladosporium herbarum (Pers.). Auf faulenden Stengeln von Bunias, Tragopogon, auf Eichenblättern u. s. w. verbreitet.

Cercospora Epilobii Schneid. Holmenkollen am Wege auf Epilobium montanum.

C. Geranii sanguinei P. Henn. n. sp.; maculis fuscis, apicibus foliorum, hyphis fasciculatis, septatis, fuscis, 30—50 × 3—5 μ; conidiis subcylindraceis, vel clavatis, rectis, apice obtusis, medio 1 septatis, hyalinis, 20—40 × 4—5½ μ.

Kongeskoven am Strande nach dem Seebad auf Blättern von Geranium sanguineum häufig.

Die Art ist von C. Geranii Kell. et Sw. aus Nordamerika verschieden, ebenso von Cercosporella Magnusiana All.

Tuberculariaceae.

Tubercularia vulgaris Tode. Gemein auf trockenen Zweigen u. Aesten überall.

T. Sambuci Cord. An trockenen Zweigen von Sambucus im Garten am Fredriksborgvei u. s. w.

T. Laburni Opiz? An Zeigen von Cytisus Laburnum dort.

Hymenula? Arabidis P. Henn. n. sp.; sporodocheis caulicolis; subpulvinatis vel discoideis, ceraceis, roseis, ca. 0,5—2 mm. diam., hyphis septatis ramosis, incarnatis, 4—6 μ crassis, sporophoris fasciculatis, conidiis oblonge cylindraceis, continuis, obtusis, 8—10 × 1½—2 μ.

Kongeskoven am Strande nach dem Seebad an trockenen Stengeln von Arabis spec. cfr. stricta. Der Pilz dürfte anscheinend in obige Gattung, nicht zu Tubercularia oder Illosporium gehören, wenn auch einzelne Merkmale abweichen.

Pionnotis Biasolettiana (Cord.). Auf einem Birkenstumpfe vor Sarabraaten am Wege, rosenrothen, schleimigen Ueberzug bildend. Juni 1902.

Gedruckt 20. januar 1904.

On some New Occurrences of Titanite from Kragerø.

By

P. Schei.

(With Table I).

During the past two years the Mineralogical Institution of the University has obtained some pretty good specimens of titanite from Kragerø. Together with older material from southern Norway, this makes a fine material for crystallographic examination, and the Director of the Institution, Prof. Dr. W. C. Brøgger, has been kind enough to submit it to me for closer inspection.

At present, some few remarks on the crystallographic types and the mode of occurrence have not been deemed out of place, the more so because collections from all these localities has got abroad already.

Titanite from Lindvikskollen.

This one occurs at the same great granite-pegmatitic dyke that has yielded already the newly described mineral hellandite[1].

[1] Prof. Dr. W. C. Brøgger: Über den Hellandit, ein neues Mineral, in this Magaz. B. 41. H. 3. 1903.

Together with that mineral and likewise embedded in quartz mainly, with little or no feldspar, occur crystals of titanite of a type well known from alpine localities.

The predominating forms are: {100}, {111}, {001}, {110}; referred to the axial ratio of Descloizeaux—Dana. Two different types occur, the one represented by fig. 1 and characterised by the forms {100}, {110}, {111} & {001} and the other with {100}, {111} and {001}, see fig. 2. 1 is identical with the combination figured by Hessenberg from Zillerthal, and 2 likewise with v. Rath's Figur of crystal from St. Gotthard.

Common to both is the constant twinning with tw-plane {100}, no single individual being as yet observed; almost as constant is the phenomenon that the faces of {111} only form the termination at one end, while {001} only is to be found at the other. In one specimen, however, a small face of {001} cuts off the point of the arrow head.

Narrow faces of $\{\bar{1}11\}$ are sometimes observed cutting the edges between {110} and 001. Besides these, in one specimen are seen $\bar{1}01$ together with $\bar{1}12$ and $\bar{1}\bar{1}2$.

The size is variable, mostly 30—50 mm. broad by 10—20 mm. thick and 20—30 mm. high, the greatest crystal measuring 80, 50 and 30 mm. resp.; a broken mass of a yet greater crystal has been obtained.

The mineral from this locality is seldom found in unaltered condition — in that case dark brown and strongly resembling yttrotitanite; usually it is altered through the whole mass to a light grey substance, earthy-looking by weathering and containing grains of: quartz, muscovite, epidote, chlorite, etc., dispersed in the remaining titanite mass.

Titanite from the West of Kammerfoselv.

Of quite a different type are the crystals of titanite gathered from a chloritic schist west of Kammerfoselv.

The type is shown in fig. 3, with the following forms: {111}, {$\bar{1}$12}, {010} & {001} and fig. 4 with {110} & {$\bar{1}$11} also.

Twinning seems to be rare, only two twins after the common law: {100} tw.plane, being found among a great many single individuals.

The faces are unsually dull but sometimes as if varnished, of a redbrown colour, finely white-sprinckled: the thin section shows the cause of the sprinckling: once perhaps yellow or yellowish green and translucent to transparent, the titanite is now altered into a mixture of minute crystals of octahedrite (anatase) in a groundmass of allotriomorphic granular calcite, with a little quartz. The octahedrite (anatase) crystals are from 0·1 to 0·5 mm. long, well developed with {111}, {100} and sometimes {001}, of a redbrown or purple colour, very splendent. They have been identified by the angle 111 to 11$\bar{1}$, measured provisionally to 137° in medium and in thin-section by the cleavage parallel to {111} and {001}, and by the neg. optical character.

One handspecimen from this locality contains, besides several of these pseudomorphs, an individual not yet wholly altered, with part of yellowish translucent substance, strongly resemling the mineral from the third locality.

Titanite from Frydensborg.

This titanite is quite fresh, yellowish green to brownish yellow, translucent, and occurs embedded with calcite, rutile, hematite, etc., in a chloritic rock somewhat similar to the mother rock of the last named titanite. The rutile has been observed here in allotriomorphic grains forming a nucleus in the midst of a titanite individual.

Only single individuals have been found, which are of a very persistent type, represented in fig. 5.

The following forms have been noticed: {111}, {131}, {$\bar{1}$11}, {$\bar{1}$12}, {$\bar{1}$13}, {$\bar{1}$21}, {021}, {$\bar{1}$01}, {001}, {010} and {110}, of which, to my knowledge, {$\bar{1}$21} is nowhere observed before.

Almost every crystal shows these forms, with the only exception of {$\bar{1}$01} that is often wanting. Remarkable is the constant occurrence, in this and the last mentioned variety, of {010}, a rare form in titanite.

The cleavage parallel to {$\bar{1}$11} is much pronounced, and parallel to one face of {221} is observed a parting giving exquisite smooth planes —. The nature of the faces is very different: {010}, {131}, and {$\bar{1}$13} are usually dull or looking varnished, {111} and {001} strongly faceted and giving disturbed signals, {$\bar{1}$11}, {$\bar{1}$21}, and {$\bar{1}$12} are often very brilliant, {$\bar{1}$12} & {$\bar{1}$13} both show vicinal faces.

Printed 23. november 1903.

Beiträge zur Gattung Papilio L. und Colias Leach.

von

Oskar Schultz.

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1. *Papilio machaon* L. *ab. rubromaculatus* Schultz.

Ab. rubromaculatus: *Al. post. supra rubromaculatis.*

Diese Form, welche in den Catalogen gewöhnlich als „ab mit rothen Flecken am Vorderrande der Hinterflügel“ aufgeführt wird und kürzer als ab. rubromaculatus bezeichnet wird, tritt in weniger ausgeprägten Exemplaren nicht selten überall unter der Stammart auf; Stücke, bei denen die rote Fleckung grössere Ausdehnung erreicht, wie sie weiter unten erwähnt werden, dürfen als Seltenheiten angesprochen werden.

Rote Schuppen finden sich oberseits in den gelben Saummonden der Hinterflügel und zwar:

in Mond 1 (sehr häufig),
in Mond 1 und 2 (häufig),
in Mond 2 und 3 (ziemlich selten),
in Mond 1 bis 3 (ziemlich selten),
in Mond 1 bis 4 (selten),
in Mond 1 bis 5 (sehr selten),
in Mond 1 bis 6 (sehr selten),
in Mond 1 und 6 (sehr selten),
in Mond 1, 2 und 6 (selten).

Die rote Bestäubung kann demnach in sämtlichen 6 Saummonden auftreten. Sie zeigt sich bald kräftiger, den ganzen

lichten Fleck ausfüllend — bald schwächer, oft nur schattenhaft einen Teil desselben einnehmend.

Des Weiteren tritt in seltenen Fällen auch rote Bestäubung (wie unterseits) oberseits an der inneren Seite des dunklen Submarginalbandes der Hinterflügel auf, entweder allein oder auch in Verbindung mit roter Bestäubung der Marginalmonde. Sie erstreckt sich dann längs des ganzen Submarginalbandes oder nur eines Teiles desselben. Bisweilen tritt die rote Färbung sogar auf die Submarginalbinde selber über. Bei einem Exemplar aus der Coll. Pilz-Heinrichau, welches vor dem inneren Rand der Submarginalbinde rote Bestäubnng zeigt (♀), hat das Analauge die deutliche Bildung des Hospiton-Auges angenommen: zur Hälfte roth, zur Hälfte blau, dazwischen eine schwarze Trenungslinie. Zwei Exemplare mit Characteren der ab. rubromaculatus aus meiner Sammlung zeigen das Auge einfarbig zinnoberrot, ohne jede Spur von Blau.

Auch am Afterwinkel oberhalb des Augenflecks treten bisweilen keilförmig rote Schuppen auf (Iris 1900 p. 104).

Schliesslich möchte ich die Mitteilung eines Sammlers nicht unerwähnt lassen, nach welcher bei einem weiblichen Exemplar, das in mehreren Saummonden und vor dem Innenrand der Submarginalbinde der Hinterflügel rote Beschuppung aufwies, sich schwach rote Bestäubung auch auf die beidon untersten gelben Saummonde der Vorderflügel erstreckte.

Die Merkmale der ab. rubromaculatus scheinen sich häufiger beim weiblichen als beim männlichen Geschlecht von *Papilio machaon* L. zu finden.

2. *Papilio hospiton* Guené *ab. n. subrubicundus* Schultz.

Ab. subrubicundus: Al. post supra rubromaculatis.

Rote Beschuppung auf der Oberseite der Hinterflügel.

Die mir vorliegenden Exemplare dieser Abart (Coll. Pfitzner-Sprottau ♀; Coll. Pilz-Heinrichau) zeigen die beiden obersten

Saummonde am Vorderrand der Hinterflügel von dieser Erscheinung betroffen, eins davon auch den untersten, dem Analauge zunäehst gelegenen (6.) Saummond, indessen letzteren nur in sehr schwacher Weise.

Bisweilen erscheint auch der Innenrand der dunklen Submarginalbinde (♀) rostrot bestäubt (Coll. Pilz).

Fluggebiet: Corsica, unter der Stammform.

3. *Papilio xuthulus* Brem. *ab. miniatulus* Schultz.

Ab. miniatulus: Al. post. lunulis marginalibus supra ochraceo-tinctis:

Die rotgelbe (ockergelbe) Färbung der Unterseite, welche oft sehr ausgebreitet auftritt, zeigt sich in seltenen Fällen auch auf der Oberseite der Hinterflügel.

Mir liegt eine Form vor (ab. miniatulus), welche die gelben Saummonde der Hinterflügel (1—4.) stellenweise rötlich gelb gefärbt zeigt.

Vom Amurgebiet.

4. *Colias hyale* L. *ab. (n.) radiiformis* Schultz.

Ab. radiiformis m.: Al. post. (et ant.) punctis ferrugineis subtus in radios effluentibus.

Oberseite: Vorderflügel von typischen Exemplaren nicht verschieden; auch der dunkle Rand nicht breiter.

Hinterflügel: ebenfalls typisch. Nur ein einziges Exemplar weicht insofern ab (♀), als der schwarze Aussenrand völlig fehlt

Unterseite: Hier zeigen sich die characteristischen Merkmale der neuen Abart:

Schon auf den Vorderflügeln sind bei mehreren Exemplaren entweder die obersten 2 Punkte der vor dem Saum befindlichen braunschwarzen Punktreihe nach dem schwarzen Mittelfleck zu durch starke schwarze Striche erweitert oder es sind die beiden untersten Punkte derselben in analoger Weise ausgezogen. Ein

hierhergehöriges ♂ (cf. 6. Jahresbreicht des Wiener ent. Vereins 1895 p. 53) wird seiner Vorderflügelunterseite nach wie folgt beschrieben: „Auf der Unterseite der Vorderflügel stehen in Zello 1 b, 2 und 3 innerhalb der Saumpuncte grosse schwarze Mondflecke, deren convexe Seite die Saumpuncte berührt.“

Besonders aber treten die Merkmale der Abart auf der Unterseite der Hinterflügel hervor.

Bald sind die rostfarbenen Punkte vor dem Saume sämmtlich nach dem 8 förmigen Mittelfleck strichförmig ausgezogen, bald sind dieselben nicht peripher, sondern nach dem Saume zu längs den Flügeladern strahlenförmig erweitert (so auch. l. c. p. 53: „Von den Saumpunkten der Unterseite der Hinterflügel ziehen rothbraune Strahlen zwischen den Rippen bis zum Saume“).

Diese Form, welche ich durch den besonderen Namen *ab. radiiformis* (wegen des strahlenartigen Ausfliessens der Saumpuncte) von der Stammart absondern möchte, wurde in Pommern (Zamzow, Gienow), Brandenburg (Berlin), in Nieder- und Mittel-Schlesien (2 Stücke in Heinrichau, Coll. Pilz), in Oesterreich (Schneeberggebiet, Gutenstein), in der Schweiz beobachtet. Die Ab. radiiformis tritt wohl überall da auf, wo die Stammform fliegt, wenn auch nur selten.

5. *Colias phicomone* L. *ab. elegans* Schultz, *Forma obscurior.*

Ab. elegans: Al. ant. unicoloribus griseis, maculis submarginalibus vix perspicuis; al. post. supra macula media rubra permagna.

Schöne Form, auffallend durch die dunkle Färbung. Auf den Vorderflügeln ist im Wurzel- und Mittelfelde die grüngelbe Grundfärbung völlig geschwunden und durch eine tief dunkelgraue Bestäubung verdrängt; der dunkle Aussenrand ist vorhanden; die lichteren Randflecken treten nur sehr wenig hervor.

Bei einem Exemplar sind die Submarginalflecken völlig geschwunden. Der Mittelpunct gross und tief schwarz hervortretend.

Hinterflügel ebenfalls tief dunkelgrau, jedoch mit breitem licht grünlich grauem Saum. Der Mittelfleck auffallend gross, kräftig ziegelrot gefärbt.

Die Unterseite von typischen Exemplaren nicht verschieden.

Aus der Schweiz. Coll. Pilz.

6. *Colias myrmidone* Esp. ♀ *ab. (n.) inumbrata* Schultz.
Ab. inumbrata: Al. ant. supra margine immaculato nigro.

Diese weibliche Form unterscheidet sich vom Typus dadurch, das der Saum der orangeroten Vorderflügel oberseits einfarbig schwarz und ungefleckt wie beim ♂ (jedoch breiter als bei diesem) ist.

Die gelblichgrünen Hinterflügel zeigen dagegen den schmalen schwarzen Saum von lichtgelben (kleineren als beim Typus) Flecken begrenzt.

Wegen der Verdunkelung des Vorderflügelsaumes möge diese Form ab. inumbrata heissen.

2 Exemplare in Coll. Pilz (aus Glatz?); eins in meiner Sammlung (Oesterreich).

7. *Colias myrmidone* Esp. ♀ *ab.*

Prächtige weibliche Aberration dieser Species.

Die dunkle Färbung des Saumes der Vorderflügel sehr eingeschränkt dadurch, dass die hellen gelblichen Submarginalflecke an Grösse und Breite sehr zugenomnen haben und eine fast ununterbrochene Binde bilden.

Die Hinterflügel mit schmalerem schwarzen Saum; vor demselben sehr grosse lichte Flecke. Der orangerote Mittelfleck kleiner als beim typischen Weibchen.

Die Grundfärbung oberseits weniger lebhaft, orangefarben; unterseits mehr grünlich als gelb. Der 8-förmige Fleck kleiner.

Aus Nieder-Oesterreich. In meiner Sammlung.

8. *Colias chrysotheme* Esp. ♀ *ab.*

Unterseits auf den Vorderflügeln mit schwarzen Streifen zwischen dem dunklen Mittelpunct und den Saumpuncten.

Provenienz unbekannt.

Collect. Pilz.

9. *Colias edusa* Fabr. ♂ *ab.*

Der Vorderrand der Vorderflügel nicht orange gefärbt, sondern breit schwefelgelb angelegt; ebensolche Färbung längs des Vorderrandes und im Analwinkel der Hinterflügel. Die übrige Flügelfläche typisch orangefarben mit breitem schwarzen Saume.

Collection Pilz. Fundort: Breslau(?). Diese männliche Form gehört vielleicht zu der ab. chrysotheme St. (= *ab. aubuissoni* Car. ♀.), welche in der Färbung als in der Mitte zwischen der Stammform und ab. helice stehend besschrieben wird und alle Flügel mehr oder minder orangefarben übergossen zeigt. Auffallend bleibt immerhin der mir angegebene Fundort Breslau, da die *ab. aubuissoni* Car. nur in Südeuropa, Kleinasien und Nord-Africa vorkommt.

10. *Colias edusa* Fabr. ♀ *ab.*

Prächtige Aberration.

Vorderflügelfläche in ihrer ganzen Ausdehnung bis zum dunklen Saum nicht orangefarben, sondern schwefelgelb.

Die Hinterflügel grüngelb, durch zahllose schwärzliche Atome dunkel bestäubt; dieselben zeigen einen schönen bläulich-grünlichen Anflug.

Unterseits: normal gefärbt.

Fundort: Langenbielau Kreis Reichenbach. — Coll. Pilz.

11. *Colias edusa* Fabr. *gyn.*

Gynandromorphes Exemplar.

Grösse die eines kleinen typischen Weibchens. Rechte

Flügel weiblich, etwas grösser als die linken; linke Flügel männlich.

Linker Vorderflügel: 24 mm. gross, männlich, schlanker, weniger breit, mit breitem schwarzem Saum, letzterer ohne lichte Flecken.

Linker Hinterflügel: männlich, etwas kleiner als der rechte.

Rechter Vorderflügel: 25 mm. gross, weiblich, breiter, mit etwas breiterem dunklen Saum; letzterer mit mehreren grossen hellgelben Flecken.

Rechter Hinterflügel; weiblich.

Leib nach Gestalt und Färbung weiblich. Die äusseren Genitalien dem Anscheine nach rein weiblich.

Von Laghouat.

cf. Berliner ent. Zeitschrift XLVIII p. 270.

Gedruckt 27. januar 1904.

Aarsberetning
for
Det biologiske selskab i Kristiania
1903.

Ved

F. G. Gade og Jens Holmboe.

Medlemmernes antal var ved aarets begyndelse 54. I aarets løb har ét medlem traadt ud af selskabet, medens samtidig 3 nye er indvalgte: dr. med. Lyder Borthen, prof. dr. med. F. Harbitz og stud. med. P. W. K. Bøckman.

Bestyrelsen bestod af: prosektor dr. med. F. G. Gade, formand, prof. dr. E. Poulsson, viceformand, og amanuensis Jens Holmboe, sekretær.

Der blev holdt 6 møder med ialt 10 foredrag. I møderne deltog fra 7 til 10, gjennemsnitlig 8 medlemmer, samt fra 4 til 35, gjennemsnitlig 12, gjæster.

Møde torsdag den 22de januar.

Amanuensis Thekla R. Resvoll holdt et af lysbilleder ledsaget foredrag om den nye vegetation paa skredet i Værdalen.

Ved det store lerfald i mai 1893 dannedes et betydeligt nyland, idet der gled ud et areal af ca. 2,3 km.^{2}, og de udgledne masser oversvømmede dalen i en længde af 8 km. nedover. I den allerførste tid efter den voldsomme naturbegivenhed havde dette omraade et overmaade goldt og nøgent udseende; men det

varede ikke ret længe, før en ny vegetation begyndte at indfinde sig. Allerede i 1898 — kun 5 aar efter ulykken — havde større dele af skredet en ganske grøn farve, og ved nærmere undersøgelser, som da blev anstillede, viste det sig, at endog noget over 100 plantearter voksede paa den nye jordbund. I det store og hele taget var dog den nye vegetation tiltrods for det forholdsvis betydelige artsantal meget ensformig, idet kun ganske faa arter beherskede pladsen. Væsentlig var det kun 2 planter, hestehoven (*Tussilago farfara)* og akersnelden *(Equisetum arvense),* der begge i sine rigt grenede underjordiske dele har ypperlige spredningsmidler, som kunde siges at danne tætte bevoksninger. De øvrige arter fandtes ikke i synderlig stort individantal og havde en spredt forekomst. For en stor del syntes planternes fordeling at være bestemt af jordbundens fysiske forhold og fugtighedsforholdene. Der, hvor bunden bestod af grus, havde den sin særegne vegetation, ligesom ogsaa der, hvor den bestod af ublandet ler. Paa steder, hvor det var fugtigt nok og leren passelig opblandet med sand, fandtes saavel det tætteste som rigeste planteliv. Et saadant sted var f. eks. Follobækkens nye leie, hvor der i en tæt bundvegetation af akersnelde voksede omtrent 70 andre arter. Særlig opfriskende var plantelivet ved nogle smaa tjern, hvor der enkelte steder var udviklet temmelig rige vandplantesamfund. Tjernene var hyppig kransede af en tæt sumpvegetation, hvor især elvesnelden *(Equisetum fluviatile)* og endel siv- og stararter var fremtrædende, mens *Potamogeton*- og *Sparganium*-arter samt endel andre vandplanter voksede ude i selve vandet. De paa skredomraadet indkomne planter var almindelige skog-, myr-, eng- og ugræsplanter, som øiensynlig stammede fra skredets nærmeste omgivelser, og havde vistnok for en stor del spredt sig ud fra de mange flag af den gamle overflade, som under udrasningen havde flydt ovenpaa lermasserne. For at kunne erholde materiale til fremtidigt studium af arternes indbyrdes kamp om pladsen, blev nylandet ved udstukne linjer opdelt i smaa omraader og de forskjellige planter inden

hvert af disse optalt og opskrevet. Nye undersøgelser, anstillede sommeren 1902, viste, at der i løbet af 4 aar ikke var foregaaet særdeles store og væsentlige forandringer med vegetationen. Kun var plantedækket blevet tættere, idet enkelte arter havde spredt sig stærkt. I det store og hele taget syntes vegetationen i de forløbne aar væsentlig at have fortsat i den retning, som var paabegyndt i 1898. (Cfr. Den nye vegetation paa lerfaldet i Værdalen. N. Mag. f. Natv. Bd. 41). — Foredraget. gav anledning til en diskussion, hvori deltog brigadelæge C. Arbo, professor dr. N. Wille og amanuensis Jens Holmboe. Den sidstnævnte bragte, i tilknytning til foredraget, nogle korte meddelelser om

Vegetationen paa Hamar domkirkes ruiner.

„Paa den odde, som mellem Akersviken og Furnæsfjord skyder ud i Mjøsen, paa Storhamar gaards grund, ligger de berømte ruiner af Hamar domkirke. Den gamle, i middelalderen opførte kirke led stærkt ved svenskernes herjing under Syvaarskrigen (1567), og store dele af den forfaldt i løbet af det følgende aarhundrede[1]). Rester af dens mægtige buer tegner sig dog endnu mod himlen som et ærværdigt minde om svundne tiders kultur.

Oppe paa de gamle mure og buer vokser der en ganske rig vegetation af forskjellige høiere planter. Ved et besøg den 23de juni 1901 noterede jeg ialt følgende 44 arter blomsterplanter og bregner:

Acer platanoides L. Sparsomt.
Achillea Millefolium L. Temm. sparsomt.
**Alchemilla vulgaris* L. **pubescens* Lam. Sparsomt.
**Anthriscus silvestris* Hoffm. Sparsomt.
**Anthyllis Vulneraria* L. Sparsomt.
**Arenaria serpyllifolia* L. Temm. talrig.
Artemisia Absinthium L. Sparsomt.

[1]) Gustav Storm, Om det gamle Hamar, p. 131—133. (Histor. Tidsskr. 3 R. 1 Bd. Kristiania 1890).

**A. campetris* L. I mængde, selv paa de høieste buer og pillarer.

Atriplex patula L. Sparsomt.

Betula alba L. Unge expl., sparsomt.

**Calamintha Acinos* Benth. Sparsomt.

**Campanula rotundifolia* L. I mængde.

**Cerastium vulgare* Hartm. Temm. sparsomt.

Chelidonium majus L. Sparsomt.

Chenopodium album L. Flerestedes.

**Cystopteris fragilis* Bernh. Flerestedes.

**Draba incana* L. Flerestedes.

**Erysimum hieraciifolium* L. Temm. talrig.

**Festuca ovina* L. Temm. talrig.

**Fragaria vesca* L. Sparsomt.

**Galeopsis Tetrahit* L. Temm. talrig.

**Galium verum* L. Sparsomt.

Geranium silvaticum L. Sparsomt.

**Hieracium murorum* L. Sparsomt.

Leontodon autumnale L. Sparsomt.

Linaria vulgaris L. Sparsomt.

**Myosotis arvensis* L. Sparsomt.

**Pimpinella Saxifraga* L. Temm. sparsomt.

**Plantago media* L. Temm. sparsomt.

**Poa nemoralis* L. Temm. talrig.

**Potentilla argentea* L. Sparsomt.

Rubus idaeus L. Temm. sparsomt.

R. saxatilis L. Temm. sparsomt.

**Rumex Acetosa* L. Sparsomt.

Salix caprea L. Kimplanter, temm. talrig.

**Sedum acre* L. I mængde.

**Silene inflata* Sm. I mængde.

**Taraxacum officinale* Web. Talrig.

**Trifolium pratense* L. Sparsomt.

**T. repens* L. Sparsomt.

Urtica dioica L. Temm. sparsomt.
Verbascum nigrum L. Temm. sparsomt.
**Vicia Cracca* L. Temm. sparsomt.
**Viola Riviniana* Rchb. Sparsomt.

Blandt disse arter iagttoges 29 med blomst eller frugt (eller for bregnernes vedkommende med sporer); disse er i fortegnelsen mærkede med en stjerne (*). De fleste arter voksede oppe paa selve murene og afsatserne; andre stak frem fra sprækker og revner mellem bygningstenene. Rigest saavel paa individer som arter var vegetationen paa murernes lavere del (dog brød jeg mig ikke om at notere nogen lavere end 0,5 m. over marken). Kun følgende 13 voksede i større høide end 3 m.: *Anthriscus, Artemisia campestris, Campanula rotundifolia, Draba incana, Festuca ovina, Leontodon, Pimpinella, Plantago media, Sedum acre, Silene inflata, Taraxacum, Trifolium pratense* og *Vicia Cracca*. Af disse 13 fandtes de 12 i blomst, og den eneste, som jeg kun saa steril, var *Leontodon*, hvis blomstringstid endnu ikke var inde.

Hvad angaar den maade, paa hvilken frø af de fundne planter maa antages bragt op til de usædvanlige voksepladse, kan følgende anføres. Foruden de arter (*Betula, Salix*, flere compositer, etc.), hvis frø og frugter er forsynede med fnok, vinger, o. l., maa ogsaa en stor del af de andre ansees vel skikkede til spredning ved vindens hjælp, paa grund af frøenes lidenhed. Exempelvis kan nævnes *Campanula rotundifolia, Sedum acre, Urtica dioica*, m. fl. Saftfulde frugter har vistnok kun 3 (*Fragaria vesca* og de to *Rubus*-arter), men efter prof. R. Collett's og mine egne undersøgelser fortærer forskjellige fugle frø og frugter af langt flere arter (*Achillea Millefolium, Artemisia campestris, Atriplex patula, Chenopodium album, Galeopsis Tetrahit, Trifolium pratense, Urtica dioica* og *Vicia Cracca*).[1]

[1]) Jens Holmboe, Notizen über die endozoische Samenverbreitung der Vögel. (N. M. f. N. Bd. 38. 1900).

Ved myrers hjætp spredes saavel i Norge som i Sverige *Chelidonium majus*[1]); talrige myrer saaes at vandre omkring paa ruinerne. Ingen af de fundne arter behøver at være ført hid fra nogen stor afstand; de fleste voksede i mængde paa de tørre silurberge ved Mjøsens bred nedenfor ruinerne. Alene *Draba incana* lykkedes det ikke at finde i de nærmeste omgivelser, men ogsaa den forekommer ifølge Jon Rud[2]) ikke langt fra Hamar.

Lignende iagttagelser som de her meddelte foreligger fra flere andre lande, der er rigere paa ruiner end Norge. Hvad vore nabolande angaar, har H. Mortensen[3]) givet oplysninger om plantevæksten paa den gamle marmorkirke-ruin i Kjøbenhavn, hvor han fandt 23 arter karplanter. Endvidere har C. A. M. Lindman[4]) undersøgt vegetationen paa Visby ruiner (96 arter), og R. Sernander[5]) plantevæksten paa ruinerne af Kastellholms slot og Bomarsunds fæstning paa Ålandsøerne (73 arter). Det kan have sin interesse at sammenligne artlisterne fra disse hidtil undersøgte ruiner; det viser sig, at Hamar domkirke har 3 arter fælles med marmorkirken i Kjøbenhavn, 23 med ruinerne ved Visby og 18 med dem paa Åland. Ialt er 30 af de ved Hamar fundne arter kjendt fra andre skandinaviske ruiner, og kun følgende 14 kan opføres som et tillæg til den skandinaviske ruinvegetation: *Alchemilla vulgaris, Anthyllis Vulneraria, Betula alba, Cystopteris fragilis, Draba incana, Erysimum hieraciifolium, Galeopsis Tetrahit, Geranium silvaticum, Linaria vulgaris, Plantago media, Rubus saxatilis, Salix ca-*

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[1]) R. Sernander, Den skandinaviska vegetationens spridningsbiologi, p. 289. Upsala 1901.

[2]) Jon Rud, Mjøsegnens flora, p. 25. (Indbydelsesskrift til eksamen ved Hamar off. skole 1884).

[3]) H. Mortensen, Marmorkirkens Flora (Botan. Tidsskr. 3. R. 3 Bd. Kjøbenbavn 1879).

[4]) C. A. M. Lindman, Kärlväxtfloran på Visby ruiner. (Öfv. af K. Sv. Vet. Ak. Förh. 1895. No. 4).

[5]) Sernander, l. c., p. 375, flg.

prea, Verbascum nigrum og *Viola Riviniana.* Flere af disse er paa de andre ruiner erstattet af nærstaaende arter. Ligheden mellem de undersøgte ruiners vegetation maa — i betragtning af den store afstand mellem dem — siges at være temmelig stor."

Møde torsdag den 26de marts.

Professor dr. S. Torup holdt foredrag om ionelæren og dens betydning for nogle biologiske processer. — Til foredraget knyttedes bemærkninger af prof. dr. E. Poulsson og dr. med. F. G. Gade.

Møde lørdag den 12te september.

Mødet blev holdt paa den biologiske station i Drøbak.

Dr. med. K. E. Schreiner holdt foredrag om generationsorganet hos *Myxine glutinosa* (L.).

Foredragsholderen gav først en almindelig karakteristik af generationsorganets bygning og udseende hos *Myxine* og viste, hvorledes dette ved sin længde, sin udvikling alene paa dyrets ene side og sin hermaphroditiske natur adskiller sig fra den almindelige type af generationsorganer, som man finder hos de fleste øvrige hvirveldyr. Efterat foredragsholderen derefter havde givet en fremstilling af den nu almindelig herskende opfatning af hermaphroditismen hos *Myxine* som værende af protandrisk natur, saaledes at dyrene først fungerede som hanner og senere som hunner — en opfatning, som er grundlagt af skotlænderen Cunningham og vor landsmand, professor Nansen — refereredes de resultater, til hvilke foredragsholderen og hans hustru var komne efter undersøgelse af et betydeligt materiale (nemlig ca. 2500 eksemplarer). Disse resultater gik ud paa, at hermaphroditismen hos *Myxine* ikke er effektiv, men rudi-

mentær, idet en del af de tilsyneladende hermaphroditer er at opfatte som hanner og en del som hunner. Hos de første fandt man generationsorganets testisdel mer eller mindre vel udviklet, medens den proximalt liggende ovarialdel er rudimentær, viser pathologiske forandringer af forskjellig natur og aldrig udvikler sig videre. Paa samme maade finder man hos hunnerne bagenfor det vel udviklede ovarium et hanorgan, som er hemmet i sin udvikling eller viser tydelige degenerative forandringer. Overgange mellem disse 2 former, som den tidligere opfatning af hermaphroditisme forudsætter, forekommer i virkeligheden ikke. Foruden hanner og hunner forekommer der desuden et ikke ringe antal sterile eksemplarer, hos hvem der i kjønsorganet enten aldeles ikke findes æg eller testisfollikler anlagt, eller hos hvem kjønsorganet som helhed viser hemmet eller abnorm udvikling. Forskjellen mellem de 2 kjøn er i almindelighed tydelig udtalt hos dyr paa en længde af 24 cm. og derover (dyrene naar sjelden en længde af 40 cm.); men den kan ogsaa ikke sjelden paavises hos dyr, som er ca. 20 cm. lange, i ganske enkelte tilfælde muligens allerede hos 17 cm. lange dyr. Efter en skildring af de mange variationer, som kjønsorganet hos *Myxine* kan opvise baade hvad længde angaar og med hensyn til udvikling og fordeling af den hanlige og hunlige kjønskjertelsubstans, omtaltes en række tilfælde, hvor kjønsorganet var fundet at være parret.

Samtlige ovenfor skildrede forhold demonstreredes paa et betydeligt antal udstillede eksemplarer.

De kjendsgjerninger, som de refererede undersøgelser af *Myxines* biologi og kjønsorgans bygning havde bragt tilveie, talte, sammenholdt med tidligere undersøgeres resultater, for sandsynligheden af, at Myxinoidernes forfædre har ført et mere omstreifende liv og besiddet et parret hermaphroditisk kjønsorgan, som producerede talrige blommefattige æg. Eftersom Myxinoidernes levevis lidt efter lidt er blevet forandret, og dyrene som saprophyter er blevne mere bundne til bestemte lokaliteter, har samtidig med

larvernes forandrede levevis æggenes blommerigdom tiltaget. Denne tiltagen i masse har saa ført til en aftagen i antal og til en forsvinden af den ene sides kjønsstræng. De talrige variationer, man finder i det gjensidige forhold mellem testis og ovarium, forklaredes som for en væsentlig dels fremgaaet ved en udvikling fra en tidligere eksisterende effektiv hermaphroditisme til diöcisme. (Udførligt referat af foredraget vil blive trykt i „Biolog. Centralbl.“). — Foredraget gav anledning til bemærkninger af prof. dr. G. A. Guldberg, prof. dr. F. Harbitz, prof. dr. N. Wille og dr. med. F. G. Gade.

Møde torsdag den 24de september.

Dr. S. Schmidt-Nielsen redegjorde i tilknytning til et tidligere foredrag om "cellens kemiske værktøi" for en af ham opstillet hypothese om de intracellulære enzymers virkemaade, hvorefter denne skulde være intermitterende, saaledes, at der i en celle samtidig ikke behøvede at være mere end et enzym i virksomhed. Efter nogen tids forløb vilde dette paa grund af ophobede stofvekselsprodukter sættes ud af virksomhed, mens samtidig de fysikalske forhold blev bragt tilveie, som gjorde det muligt for et andet enzym at virke. Paa denne maade vilde efter hverandre et tredie og fjerde og flere enzymer kunne træde i virksomhed. Naar saa i mellemtiden de først dannede produkter var transporterede bort, kunde det første enzym atter begynde sit arbeide. Fordelen ved denne forklaring var efter foredragsholderens opfatning den, at man ikke behøvede at forudsætte nogen anden struktur hos protoplasmaet end den allerede kjendte, at den altsaa i modsætning til Hofmeister's kunde antages saavel af botanikere som zoologer. — Foredraget gav anledning til en diskussion, hvorunder professor dr. N. Wille og veterinærdirektør dr. O. Malm i flere punkter sluttede sig til den i foredraget udviklede tanke, mens konservator Kristine Bonnevie tog afstand derfra.

Dr. Schmidt-Nielsen refererede dernæst nogle forsøg over lysets virkninger paa enzymer, som han med understøttelse af Nansenfondet havde foretaget i Kjøbenhavn ved Finsens lysinstitut. Det havde vist sig, at saavel sollys som lyset fra en buelampe og det koncentrerede lys, der anvendes ved lupusbehandlingen, virkede ødelæggende ikke alene paa enzymerne selv, men ogsaa paa deres uvirksomme forstadier (proenzymer) og paa visse stoffe i blodserum, der neutraliserer enzymerne (antienzymer). Det viste sig at være lysets ultraviolette straaler, hvem denne virkning skyldtes, hvorimod den synlige del af solspektret saa at sige ingen indflydelse havde. — Foredragsholderen omtalte tilsidst nogle forsøg, som han havde udført over Röntgen- og Becquerelstraaler. Mens de første havde vist sig uvirksomme, kunde de sidste i nogen grad svække en enzymopløsning. I det hele taget syntes lyset at maatte kunne anvendes som en reagens til at studere baade enzymer, proenzymer og antienzymer. — I tilslutning til dette foredrag fremholdt professor dr. N. Wille ønskeligheden af, at den enestaaende anledning, som vi om sommeren i den nordlige del af vort land har til at studere de forskjellige sider af lysets virkning, i større udstrækning end hidtil maatte blive benyttet.

Dr. med. F. G. Gade demonstrerede dernæst Grayson's prøveplade og andre prøveobjekter for mikroskopet.

Møde lørdag den 7de november.

Amanuensis Thekla R. Resvoll holdt foredrag om vegetationen i Schweiz, som hun havde studeret paa en reise sidste sommer. Saavel de lavtliggende dalførers vinberge og kastanjeskoge som bergregionens naaleskoge og høialpernes frodige græsmatter og urtelier blev nærmere skildret. Under foredraget fremvistes talrige lysbilleder samt pressede eksemplarer af de for hvert enkelt plantesamfund mest typiske arter.

Møde torsdag den 3die december.

Konservator Sig Thor meddelte nogle iagttagelser angaaende

Cellekjernens forhold til ergastoplasmaet, væsentlig efter nyere franske undersøgelser.

„Man tillægger gjerne B. Solger æren for i dyriske cellers cytoplasma først (1894) at have beskrevet og afbildet visse traadformede, hémateinofile formationer, som han kaldte basalfilamenter. Det var i menneskets tungespytkjertler. Sammesteds gjenkjendte Ch. Garnier (1897) de nævnte filamenter og gav dem det specifike navn ergastoplasma, omtrent samtidig med, at M. og P. Bonin (1898) indførte samme navn i botaniken. Ergastoplasmaet kjendes, efter Garnier, paa basal beliggenhed i glandulære celler, filamentær form, gruppering i bundter etc., samt paa sin kromatiske affinitet for safranin og jern-hæmatoxylin. Man har ogsaa konstateret en tydelig kromatisk variation, stemmende med visse forandringer i kjernen. Siden har flere forskere omtalt disse formationer i forskjellige celler (f. eks. Theohari, Laguesse, Jouvenel, Leger, Duboscq, Regaud, Bensley, Vignon, M. Loyez, Renaut, Launoy). K. C. Schneider kalder dem „Sekretfibrillen“. Det er tvivlsomt, om Benda's „mitochondria“ og M. Heidenhain's „pseudochromosomer“ kan henføres til samme gruppe. Prenant har omtalt dem under fællesnavnet: „protoplasma supérieur“. Foredragsholderen havde fundet ergastoplasma i kjertelceller hos visse *Acarina*. Der er fremsat forskjellige opfatninger af disse filamenters rolle og oprindelse. Enkelte anser dem for at være af cyptolasmisk, andre af nucleær, atter andre af dobbelt oprindelse. Foredragsholderen refererede et par nyere franske undersøgelser, der kaster et vist lys over sagen. Dr. Conte og dr. Vaney (i Lyon) fandt (1902) i en i vandsalamanderens tarmkanal snyltende protozo, *Opalina intestinalis*, safranofile korn, der gjennem visse aabninger i

kjernemembranen trængte ud af kjernen og spredte sig i cytoplasmaet. Denne proces benævner C. og V. „emission nucléaire“, Siden opløser kornene sig i smaakugler, der antager en mere rødlig teint, svulmer op og opløser sig senere i cytoplasmaet. Kornene svarer til zymogen-korn, som f. eks. findes i ølgjær og sammenlignes med lignende dannelser, iagttagne i insekters, tusenbens og pattedyrs æg.

I en anden meddelelse (trykt 2/3 1903 i "Comptes R.", Paris) omtaler Conte og Vaney hestebremsens larve, i hvis trakéceller de finder lignende kromatofile masser, dels spredt i cytoplasmaet, dels indesluttet indenfor kjernemembranen. Denne viser sig undertiden dobbelt. Den ydre kjernemembran dannes delvis af det cytoplasmiske net, den indre, stærkt kromatofil, bestaar undertiden af korte stykker; den kan ogsaa mangle. De nævnte stykker viser sig paa heldige præparater dannet af kjernens kromatiske tener. Disse lægger sig dels hen til den ydre membran og danner saaledes helt eller delvis en indre, dels trænger de gjennem kjernemembranens aabninger ud i cytoplasmaet, hvor de forgrener sig.

I de omtalte trakéceller viser altsaa kjernen et intimt forhold til de omtalte elementer, idet den danner eller ialfald deltager i dannelsen af de nævnte korn og kromatiske stykker. Kjernemembranen synes mindre solid og simpel, end man ofte har fremstillet den.“ — Til foredraget knyttedes bemærkninger af prof. dr. E. Poulsson og dr. med. K. E. Schreiner, hvortil foredragsholderen replicerede.

Konservator Kristine Bonnevie holdt foredrag om spermiernes dannelse hos en lavtstaaende, parasitisk levende snegl, *Enteroxenos Östergreni*, og fremviste tegninger af de forskjellige stadier fra deres første anlæg til færdige udvikling. Hun sammenlignede dette dyrs spermier med de øvrige snegle samt høierestaaende dyr og paapegede den ved vor tids udviklede mikroskopiske teknik paaviste store overensstemmelse i spermiernes dannelse inden forskjellige dyreklasser. (Foredraget vil blive

trykt i „Biol. Centralbl.“). — Foredraget gav anledning til en diskussion mellem dr. med. K. E. Schreiner og foredragsholderen.

Cand. philos. Hj. Broch gav endel spredte meddelelser fra „Michael Sars“s togter sommeren 1903. Han skildrede det rige dyreliv i havet, som skibets fortrinlige udrustning med moderne fangstapparater gav saa god anledning til at studere. Med et eneste træk af det saakaldte „tobisvad“ kunde man hente indtil halvanden hektoliter dyr op fra dybet. Særlig fiskeyngel og manæter samt den vakre, lyserøde hydroide *Tubularia larynx* forekom i største mængde. I Danmarkstrædet stødte man paa store stimer af ægte "islandssild“, som gik lige i vandskorpen; i den knappe tid, som kunde afsees, blev der gjort en rig fangst. Sankthansaften fik man se en flok store haier; i løbet af en times tid kunde man fra skibets dæk tælle 12 à 13 stykker. I Mjofjorden paa Island blev en netop skudt nordkaperhval undersøgt; den var eiendommelig derved, at dens bug var hvidfarvet. En kaskelot, som var bragt ind til brødr. Ellefsen's etablissement, havde været i kamp med en 25—26 fod lang kjæmpeblæksprut *(Architeutes)*; og at den ogsaa tidligere havde stødt paa slige, kunde sees af, at tre fjerdedele af dens maveindhold bestod af blæksprutnæb.

Trykt den 27de januar 1904.

Navneregister.

Dyrelivet i Drøbaksund

ved

Hans Kiær.

(Med Pl. II, III).

For at udføre biologiske undersøgelser i Drøbaksund havde jeg sommeren 1899 stipendium af det Rathkeske legat. Under disse undersøgelser, der delvis er udført med dr. Petersens interessante afhandling om dyrelivet i Holbækfjord i Danmark som mønster, har dr. J. Hjorts velvillige bistand og raad været mig til stor nytte, ligesom ogsaa følgende videnskabsmænd delvis har hjulpet mig med bestemmelsen af enkelte dyregrupper, nemlig prof. G. O. Sars, frk. K. Bonnevie, dr. J. Kiær og cand. A. Wollebæk, hvorfor det her er mig en trang at udtale min tak for den modtagne hjælp. Jeg maa ligeledes tillade mig at bringe hr. prof. R. Collett min tak for den adgang jeg har haft til universitetets samlinger.

De følgende undersøgelser omfatter dyrelivet og dets sammensætning paa enkelte udvalgte lokaliteter ved Drøbak, specielt de forskjellige dyregruppers og arters forekomst og mængdeforhold samt naturforholdene og disses indflydelse paa dyrelivet.

Inden de forskjellige dele af Kristianiafjorden hersker der særdeles vexlende naturforhold, der forøvrigt synes at kunne henføres til nogle faa hovedgrupper. Ved at undersøge lokaliteter,

hvis naturforhold svarer til hver af disse hovedgrupper, vil man saaledes kunne faa et begreb om naturforholdene i fjorden i det store og hele taget.

Mine undersøgelser ved Drøbak skulde derfor tjene til at belyse dyrelivets sammensætning og økonomi ikke alene paa de enkelte undersøgte lokaliteter, men ogsaa paa de dele af havbunden, hvorpaa disse lokaliteter er typer. Desuden troede jeg, at ethvert bidrag til forstaaelsen af naturforholdene i Drøbaksund vilde være af interesse for de undersøgelser, der drives ved den biologiske station i Drøbak.

Ialt undersøgtes 5 forskjellige lokaliteter, der med hensyn til naturforhold kan karakteriseres paa følgende maade:

1. Mudderbund 0— 12 meter (Sandspollen).
2. „ ca. 100 „ (mellem Haa- og Graaøen).
3. „ ca. 200 „ (syd for Drøbak).
4. Sand- og fjeldbund med *Laminarier* (mellem Storskjær og „Vestlandet").
5. Fjeldbund med koraller og alger (Drøbaksgrunden samt fjeldet nord for den biologiske station).

Jeg har væsentlig blot taget hensyn til de almindeligst forekommende laverestaaende dyrearter, men det er paa ingen maade min hensigt at levere en fortegnelse over alle disse paa hvert enkelt sted.

Omend dette arbeide i mange henseender er meget ufuldstændigt, er det dog mit haab, at mine undersøgelser over det lavere dyreliv som tillæg til dr. HJORTS fiskeriundersøgelser, maa have nogen betydning til forstaaelse af, hvordan dyrelivet idethele arter sig paa de nævnte lokaliteter.

Thalamophorerne er ikke specielt nævnt her, da disse af mig er behandlede i en egen afhandling: „Synopsis on the Norwegian marine Thalamophora".

Af redskaber benyttedes en otertrawl, en skrabe, samt enkelte gange et finmasket vad og en planktonhov.

Beskrivelse af de undersøgte lokaliteter og deres dyreliv.

1. Sandspollen.

Dybde: 0—12 meter. Mudderbund.

Sandspollen er et indelukket bassin, der blot ved et smalt sund staar i forbindelse med fjorden udenfor. Sundet har omtrent samme dybde som selve pollen, der dels er omgivet af steile fjeldknauser, dels af flade marker, hvis fortsættelse danner pollens mere eller mindre jevnt skraanende havbund. I august maaned var temperaturen paa 10 meters dyb 11—12° C., medens overfladetemperaturen 18°.25 fandtes ned til en dybde af 7 meter[1].

Den inderste bugt af Sandspollen danner inderst inde et lang-

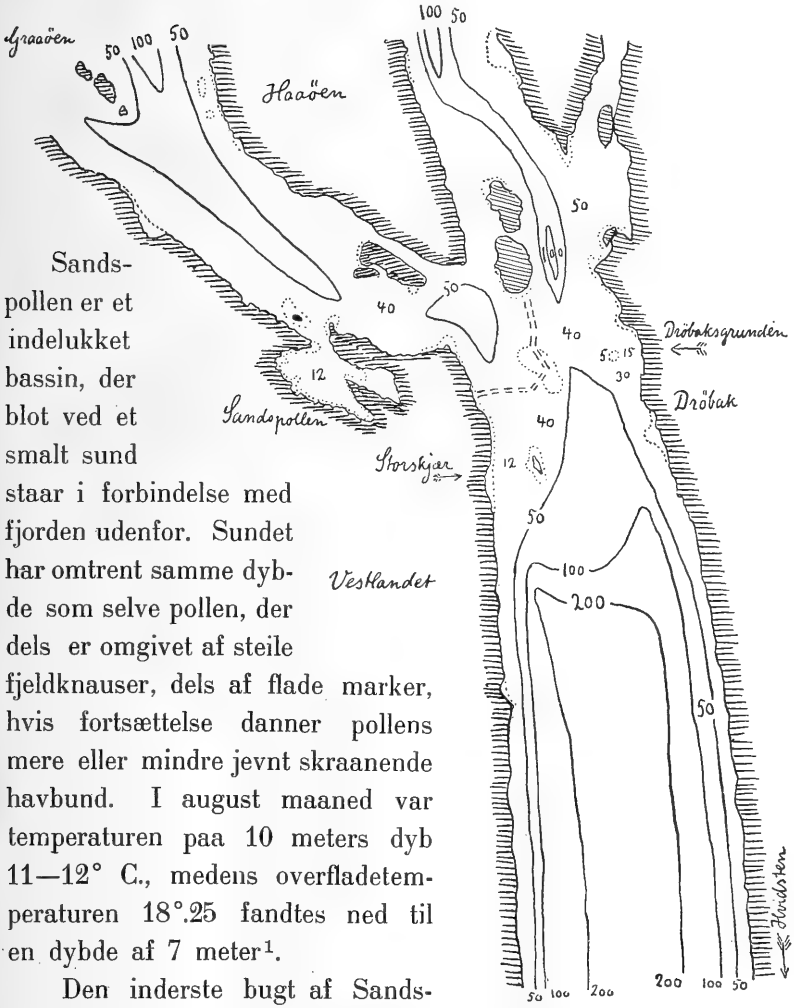

Fig. 1. Dybdekart over Drøbaksund.

[1] Ifølge dr. Hjorts undersøgelser d. 11. aug. 1897.

grundt bælte uden vegetation. Her findes talrige tuer frembragte af *Arenicola piscatorum* med lange bugtede strenge af opslyngede excrementer, af og til sees ogsaa de eiendommelige aabninger (i sandet), som skyldes *Mya arenaria*.

Paa begge sider af den inderste bugt er der steile fjeldknauser med nedrasede klippestykker, hvorpaa findes *Littorina littorea* i talrig mængde og i forskjellige størrelser. Langs stranden svømmer enkelte exemplarer af *Cottus scorpius* og *Palaemon fabricii* stødvis frem og tilbage. Enkelte smaa krabber *(Carcinus maenas)* sees ogsaa af og til.

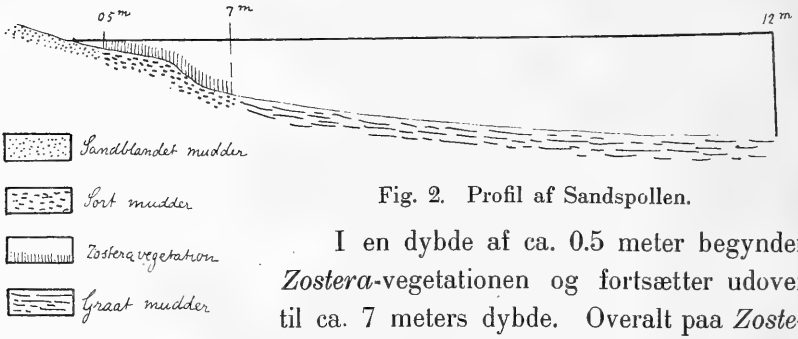

Fig. 2. Profil af Sandspollen.

I en dybde af ca. 0.5 meter begynder *Zostera*-vegetationen og fortsætter udover til ca. 7 meters dybde. Overalt paa *Zosteraen* lever i talrig mængde *Rissostomia octogona* og ikke faa af *Rissoa albella*, begge arter i forskjellige udviklingstrin. *Abra alba* forekommer ogsaa af og til, men hører egentlig hjemme paa lerbunden udenfor, medens de 2 førstnævnte arter er karakterformer for *Zostera*-bæltet. Enkelte smaa individer af *Littorina littorea* (af 7—12 milimeters længde) paatræffes ogsaa. Endvidere kan nævnes *Nassa reticulata*, *Cylichna sp.*, begge enkeltvis og udvoxne, *Asterias rubens*, ganske smaa og enkelte halvstore exemplarer, *Strongylocentrotus drøbachiensis*, *Balanus balanoides* samt *Crangon*- og *Palaemon*-larver, *Membranacea* og *Spirorbis*, hvilke arter dog aldrig optræder i nogen forholdsvis stor mængde, derimod forekom der af og til en mængde exemplarer af *Mytilus sp.* i de første udviklingsstadier fastheftede til eller mellem sammenklæbede blade af *Zostera*. Til hvilken art disse *Mytilus*-unger hører, lader sig ikke afgjøre. *M. edulis*

forekommer blot af og til langs stranden paa denne lokalitet, men da den indsamles og bruges til agn, er det umuligt med bestemthed at have nogen mening om dens udbredelse. Imidlertid synes *Zosteraen* her at være et gunstigt levested for *Mytilus*-yngelen, hvad man paa forhaand ogsaa kunde slutte sig til, da der paa *Zosteraens* blade ofte findes et rigt mikrospisk dyreliv, bestaaende af smaa *Arachnider, Crustaceer*, specielt *Ostracoder*, samt *Hydroider, Anguillula sp.* og *Infusorier*. Disse mikroskopiske dyr opholdt sig især mellem hobe af sammenfiltrede alger.

Af planktonformer findes i Sandspollen de samme som i fjorden udenfor. Saaledes optraadte der i juni maaned og tidligere i Kristianiafjorden og i Sandspollen, lige til de inderste bugter af denne, uhyre masser af *Ctenophorer*[1] og senere af *Noctiluca sp.* En dag i juli maaned var de inderste bugter af Sandspollen opfyldt af *Meduser (Aurelia aurita)*.

Mellem rødderne af *Zostera* fandtes af og til et enkelt exemplar af *Ophioglypha lacertosa* og af *Aporrhais pes pelecani*. I mudder fra bunden Insektlarver, *Acariner, Turbellarier, Anguillula sp.*, smaa *Crustaceer*, saaledes *Ostracoder, Infusorier* og *Diatomeer*.

Ved ca. 7 meters dyb begynder barbunden, der bestaar af blød, graa lere med sorte streif, som skyldes forraadnende dele af *Zostera*, hvoraf der altid kom meget op med skraben. Der fandtes ogsaa næsten altid en hel del tomme skaller af *Molluscer*, enkelte træstykker, barnaale, bark, smaasten, slagger, grus og sand samt rør af *Annellider* i forskjellige størrelser.

De almindeligste større dyreformer paa barbunden er følgende: *Ophioglypha lacertosa, O. albida, Aporrhais pes pelecani, Abra alba, Corbula rosea*, samt *Nephtys ciliata*.

I den ydre del af pollen paa ca. 12 meters dyb er *Amphidetus cordatus* ikke sjelden, de fundne exemplarer var udvoxne og kjønsmodne i august maaned.

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[1] *Mnemia (Bolina) norvegica.*, enkelte: *Beroe (Idya) cucumis.*

Mere sparsomt forekommende var følgende arter:

Abra nitida,
Macoma baltica,
Asterias rubens,
Strong. droebachiensis,
Cyprina islandica,
Virgularia mirabilis,
Buccinum undatum,
Cylichna sp,
Xylophaga dorsalis,
Teredo norvegica,
Pectinaria sp.,
Nassa reticulata,
Cultellus pelucidus,
Cardium edule,
Pagurus sp.,
Littorina littorea,
Ascidia sp,
Boreochiton marmoreus,
Saxicava pholadis,
Balanus porchatus,
Mytilus modiolus.

Alle disse arter fandtes levende paa barbunden. *Saxicava pholadis* fandtes i tomme skaller af *Cyprina islandica* og *Mytilus modiolus.* Udenpaa skallerne levede *Boreochiton marmoreus* og *Balanus porchatus.* Paa skaller af *Aporrhais* saaes talrige *Hydroider* og en enkelt liden *Aktinie.* Alle de nævnte dyreformer fra barbunden fandtes altid blot som fuldt udvoxne med undtagelse af *Nephtys ciliata, Asterias rubens* og *Strongylocentrotus droebachiensis* samt *Cyprina islandica,* dog heller ikke af disse fandtes ganske smaa individer. Af *Cyprina islandica* fandtes ingen fuldt udvoxne. *Ophioglypha lacertosa* var kjønsmoden i juli maaned, mange af de fundne exemplarer holdt da paa at afsætte sine æggekapsler, hvoraf endel fandtes paa træstykker og andre gjenstande (specielt 13. juli).

For at illustrere, hvad der normalt kan bringes op ved et enkelt træk skal her anføres efter journalen enkelte typiske træk:

24. august. Træk med skrabe i den inderste vig af Sandspollen, fra 4—2 meter i *Zostera*-regionen.

Rissostomia octogona . . . en mængde exemplarer.
Rissoa albella . . . . . endel „
Littorina littorea . . . . . enkelte smaa „
Asterias rubens, Radius 12 og 15 mm. enkelte „

Mytilus sp., uhyre mængde ganske smaa exemplarer.
Ostracoder. . . . . enkelte „

13. juli. Træk med finmasket vad i den inderste bugt paa mudderbunden fra 8—10 meter, op paa stranden.

Ophioglypha lacertosa	126	exemplarer.
„ *albida*.	20	„
Asterias rubens, 6—11 cms. Radius	3	„
Aporrhais pes pelecani, levende . . .	2	„
„ „ „ døde	18	„
Abra alba, levende . . . . . ca.	30	„
„ „ døde	110	„
Corbula rosea, levende	7	„
„ „ døde.	4	„
Littorina littorea „	3	„
Nassa reticulata „	1	„

17. juli. 2 træk med skrabe i den ydre del af Sandspollen paa ca. 12 meters dyb. Mudderbund.

Ophioglypha lacertosa	2	exemplarer.
„ *albida*.	1	„
Amphidetus cordatus, levende . . .	12	„
Asterias rubens, 14.5 cms. længde . .	1	„
Aporrhais pes pelecani, levende . .	26	„
„ „ „ døde . . .	72	„
Abra alba, levende.	40	„
„ „ døde	150	„
Corbula rosea „	4	„
Buccinum undatum, levende . . .	4	„
Turritella terebra, døde	4	„
Nassa reticulata „	1	„
Littorina littorea „	4	„
Boreochiton marmoreus, levende. .	5	„
Pectinaria sp., levende	1	„
„ „ døde	4	„

Nepthys ciliata, levende	2	exemplarer.
Cyprina islandica, levende	1	„
„ „ døde.	34	„
Mytilus modiolus, levende	1	„

Indholdet af de enkelte træk var ofte særdeles vexlende, hvilket tyder paa at de fleste arters forekomst er meget spredt, dog synes der idethele ikke at være nogen forskjel i faunaen paa mudderbunden i den indre og den ydre del af Sandspollen med undtagelse af, at *Amphidetus cordatus* blot fandtes i den ydre del og at *Ophioglypha lacertosa* og *albida* var talrigst i den indre del. *Nephtys ciliata* var undertiden talrig tilstede, saaledes fandtes i et enkelt træk 22 for det meste udvoxne individer. *Virgularia mirabilis* fandtes blot i den indre del af Sandspollen paa 10—12 meters dyb og blot en sjelden gang.

Næsten altid fandtes en hel del tomme skaller af mollusker i mudderet fra bunden. Skallerne var i regelen forenede og fyldt med mudder, undtagen *Cyprina*-skallerne, der som oftest var faldne fra hinanden. De tomme skaller tilhørte de samme arter, der fandtes levende, med undtagelse af *Macoma calcarea*, *Pecten septemradiatus* og *Turritella terebra*. Disse subfossile arter var forholdsvis sjeldne.

Af smaa og mikroskopiske dyr indeholder mudderet en stor mængde. En halv bøtte mudder fra 8—10 meters dyb siltes først gjennem sigtedug af 1 millimeters maskevidde for at fjerne alle grovere partikler, derpaa gjennem sigtedug af 0.5 millimeters maskevidde. Det residuum, der blev liggende paa den fineste sigtedug, udgjorde efter et løseligt skjøn 150 à 200 cm.^{3} Heri fandtes en hel mængde levende *Nematoder*, endel *Ostracoder*, *Gasteropoder*, *Annelider*, Insektlarver og *Thalamophorer*.

2. **Mudderbunden mellem Haa- og Graaøen.**

(ca. 100 meters dyb).

I den nævnte dybde findes et særdeles blødt, graat slam, der indeholder en hel del forraadnede vegetabilske substanser,

saasom *Fucus, Zostera,* træstykker, bark og løv, der er drevet ud fra grundt vand, af og til mindre stene, grus og sand samt i regelen en stor mængde lerrør af Annellider. Bundtemperaturen fandtes i juli maaned at være 7° C., medens temperaturen i overfladen var 20°.

Dyrelivet er særdeles ensartet. De almindeligste arter er:

Stichopus tremulus,
Ascidia obliqua,
Bolocera longicornis,
Pandalus borealis,
Clymene sp.,
Laetmonice filicornis,
Maldane biceps,
Pecten septemradiatus,
„ *abyssorum.*

Mere enkeltvis fandtes følgende arter:

Astropecten andromeda,
Archaster sp.,
Mesothuria interstitialis,
Ophioglypha albida,
Saxicava pholadis,
Scaphander puncto-stratius,
Crangon Allmanni,
Ponthophilus norvegicus,
Hippolyte securifrons,
„ *polaris,*
Nemertes sp.,
Philine sp.

Desuden fandtes enkelte exemplarer af *Molluscer* af 4—14 mms. længde, forskjellige fra de ovennævnte arter samt et par tomme skal af *Cyprina* og *Pectinaria.* De talrige rør af *Annellider* havde en tykkelse af fra 1—12 millimeter. De fineste rør var ofte beboede, medens de grovere, af en kaliber af mindst 3 millimeter meget sjelden husede *Annellider.* Af den groveste kaliber fandtes blot et par brudstykker.

En enkelt gang bemærkedes smaa *Crustace*-larver og *Nematoder* i mudderet, der altid indeholdt en stor mængde *Thalamophorer.*

Af fiske forekom følgende arter:

Gadus argenteus,
Merluccius vulgaris,
Motella sp.,
Drepanopsetta platessoides,
Pleuronectes cynoglossus,
m. fl.

Som prøve paa, hvad trawlen kunde fange, anføres her resultatet af 2 træk den 23. juni:

Stichopus tremulus	24	exemplarer.
Bolocera longicornis	8	„
Laetmonice filicornis	3	„
Ascidia obliqua	3	„
Maldane biceps	3	„
Clymene sp.	25	„
Pecten septemradiatus	11	„
„ *abyssorum*	27	„
Scaphander puncto-striatus	7	„
Crangon Allmanni	3	„
Pontophilus norvegicus	2	„
Hippolyte securifrons	4	„
„ *polaris*	1	„
Pandalus borealis	43	„
Gadus argenteus, 11.5 cm.	1	„
Merluccius vulgaris	1	„
Drepanopsetta platessoides	6	„
Pleuronectes cynoglossus, (10.5—30 cm.)	4	„

Holothurierne var for en stor del befængte med parasitiske Molluscer i tarmkanalen. Ved et træk indeholdt af 24 *Stichopus tremulus* de 11 parasiter. En *Holothurie* indeholdt mange, de fleste blot en eller nogle faa parasiter. Ved et andet træk indeholdt nogle *Holothurier* en, mange 6—8, en 20 parasiter i forskjellige udviklingstrin. Hver 4 *Holothurie* havde parasiter, i gjennemsnit kom 3—4 parasiter paa hver af disse. *Holothuriernes* tarmindhold var mørkt graat mudder.

3. **Mudderbunden mellem Drøbak og Hvidsten.**

Dybde: ca. 200 meter.

Paa denne lokalitet lykkedes blot 2 træk, som her hensigtsmæssigt anføres i sin helhed.

19. Juni. Træk med trawl paa ca. 200 meters dyb ved Hvidsten. Uhyre portion mudder af brunlig kulør, hvori mange rør af *Annellider*, forraadnende tangrester, slagger og smaasten, de sidste tildels med fastsiddende smaa *Molluscer* og *Ascidier*.

Pandalus borealis	25	exemplarer.
Bolocera longicornis	1	„
Stichopus tremulus	40	„
Pecten septemradiatus	4	„
Ascidia obliqua	14	„
Clymene sp.	mange	„

Desuden fandtes nogle tomme skal af *Cyprina islandica* og *Scaphander puncto-striatus*. *Holothurierne* var meget mindre end de paa 100 meter levende. Blot 5 eller 6 var befægte med parasitiske *Molluscer*. En *Holothurie* havde blot en, nogle 4 parasiter.

15. September. Træk med skrabe mellem Drøbak og Hvidsten. Dybde: ca. 200 meter. Omkring nettets nederste del var syet en finmasket pose for at hindre det løse mudder fra at sile ud under optrækningen.

Neaera obesa	1	exemplar.
Portlandia lucida	nogle	exemplarer.
Axinus Sarsi	mange	„
Saxicava pholadis	1	„
Pecten septemradiatus	enkelte	„
Nepthys ciliata	nogle	„
Trophonia plumosa	„	„
Terebellides strömii	„	„
Terebella sp.	„	„
Maldane sp.	„	„
Phascalosoma sp.	„	„
Munopsis typica	1	„
Antalis entalis	nogle	„

4. Sand- og fjeldbund med Laminarier (mellem Storskjær og Vestlandet[1]).

Langs Vestlandet strækker sig en temmelig betydelig sandafleiring bestaaende af fin mursand, hvori der paa et par steder er gravet meget dybt ind. Sandet indskibes i lægtere. I disse sandtag findes ialmindelighed ingen subfossiler, dog er der i et af sandtagene i en høide af ca. 6 meter over havspeilet et svagt fossilførende lag af grov sand og grus. Langs stranden ender sandafleiringerne i en høide af ca. 4 meter over havfladen i en næsten lodret styrtning. Lige under græstorven, der hænger ud over den øvre rand af denne styrtning, strækker der sig et stærkt fossilførende lag af ca. 30 cm.s mægtighed. De vigtigste subfossiler er her *Cyprina islandica, Cardium edule, Mya truncata.*

Styrtningen ender nedentil i en lav strand, dannet af rullestene, der i almindelighed varierer fra et menneskehoveds til en knytnæves størrelse. Her findes enkeltvis tomme skal af de ovennævnte *Mollusker.*

Længre ude, hvor bølgerne slaar over stranden, sidder en mængde *Gasteropoder* og *Balaner* (*Littorina littorea* og *Balanus porchatus*) paa stenene. Af *Gasteropoderne* er det for det meste blot udvoxede exemplarer, der ved lavvande sidder over vandspeilet. Langs stranden svømmer talrige individer af *Palaemon fabricii.* Paa stene ude i vandet sees en mængde exemplarer af *Littorina littorea* i alle størrelser. I almindelighed er de mere eller mindre graaagtige, blot enkelte har antaget en lysegul kulør, der er almindelig hos den forholdsvis sjeldne *L. obtusa.* Enkelte stene er aldeles bedækket af *Balanus porchatus* eller af *Mytilus edulis.* Tager man og vender en af de større stene, vil man i regelen se et mylder af smaa *Isopo-*

[1] Vestlandet er den gjængse betegnelse for Kristianiafjordens vestre bred.

der (*Iara marina*) og *Amphipode*-unger (*Gammarus locusta*), der hurtigt kryber afsted i alle retninger. Enkelte udvoxne *Amphipoder* (*G. locusta*) følger ogsaa med stenene op over vandfladen.

Lidt længre ude, paa ca. 1/2 meters dyb begynder blæretangen, der voxer i tætte tuer, kun af og til afbrudt af aabne partier med fin graa sand, hvor de eiendommelige forhøininger, der skyldes *Arenicola piscatorum*, af og til sees. Paa sanden sees ogsaa undertiden et enkelt større exemplar af *Asterias rubens*.

Lige ud for de omtalte sandtag arbeider en muddermaskine paa ganske grundt vand. I den fine sand, der faaes op af muddermaskinen forekommer blot enkeltvis større, afrundede stene samt tomme skal af *Mya arenaria* og *Cyprina islandica* i forskjellige størrelser, ligeledes af og til store eller middelstore exemplarer af *Nereis virens*. Selve muddermaskinen er under vandfladen tæt overgroet af blaaskjæl (*Mytilus edulis*) i alle størrelser saaledes at de mindste, et par millimeter store, sidder øverst, derefter følger større og større exemplarer og nederst kommer de største, der dog ikke er aldeles udvoxne.

Paa stene paa ganske grundt vand, i ca. 1/2 meters dybde, forekommer ogsaa af og til halvstore og smaa exemplarer af *Mytilus edulis* (ca. 0.2—4^{cm}).

Yngel saaes hele sommeren i mængdevis paa blæretang lige under havfladen, ligeledes en mængde smaa alger og *Sertularier* (*S. pumila*), hvilke ogsaa fandtes i stort antal paa *Chorda filum*, der paa et enkelt sted voxer sammen med *Zostera marina* paa ca. 2 meters dyb. Paa *Zostera* levede *Rissostomia octogona* og *Rissoa albella* i forskjellige udviklingstrin.

Paa ca. 4 meters dyb begynder *Laminarierne*. Blot *L. sachharina* voxer her og ofte i kjæmpemæssige exemplarer, som oftest tæt overgroet med mængder af *Membranipora* og *Spirorbis* samt enkeltvis af *Balanus balanoides* og *Planorbulina lobatula*.

En mængde ganske smaa individer af *Asterias rubens* saaes hele sommeren paa *Laminarierne*. Fra slutningen af juni til begyndelsen af august havde hovedmassen en radius af 1—1.5 millimeter og vexten syntes saaledes i dette tidsrum at have været umærkelig. Den 7. august noteredes følgende størrelser, beregnet efter individernes radius, hver prik betegner et exemplar.

mm	mm	mm
1	7 .	16
1.5	7.5	17 .
2	8 ..	18
2.5 ...	8.5	19
3	9 ..	20
3.5 .	9.5	21
4 .	10	22 .
4.5 .	11 .	
5	12 ..	30
5.5	13 .	
6 ...	14 .	
6.5 .	15 ..	40 .

Den 2. september fandtes individer af følgende størrelse:

Radius: mm		Radius: mm	
1	— nogle exemplarer	6	— mange exemplarer
2	— uhyre mængde	7	— nogle »
3	— » »	8	— » »
4	— » »	9	— » »
5	— » »	10	— et exemplar

Da disse optegnelser er gjort efter individer, som fandtes nogenlunde paa samme sted, maa man være berettiget til at slutte, at *Asterias*-yngelen paa dette sted i tidsrummet fra den 7. august til den 2. september var voxet fra 1 à 1.5 millimeter til 2—5 millimeter.

Yngletiden for *Asterias rubens* synes i Kristianiafjorden at være slutten af april eller begyndelsen af mai. Ialfald ynglede nogle exemplarer i akvarierne paa den biologiske station i slutningen af april.

Havbunden mellem Storskjær og Vestlandet kan karakteriseres som en jevn og ensartet sandbund, der fra Vestlandets flade rullestenskyst langsomt synker ned til en dybde af 12—14 meter, for derpaa ligesaa langsomt at hæve sig hist og her afbrudt af efterhaanden mer og mer udbredte partier af nedrasede klippestykker, indtil Storskjærs glat afskurede granitfjeld lidt efter lidt befries fra den løse sand og tilsidst kommer tilsyne over havfladen som en langstrakt afrundet holme.

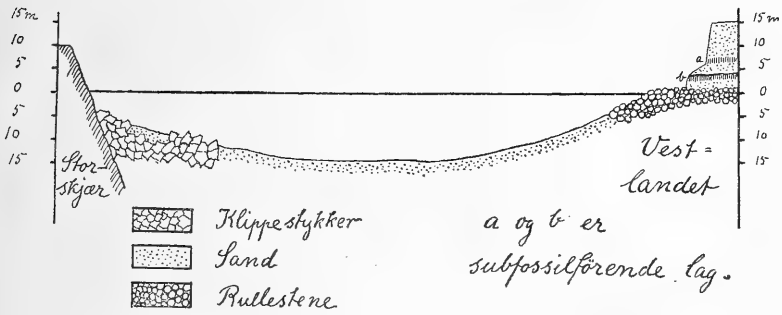

Fig. 3. Profil af sundet mellem Storskjær og Vestlandet.

Det mikroskopiske dyreliv, der fandtes ved hjælp af en til skraben fastbundet planktonhov, syntes paa hele strækningen mellem Storskjær og Vestlandet at være temmelig ensartet, og bestod af smaa *Annellider*, *Turbellarier*, *Gasteropoder*, *Crustaceer*, spec. *Ostracoder*, *Acariner*, Insektlarver, *Nematoder*, *Thalamophorer*, spec. *Planorbulina lobatula*.

I en bugt med fint sand, der ved ebbe næsten ligger tør, ved nordpynten af Storskjær, saaes talrige snevre huller i sanden, af 2—4 millimeters diameter. I hvert hul fandtes i en dybde af 5—15^{cm} i regelen et 3—10^{cm} langt exemplar af *Nereis*

virens. I sandet saaes ogsaa sandormens tuer og eiendommelige dobbeltaabninger, som skyldes *Mya arenaria,* dog blot enkeltvis. Nogle smaa exemplarer af *Arenicola piscatorum* og *Mya arenaria* fandtes, begge arter i ca. 30 centimeters dybde.

Som exempel paa, hvad skraben kunde bringe op, kan passende anføres følgende typiske træk:

10. juli. 3 træk med en let skrabe fra 8—3 meter langs Vestlandet. En mængde *Laminarier,* noget *Zostera* samt en hel del forraadnede plantedele, smaasten, grus og sand. *Laminarierne* var fastheftede til tomme skal af *Mytilus modiolus* og *Cyprina islandica.*

Mytilus modiolus, levende	3	exemplarer
„ „ tomme skal . . .	8	enkelte, 2 dobbelte
Cyprina islandica, „ „ . . .	4	„ 2 „
Saxicava pholadis, levende . . .	4	exemplarer
Anomia ephhippium, 1—3^{cm}, levende	12	„
Aporrhais pes pelecani, døde . . .	3	„
Nassa reticulata „ . . .	4	„
Boreochiton ruber	4	„
„ *marmoreus,*	5	„
Balanus porchatus, levende	4	„
„ „ døde	4	„
Ophioglypha albida	1	„
Strong. droebachiensis, store	2	„
„ „ ca. 2^{mm} . .	5	„
Asterias rubens, 17 og 28^{cm}	2	„
enkelte af 2^{cm}'s størrelse		
mange smaa, 3^{mm}, paa Laminarier		
Lepidonotus squamosus	1	„
Nereis pelagica	6	„
Alcyonium digitatum, smaa	4	„
„ „ middelstore .	1	„
Pagurus sp.	5	„

Desuden fandtes enkelte smaa exemplarer af *Mollusker* og *Annellider*, hørende til 2 eller 3 arter, forskjellige fra de forannævnte.

14. juli. 3 træk med skrabe fra 12—10 meter, sandbund.

Cyprina islandica, levende	1	exemplar
„ „	ca. 150	tomme skal
Mytilus modiolus	6	„ „
Saxicava pholadis, 2—3^{cm}, levende	7	exemplarer
„ *arctica* „ „	4	„
Anomia epphippium, 1—2^{cm}, levende	30	„
Cultellus pellucidus	et tomt skal (dobbelt)	
Gibbula cineraria, levende	7	exemplarer
Balanus porchatus „	5	„
Nassa reticulata „	2	„
Buccinum undatum „	3	„
Boreochiton ruber „	12	„
„ *marmoreus*	8	„
Pagurus sp.	3	„
Lepidonotus squamosus	3	„
Nereis pelagica	8	„
Styela rustica	7	„
Corella paralellogramma	3	„
Alcyonium digitatum	2	„
Strongylocentrotus droebachiensis, ca. 2^{cm}, levende	21	„
Asterias rubeus, 27^{cm}	1	„
„ „ ca. 2^{cm}	4	„
„ „ ca. 3^{mm}	mange paa *Laminarier*,	

hvorpaa ogsaa saaes en mængde *Spirorbis* og *Membranipora*. Skallerne af *Mytilus* og *Cyprina* var ofte overgroede af rør af *Pomatocerus triqueter*. Af denne *Annellide* fandtes mange exemplarer.

Hvor bunden bestaar af sand, indeholder den næsten overalt fra en dybde af 4 meter en stor mængde tomme skaller hovedsagelig af *Cyprina islandica*, men ogsaa delvis af andre *Mollusker*, saasom *Mytilus modiolus* og *edulis* samt *Mya truncata*. Skallerne af *Cyprina* og *Mya* har som oftest et meget gammelt præg. Disse *Mollusk*-skaller er af stor betydning for dyrelivet, thi en mængde dyr findes enten i eller paa skallerne eller paa de *Laminarier* og andre alger, der ofte voxer paa skallerne. I hvert *Cyprina*-skal fandtes i regelen flere, undertiden 4—5 skaller af *Saxicava pholadis* og *arctica* i forskjellige størrelser samt nogle exemplarer af *Nereis pelagica*. *Cyprina*-skallerne var ofte aldeles overgroede med *Serpula*-rør, saa blot en ganske liden aabning var tilbage, meget mindre end *Saxicavaerne*, der altid fandtes levende inde i de saaledes vel tillukkede *Cyprina*-skal. *Cyprina*-skallerne var desuden ogsaa i regelen halvt fyldt med mudder.

I og paa *Cyprina*-skal fandtes desuden følgende dyrearter:

Corella paralellogramma,
Styela rustica,
Boreochiton ruber,
„ *marmoreus,*
Lepidopleurus cinereus,
Tectura virginea,
Lepeta caeca,
Gibbula cineraria,
Balanus porchatus,
Anomia ephhippium,
Alcyonium digitatum,
Pomatocerus triqueter,
Lepidonotus squamosus,
Ophiopholis aculeata.

Meget almindelig forekommende var følgende arter.

Saxicava pholadis,
„ *arctica,*
Balanus porchatus,
Styela rustica,
Tectura virginea,
Lepeta calca,
Gibbula cineraria,
Pomatocerus triqueter,
Boreochiton marmoreus,
„ *ruber,*
Nereis pelagica,
Anomia ephhippium,
Strong. droebachiensis,
Asterias rubens,
Lepidonotus squamosus.

Mindre talrige var:

Mytilus edulis,
„ *modiolus,*
Aporrhais pes pelecani,
Buccinum undatum,
Alcyonium digitatum,
Nassa reticulata,
Lepidopleurus cinereus,
Corella paralellogramma,
Ciona intestinalis,
Pagurus sp.

Som sjeldne kan følgende former nævnes:

Ophioglypha albida,
Ophiopholis aculeata,
Cyprina islandica,
Laetmonice filicornis,
Littorina littorea,
Trochus sp.

5. Fjeldbund med uddøde koraller og alger.

(Drøbaksgrunden samt fjeldet nord for den biologiske station).

Drøbaksgrunden er en næsten kredsrund undersøisk fjeldknaus, der har sin basis paa den høideryg, der lidt nordenfor Drøbak strækker sig tvers over Kristianiafjorden. Denne høideryg, der i seilløbet ligger omtrent 40 meter under havspeilet, begrændses mod nord og syd af dyb paa ca. 100 meter. Drøbaksgrunden adskilles fra fastlandet ved en 20—30 meter dyb rende, dens top ligger omtrent 5 meter under havspeilet.

De regelmæssige strømninger i Kristianiafjorden, der er en følge af flod og ebbe, kan være meget voldsomme og viser sig især paa Drøbaksgrunden, hvor vandet undertiden fosser afsted som stryg i en bred elv og næsten umuliggjør skrabning.

Disse strømninger, der bringer friskt havvand med et rigt pelagisk dyre- og planteliv ind i fjorden, er af stor betydning for dyrs og planters trivsel.

Paa Drøbaksgrunden findes en mængde rød- og brunalger, specielt *Laminaria saccharina,* samt et rigt dyreliv. Afrundede stene og skal af Mollusker, der faaes op med skraben, er ofte aldeles overgroede med dyr og planter. Paa enkelte steder af grunden findes subfossile rester af en koral, *Oculina prolifera,* saaledes paa den nordvestlige skraaning i en dybde af 7—25 meter, samt paa den sydlige skraaning paa 20—40 meters dyb.

Undertiden kan man faa op koralstykker paa ca. 30cm's længde, men som regel er koralstokkene smuldret op i mindre stykker fra 1 til 5 centimers længde. Resterne af denne koral er yndede opholdssteder for en stor mængde dyr, der dels er fastvoxede paa korallens grene, dels lever mellem eller inde i de hule grene.

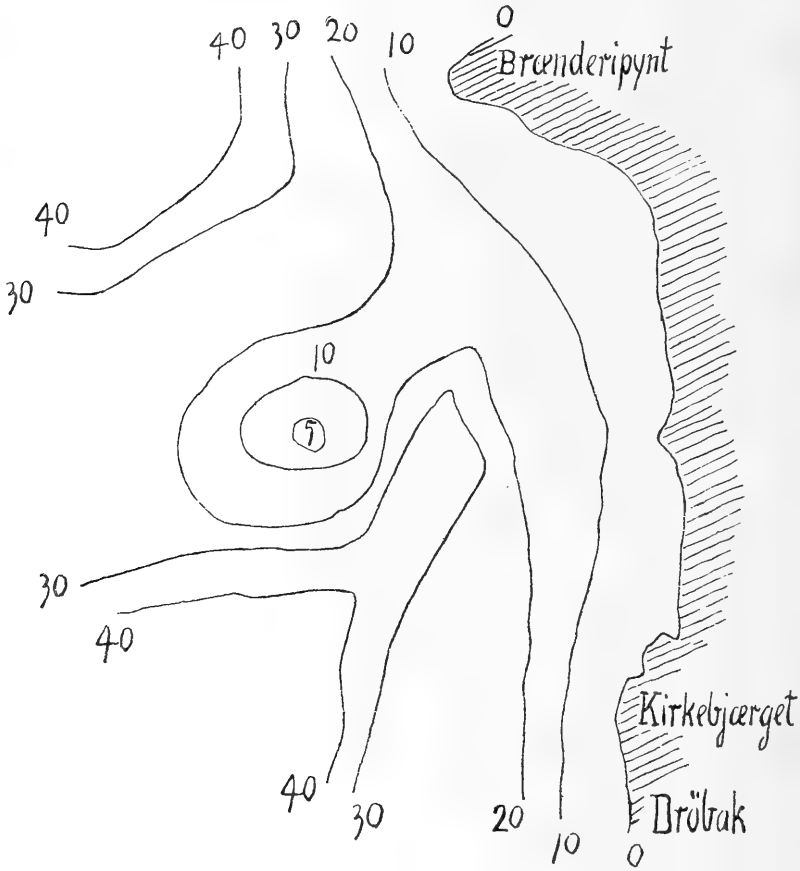

Fig. 4. Dybdekart over Drøbaksgrunden.

De almindeligste dyreformer paa Drøbaksgrunden er følgende:

Alcyonium digitatum,
Ophiopholis aculeata,
Saxicava pholadis,
„ *arctica,*
Strong. droebachiensis,
Asterias rubens,
Nereis pelagica.
Crania anomala,

Anomia ephhippium,
Styela rustica,
Lepidopleurus cinereus,
Balanus balanoides,
„ *porchatus,*
Boreochiton ruber,
„ *marmoreus,*
Tubularia larynx,
Halecium halecinum,
Plumularia pinnata,
Pomatocerus triqueter,
Membranipora sp.,
Spirorbis sp.

Mere sparsomt optrædende var følgende arter:

Leodice norvegica,
Lepidonotus squamosus,
Mytilus edulis,
„ *modiolus,*
„ *phaseolinus* (?),
Astarte sulcata,
Buccinum undatum,
Evdendrium rameum,
Campanularia verticillata,
Ascidia conchilega,
Ciona intestinalis,
Corella paralellogramma,
Ophiotrix fragilis.
Stichaster roseus,

Der fandtes ogsaa enkelte smaa *Aktinier, Nemertiner,* ganske smaa *Annellider, Crustaceer, Nematoder, Acariner, Thalamophorer* samt et enkelt exemplar af *Dendronotus arborescens,* af *Lima Loscombii* og af *Pecten tigrinus.* Inde i de hule koralstokke levede *Saxicava pholadis* og *arctica, Mytilus phaseolinus* (?), *Nereis pelagica* og enkelte *Nemertiner.* Mellem koralgrenene forekom *Ophiopholis aculeata* i talrig mængde. Det var ofte vanskeligt at faa disse dyrearter frem i uskadt stand, da korallerne maatte klippes itu stykke for stykke.

Korallerne var undertiden fuldstændig overgroede med rør af *Pomatocerus triqueter,* saa det ved første øiekast var vanskelig at se, hvilken gjenstand alle disse rør var fæstede til. *Asterias rubens* forekom i alle størrelser fra 3 millimeter til 40 centimeter. Den 18de august havde hovedmassen en længde af 3—6 millimeter.

Af de talrige skrabninger skal anføres følgende typiske træk:

17. august. Fra 15—5 meter paa den nordvestlige skraaning. 2 stykker koraller, hvert paa 30 centimeters længde og 10 centimeter i gjennemsnit.

Nereis pelagica	10	exemplarer
Leodice norvegica	3	„
Saxicava pholadis	7	„
„ *arctica*	2	„
Mytilus phaseolinus (?)	2	„
Lepidonotus squamosus	8	„
Strong. droebachiensis	15	„
Asterias rubens, 2—12^{cm}	6	„
Tubularia larynx	nogle	„
Plumularia pinnata	„	„
Campanularia verticillata . . .	„	„
Halecium halecinum	„	„
Aktinier	„	„
Ophiopholis aculeata	mange	„

17. august. 30—20 meter paa den nordvestlige skraaning. Uhyre mængde smaa løse stykker af koraller.

Ophiopholis aculeata	20	exemplarer
Nereis pelagica	17	„
Boreochiton ruber	10	„
„ *marmoreus*	7	„
Lepidopleurus cinereus	6	„
Anomia ephhippium	6	„
Balanus balanoides	30	„
Alcyonium digitatum	4	„
Plumularia pinnata	nogle	„
Tubularia larynx	„	„
Eudendrium rameum	„	„
Halecium halecinum	„	„
Gibbula cineraria	„	„

Lepeta caeca . . . . . nogle exemplarer
Astarte sulcata . . . . . et exemplar.

Desuden en mængde *Serpula (Pomatocerus triqueter)*, *Bryozoer*, *Spirorbis*, *Nematoder*, enkelte *Nemertiner* og *Thalamophorer*. Paa *Hydroiderne* var der et rigt liv af smaa *Crustaceer*, *Nematoder* og *Infusorier*.

Mellem den biologiske station og Drøbaksgrunden og adskilt fra den sidste ved en 30—40 meter dyb rende synker grunden langsomt udover til en dybde af ca. 20 meter. Her findes det samme dyreliv som paa Drøbaksgrunden med undtagelse af de dyreformer, der specielt er afhængige af koralerne. Inde ved land er der paa flere steder braadybt, idet fjeldet undertiden synker lodret ned til en dybde af 6 meter.

I blæretangen, der som et uafbrudt bælte gror langs fjeldet, lever umaadelige mængder af *Calliopus rathkii*, *Gammarus hyale* og *nilsonii*, *Idothea granulosa*, andre *Idothea*-arter samt *Copepoder*. I begyndelsen af september fandtes de forskjellige *Idothea*-arter blot som unger. Paa blæretangen saaes desuden en mængde forskjellige fastsiddende dyrearter, saasom *Spirorbis*, *Membranipora*, *Balanus balanoides*, *Mytilus edulis*, *Campanularia flexuosa*, *Clava squamata*, *Sertularia pumila*, samt *Spongier*. Nogle expl. af *Asterias rubens* og *S. droebachiensis* fandtes af og til.

I planktonhoven, der droges gjennem tangen fra 5—4 meters dyb, saaes enkelte smaa *Crustaceer*, specielt *Ostracoder*, *Anguillula sp.* og *Acariner*.

Langs fjeldet voxer i talrig mængde *Balanus balanoides* tildels indtil 1 fod over tanggrændsen og paa afstand sees disse dyrs skaller som et uafbrudt bælte med hvide pletter mod fjeldets mørke baggrund.

Søger man at komme til klarhed over de biologiske forhold i Kristianiafjorden, maa man først og fremst betænke, at denne fjord oprindelig har havt en langt større dybde end nu. De for-

andrede dybdeforhold synes at have været meget uheldige for mange dyrearter. Som bekjendt er den langs vor kyst levende koral *Oculina prolifera* omtrent uddød ved Drøbak. Enkelte *Thalamophorer* synes ogsaa at være uddøde. Andre dyreformer forekommer væsentlig blot som subfossile, saaledes *Cyprina islandica* og *Macoma calcarea.* Da disse sidste lever paa grundt vand, kan det formodentlig ikke være forandrede dybdeforhold, men andre omstændigheder, der holder paa at bevirke deres uddøen. *Cyprina islandica* findes subfossil dels i ringe dybde paa havbunden, dels paa land indtil en høide af 150 meter over havet. I Kristianiafjorden findes for tiden meget sjelden fuldvoxne exemplarer, derimod oftere smaa og middelstore individer.

Paa den anden side synes de omtalte dyrs uddøen at have bidraget til andre dyrs udbredelse. Thi netop tomme skaller af *Mollusker* og uddøde koralstokke er yndede tilholdssteder for mange dyr, ja endel dyrearter synes paa enkelte steder at være fuldstændig afhængige af de subfossile dyrelevningers forekomst. Undersøger man nemlig dyrelivet paa sandbunden ved Storskjær, vil man finde en hel del dyrearter, der ikke er skikkede til at leve paa løs bund, men udelukkende knyttede til de tomme *Mollusk*-skallers forekomst. Det samme er delvis tilfældet med mudderbunden i Sandspollen.

I saadanne indelukkede poller er strømningerne meget svage. Som følge deraf faar de talrige fine jordpartikler, der svæver om i vandet, tid til at bundfældes. Bunden i saadanne poller bestaar derfor af et blødt slik, der eftersom det afleires, dækker de gjenstande, der befinder sig paa bunden. Alle bunddyr befinder sig i en stadig kamp for ikke at kvæles af mudderet. Eftersom afleiringerne tiltager i mægtighed, hæves det niveau, hvorpaa dyrene lever. Man vil derfor paa dette løse mudder kun finde faa dyrelevninger sammen med de levende dyr. Naar man alligevel faar adskillige tomme *Mollusk*-skaller op med skraben, er dette et bevis paa, at denne trænger dybt ned i mudderet.

I strømhaarde fjorde vil der ialfald paa grundt vand ikke kunne foregaa nogen afleiring, idet de jordpartikler, der føres afsted med strømmen i alle vandlag, ikke faar tid til at afleires undtagen hvor gjenstande paa havbunden formaar at holde slammet tilbage. Saaledes vil man ofte kunne finde *Mollusk*-skaller mer eller mindre fyldte med et fint mudder af samme konsistens som i indelukkede poller. Paa grund af den stride strøm vil der paa sandbund med forholdsvis grundt vand i tidernes løb ophobe sig større eller mindre masser af skaller af *Mollusker*, eftersom disse dør. Desuden kan ogsaa endel af de mængder af skaller, man finder, være udskyllede af subfossilførende gruslag paa land. Ser man nemlig paa profilen gjennem den af mig undersøgte lokalitet ved Storskjær (se nærmere fig. 3 med forklaring), ligger det nær at tro, at der nedenfor første terrasse (ved b) paa fastlandet maa være fjernet en betydelig strækning af gruslagene langs fastlandets kyst (partiet nedenfor terrassen ved b paa profilet). Da nemlig det fossilførende lag b indeholder en stor mængde af samme sort subfossiler, som findes paa 6—12 meters dyb udenfor stranden, medens selve stranden er saagodtsom blottet for saadanne og er en typisk rullestensstrand, synes der at være rimelighed for, at al sand, grus og subfossile dyrelevninger, der engang har udgjort hovedmassen af den omtalte terrasses fortsættelse, maa være (af is eller havet selv) bragt ud paa dybet, medens de i eller under sand- og grusmassen liggende stene er blevet igjen og nu danner landets rullestenskyst.

Sammenligner man de 5 af mig undersøgte lokaliteter, vil man finde, at der, omend disse delvis kan have meget tilfælles i dyrelivets sammensætning, dog inden hver af dem raader saa mange forskjelligartede forhold, at hver enkelt af dem maa betragtes som et eget eiendommeligt omraade, der i biologisk henseende skarpt maa adskilles fra ethvert af de øvrige. Det dyreliv, der hersker paa ethvert af disse omraader maa med god grund kunne kaldes et fra de øvrige forskjelligartet ko-operativt samfund.

Denne forskjel i biologisk henseende er mest iøinefaldende mellem de lokaliteter, hvor forskjellen i dybde er størst. Man har saaledes paa den ene side mudderbunden paa 100 og 200 meters dyb og paa den anden side de omraader, hvor dybden er mindre end 20 meter. Men ogsaa inden enhver af de enkelte lokaliteter hersker der en dyb og gjennemgribende forskjel, der skyldes de naturlige forhold, som er raadende paa hvert enkelt sted.

Hvis man begynder med det grunde vand, vil man allerede fra den littorale region af se, hvilken indflydelse bundforholdene har paa dyre- og plantelivet. En sandet strand og en rullestenskyst er stadig udsat før at overskylles af bølgerne, der sætter sanden og stenene i bevægelse og hindrer dyr og planter i at faa fodfæste. Derfor er der altid langs saadanne let bevægelige kyster et bælte, hvor saagodtsom ingen alger kan gro og hvor dyrelivet er svagt udviklet. Og alligevel træffer man paa sanden ingen af de dyr, der kan trives paa rullestenene, med undtagelse af drivende og fritsvømmende dyr, som hører hjemme paa de langgrunde, solvarme strande uanseet bundens beskaffenhed.

Den faste klippekyst er derimod langs vandlinien bevoxet med et sammenhængende bælte med *Fucus,* hvor et rigt dyreliv kan trives. At hele dette intense dyreliv hører hjemme paa *Fucusen,* viser sig bedst derved, at de dyrearter, der findes i denne, naar den er dækket af sjøen, ogsaa sees i den, naar den ved ebbe er høit over vandspeilet.

Lidt nedenfor ebbegrændsen er det løse bundmateriale ikke saa udsat som i den littorale region for at sættes i bevægelse af bølgerne og strømningerne. Derfor begynder vegetationen først paa 0.5—1 meters dyb paa løs bund. Paa sandbund strækker *Zosteraen* sig som bølgende agre ud mod dybet, undertiden afbrudt af en enkelt *Fucus* fæstet til en sten. Paa rullestensbunden voxer *Fucus* tildels blandet med *Zostera* og *Chorda filum.* Den rene fjeldbund er lige fra havspeilet af dækket af

Fucus, der paa 2—4 meters dyb afløses af *Laminarie*-bæltet, dette igjen af rødalgerne. Vegetationen optræder altid i bugnende overflødighed, bare den kan faa fæste. Dette rige plantedække, der saaledes er karakteristisk for det grunde vand, har, som dr. PETERSEN fremhæver, en overordentlig stor betydning derved, at det saa at sige multiplicerer havbunden og giver plads og næring for et yderst rigt dyreliv, for størstedelen bestaaende af smaa og delvis mikroskopiske former. Lidt større dyreformer findes i regelen ikke paa tangen, da de paa grund af sin tyngde trækker tangen ned mod bunden. Det mindste, specielt det mikroskopiske dyreliv er rimeligvis det samme paa *Zostera* som paa *Fucus*. Vi finder saaledes et mylder af *Infusorier*, smaa *Crustaceer*, *Mytilus*-yngel samt flere *Rissoa*-arter paa alslags vegetation lige i havspeilet noget udenfor den nedre littorale grændse. Derimod er den store mængde af *Hydroider*, *Gammarider* og *Spongier* eiendommetig for *Fucus*. Helt ned til vegetationens nedre grændse er saavel *Fucus* som især *Laminarierne* og delvis rødalgerne og *Zosteraen* bevoxet med en stor mængde smaa dyrearter som *Hydroider*, *Serpulaer*, *Spirorbis*, *Bryozoer* og *Thalamophorer* samt ogsaa tilholdssted for *Nemertiner*, smaa *Annellider*, *Crustaceer* og andre dyr samt yngel, specielt af *Asterias*, *Strongylocentrotus*, *Annellider* etc.

Indtil en dybde af ca. 7 meter er mudderbunden bevoxet med et tæt bælte af *Zostera*, medens den udenfor denne dybde danner en svagt hældende vegetationsløs stette med forholdsvis fattigt dyreliv. Sandbunden samt især den faste fjeldbund udmærker sig ved et rigt planteliv, der i høi grad bidrager til at udvikle det bugnende dyreliv i det smaa, som ovenfor er skildret.

Paa mudderbunden paa 4—12 meters dyb (i Sandspollen) er *Coelenteraterne* paafaldende daarligt repræsenteret, idet blot en ganske enkelt *Alcyonium*[1], endel *Virgularier* samt nogle

[1] Her sigtes til de enkelte exemplarer, ikke til arter.

smaa *Hydroider* fandtes paa *Mollusk*-skaller. Det er ogsaa ganske rimeligt, at disse og andre fastsiddende dyr ikke kan trives i mudderbundens grumsede vand, men elsker de friske planktonrige strømme ude i fjorden. Desuden er der for faa gjenstande paa mudderbunden at voxe paa, idet de stene og *Mollusk*-skaller, der findes, oftest er mer eller mindre dækket af mudder. Ude paa sandbunden paa samme dyb (ved Storskjær) er derimod *Coelenteraterne* noget rigere tilstede, om de ogsaa her savner gunstige voxesteder, Den faste fjeldbund er *Coelenteraternes* hjem. Her udfolder de sig i sin fulde yppighed og danner hele undersøiske skove, der delvis dækker fjeldsiderne og danner buskadser paa stene og *Mollusk*-skaller. Drøbaksgrundens faste fjeld er derfor ved sin bugnende overflødighed af *Hydroider* og *Alkyonier* vidt forskjellig fra den løse bund.

Ophiuroiderne trives derimod udmærket baade paa mudderbund og paa fjeldbund, derimod er de ikke paa langt nær saa talrige paa sandbunden.

Slægten *Ophioglypha* er eneraadende paa mudderbunden, medens slægten *Ophiopholis* blot findes paa fjeldbund og delvis ogsaa i sandbundens *Mollusk*-skaller.

Echinoiderne forekommer nogenlunde talrigt overalt paa 4—12 meters dyb. Paa mudderbunden er *Amphidetus* talrigst, medens *Strongyglocentrotus* er den eneste slægt paa andenslags bund. *Asterias rubens* findes overalt, derimod mangler *Holothurierne* aldeles.

De øvrige dyregrupper findes omtrent i samme procentvise mængde overalt paa grundt vand. Dog er der i den indelukkede Sandspol andre arter end ude i den aabne fjord. Saaledes lever især *Nephtys, Abra, Aporrhais, Corbula* i mudderet, medens *Saxicava, Balanus, Styela, Boreochiton, Nereis* og andre slægter er talrig i den aabne fjord paa 4—12 meters dyb.

Paa større dyb bliver dyrelivet aldeles anderledes. Mudderbunden paa 100—200 meters dyb er *Holothuriernes* og de store *Aktiniers* hjem. Forøvrigt er flyndrer og ræger især almindelige paa 100 meter dybet, medens forskjellige *Vermes*-arter blot findes paa 200 meters dyb.

Anm. Naar der i de foregaaende fortegnelser over dyrearter ikke specielt er nævnt, at en dyreart er fundet i død tilstand, menes der, at den er fundet levende.

Figurforklaring.

Pl. II.

Fig. 1. Strandparti fra Sandspollen.
„ 2. Sandspollen. Aalehaandvadet drages.

Pl. III.

Fig. 3. Rullestenskyst. Vestlandet ved Drøbak.
„ 4. Fjeld med *Balaner* og indhugget vandstandsmærke, lidt nordenfor den biologiske station.

Trykt den 9de februar 1904.

Bryological notes on a trip in Norway

by

H. N. Dixon and **W. E. Nicholson**.

The mosses enumerated in the following list were collected during a short holiday in western Norway in the summer of 1900 between the 18th July, when we landed at Stavanger, and the 11th August, when we sailed for England from Bergen. From Stavanger we took the boat to Sand on the Sand fjord and followed the overland route to Odde on the Hardanger fjord through the beautiful Bratlandsdal and over the Horre pass. At Odde we rested for a few days and explored the neighbourhood, especially the valley leading to the Buar Brae and its terminal Moraine, leaving on the 24th July for Vik on the Eidfjord, whence we explored the sombre Simodal and the Maabødal up to the magnificent Vøringfos. From Vik we travelled by way of Ulvik and Vossevangen to Gudvangen on the narrow Nærøfjord, whence we took the boat to Lærdalsøren at the head of the Sognefjord, and after spending two days there we proceeded to Maristuen on the Fillefjeld, where we stayed for ten days and which we found to be a very fair centre for mosses. As one leaves the

coast in western Norway the climate and especially the rainfall becomes modified very rapidly; thus at the mouth of the Sognefjord there is an annual rainfall of about 80 inches, while on the Nærøfjord, 60 miles from the mouth, it is 31 inches, and at Lærdalsøren, 87 miles from the mouth, 16 inches only. We had hoped that Maristuen, which is only about 32 miles inland from Lærdalsøren, to some extent shared its climate, but since it rained more or less every day of our visit, we could not but think that we had met with an undue proportion of the rainfall. To the small annual rainfall, however, was probably due the fact that we noticed so few mosses growing upon the tree trunks at Maristuen: practically none of the common species of *Ulota* or *Orthotrichum* were observed, while nearer the coast the trunks are often thickly clothed with these mosses.

Although the genus *Grimmia* is generally more partial to siliceous rocks, we were very much struck by their extraordinary development on the dry limestone rocks near Lærdalsøren, where if we include *Coscinodon*, ten species were observed after a very cursory examination. On the moister parts of the same rocks *Barbula icmadophila*, Schp. was very abundant and was fruiting, though poorly, in places.

It should be added that the Sphagna of the district were not at all exhaustively studied.

We are much indebted to Dr. Hagen, Herr Kaalaas, Mm. Renauld and Cardot and Dr. Best for assistance in the identification of some of our specimens.

Sphagnum teres Ångst. Lower slopes of Suletind near Maristuen — a fuscous form with hardly a trace of green.

S. acutifolium Ehrh. var. *fuscum* Schp. Common about Maristuen, often growing with *Rubus chamæmorus*. *S. Lindbergii* Schp. Common in very wet ground near Maristuen.

Andreæa Rothii, W. & M. Var, *grimsulana* B. & S. Wet rocks on the Horre pass c. fr. Robust but scarcely so reddish

as the var. often is. *A. nivalis,* Hook. Horre pass and Maristuen, common in alpine streams.

Catharinea tenella, Røhl. Near Odde and Maristuen; the ♂ plant and old fruit. It was much commoner near Maristuen than *C. undulata.*

Polytrichum sexangulare, Ehrh. Common on the mountains near Maristuen and often with fruit: fruit small.

P. commune var. *perigoniale,* Schp. Bratlandsdal and Slutemyr near Maristuen. — The perichætial bracts and general habit of the variety well marked, but with the apical cell of the lamellæ distinctly grooved and in the Slutemyr plant almost typical.

Buxbaumia aphylla, L. Wood by the Laera, Maristuen, very sparingly.

Ditrichum tenuifolium, Ldb. Bleja and the Nærodal. The Bleja plant fruiting in company with *Dicranella secunda* Ldb., the Nærodal plant more robust, but sterile.

Rhabdoweisia denticulata, Brid. Odde c. fr., a rather robust form.

Cynodontium gracilescens, Schp. Maristuen, c. fr. Leaves sharply papillose; some of them rather obtusely pointed; the capsule pale, erect, striate on a straight seta. *C. torquescens,* Limp., and *C. fallax* Limp. both c. fr. These two species which are very closely allied to *C. gracilescens* were found very sparingly near Maristuen. Some doubts might be raised as to their value as species, but the specimens agree well with the description given by Limpricht. *C. laxirete,* (Dixon) Grebe, (*C. polycarpum* var. *lævifolium,* Hagen). Rocks in the valley below the Buar Brae, Odde c. fr.

Dicranella secunda, Ldb. Bleja, c. fr., not very common.

Dicranoweisia crispula, Ldb. Maabødal, Maristuen &c., c. fr.; very fine near Maristuen, often with the leaves markedly secund.

Campylopus atrovirens, De Not. Bratlandsdal, a very green form with the upper cells of the leaves rather shorter than usual.

Dicranodontium longirostre, B. & S. Wet rocks by the Laatefos: a very tall robust form quite eight inches high.

Dicranum fulvellum, Sm. Bleja c. fr., apparently rare near Maristuen. *D. hyperboreum*, C. M. Rocks by the Maristuenfos and on the summit of the Saddel c. fr., the plant from the Saddel poor, the other much finer. Our specimens differ very markedly from *D. fulvellum*, Sm. in the more robust habit larger leaves ending in a rigid, highly glistening bristle point, and much larger stouter capsule, deeply furrowed and pachydermatous. The calyptra also is large, inflated, and very glossy, and the spores which in *D. fulvellum* range from 15 to 20 μ., reach the size of 30 μ. in *D. hyperboreum*, averaging about 25 to 27 μ. The British plants referred to *Arctoa hyperborea* by the authors of the Bry. Eur. and other writers all belong to *D. fulvellum*. The confusion between the two has probably arisen for the most part from the description of the latter species in the Bry. Eur. and elsewhere, as having smooth capsules, whereas they are in reality always or nearly always more or less striate or furrowed.

D. elongatum, Schleich. Maabødal c. fr., Maristuen c. fr. Common and fruiting freely on rocks by the Maristuen fos. Var. *Sphagni* (Wahlen.) an attenuated form with the upper cells of the leaves more elongate.

D. fuscescens Turn. A form occurred on the Saddel with the cells more porous in the upper part of the leaf, which was almost smooth. *D. Bergeri*, Bland. Common in bogs, often sterile, but c. fr. at Slutemyr.

Grimmia apocarpa var. *alpicola* H. & T. Wet rocks Maristuen c. fr., well marked. Var. *gracilis* W. & M. Fine & well marked near Odde; nerve rough at the back. *G. conferta* Funck. Simodal, c. fr.: a small delicate form. *G. funalis*,

Schp.; with abundant fruit near Borgund, Lærdal. *G. torquata,* Hornsch.; Maristuen. not infrequent. *G. decipiens,* Ldb. Simodal, Maabødal &c, c. fr.; in smaller greyer more cushion-like tufts than *G. elatior. G. elatior,* B. & S. Maabødal & Lærdal c. fr. In large blackish spreading patches; very fine and abundant in the Maabødal.

G. Doniana, Smith. Type, and var. *sudetia* Wils. Rocks about Maristuen, c. fr.

G. anomala, Hpe. Loose stone walls at Seljestad, Eide, Vossevangen, Vinje and Stalheim; also on rocks near the Buar Brae; widely distributed in the district which we first visited, with a few capsules at Seljestad. The capsule is shortly cylindrical, smooth, irregularly wrinkled when dry; operculum with a long straight beak; peristome teeth bright orange-red, entire or slightly divided above, highly papillose in the upper three fourths; smoother below; spores · 0 10 to · 0 16 mm. Careful comparison of these capsules (the first discovered in Europe) with fruiting specimens of *G. Philibertiana,* E. G. Britton, Bull. Torr. Bot. Club, 18, 51, (1891) by European bryologists and by Mrs. Britton herself has established the identity of the two plants. *G. Philibertiana* must therefore be suppressed in favour of Hampe's name, published by Schimper (Syn; Ed. II) in 1876.

G. ovata, Schwæg.: and var. *cylindrica,* B. & S. Rocks Simodal, c. fr. Common. *G. commutata,* Hüb. Rocks by the Jordalsvand, Odde, c. fr. poor. Not uncommon in the Lærdal, but either sterile or with very poor fruit; a slender form of the ♂ plant with attenuated stems and short leaves occurred near Husum. *G. leucophæa,* Grev. Common in the Lærdal, fruit poor. *G. elongata,* Kaulf. Rocks near the summits of the mountains round Maristuen; hair points of the leaves very variable and sometimes almost absent; a form occurred low down near the old bridge below Maristuen, growing in yellowish tufts and the leaves having a rather larger more elongate and clearer areolation. Dr. Hagen writes that he has the same form

from other localities in Norway, Telemarken (st.) and Knutsteteø (c. fr.) and also from Styria, leg. Breidler; the plant may deserve varietal rank. *G. atrata,* Miel. On an outcrop of copper-bearing rocks about 3 Kilometers below Maristuen, growing in large blackish tufts, greener when young, with old capsules and immature fruit. *G. unicolor,* Hook. Lærdalsøren and Maabødal; in smaller denser blackish tufts.

Rhacomitrium ramulosum, Ldb. Rocks, Maristuen c. fr.; with short pale capsules and the leaves with the areolation longer throughout than in *R. heterostichum,* but variable.

Coscinodon cribrosus, Spr. Not uncommon in the Lærdal, occasionally fruiting.

Hedwigia ciliata, Ehrh. Var. *leucophæa,* Schp. Lærdalsøren and rocks near the old Bridge, Maristuen — Fairly well marked.

Pottia truncatula, Ldb., near Blaaflaten, Lærdal. Leaves of the type, but with the columella adherent to the lid, as in specimens which I have seen from N. America. Vide also Lesq. & James.

Desmatodon latifolius, B. & S. Not infrequent about Maristuen c. fr. Columella sometimes exserted after the fall of lid, but not *D. systylius* from which it is readily separated by the papillose areolation of the leaves (var. *brevicaulis,* Schp.).

Tortula aciphylla, Hartm. Seljestad, Maristuen &c. A *Tortula* also occurred at Maristuen with the lower portion only of the hair point bright red, which tended to connect *aciphylla* with *ruralis;* var. *mucronata,* Sendt.. Gudvangen; very like a form of *ruralis* without a hair point. *T. mucronifolia,* Schwgr. Wall near Husum, Lærdal, c. fr.

Barbula icmadophila, Schp. Maabødal sterile, Lærdal from Lærdalsøren to Maristuen on limestone rocks c. fr. and ♂ plant. Occurred sparingly at Maristuen, but quite abundantly near Lærdalsøren, where it was also fruiting. The fruit was rather poor having the appearance of being dried up by the

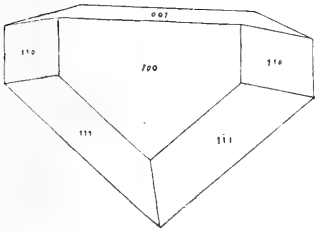

Fig. 1.

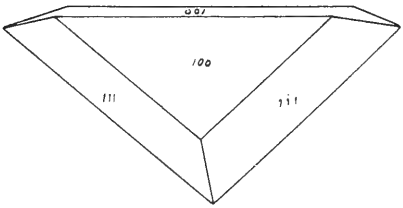

Fig. 2.

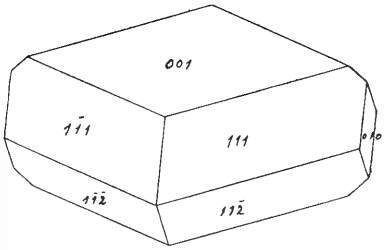

Fig. 3.

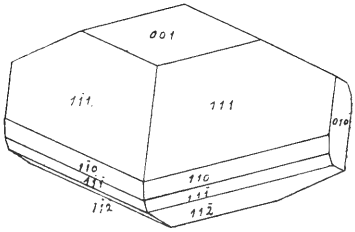

Fig. 4.

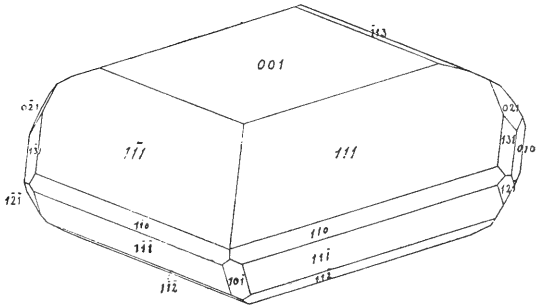

Fig. 5.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

unusual drought of the early summer. It was found in fruit at Lærdalsøren some years ago, by Dr. Bryhn.

Trichostomum fragile, Dixon. Widely distributed near Maristuen, but generally rather poor.

Encalypta brevicolla, Schp. By the old bridge Maristuen and other parts of the Lærdal c. fr., but rather poor. Maabødal. The papillosity of the back of the nerve, which can be seen with a pocket lens, may help to distinguish this species from *E. ciliata,* which it closely resembles in the field.

Zygodon lapponicus, B. & S. Rocks by the Laera, Maristuen c. fr. A tall form with an illusory resemblance to *Z. Mougeotii.*

Z. Mougeotii, B. & S. Maristuen &c. Always sterile.

Ulota Ludwigii, Brid.; near Eide, fruiting well on alders.

U. Drummondii, Brid. Nærodal &c. c. fr. Rather common near the coast, but rarer inland: only a single tuft was noticed near Maristuen. *U. curvifolia,* Brid. Maabødal and Maristuen, c. fr. Growing in loose blackish spreading tufts with shorter rounder and darker capsules than *U. Hutchinsiæ*; we noticed also that the tufts of this moss were usually coherent when gathered, while those of *U. Hutchinsiæ* somewhat readily fall apart.

Orthotrichum rupestre, Schleich. var. *Sehlmeyeri,* B. & S. Rocks near the Maristuen fos, c. fr. Generally growing away from the light; a rather well marked variety with the capsule somewhat exserted and a very hairy calyptra. A few long hairs also on the vaginula. *O. anomalum,* Hedw. Walls near Husum in the Lærdal c. fr. *O. Schubartianum,* Lor. Rocks about 5 kilometers below Maristuen c. fr. Habit of *O. cupulatum,* but with a hairy vaginula and a very rudimentary „Vorperistome". *O. alpestre,* Hornsch. Rocks, Maristuen. In very short bluish green tufts richly fruiting; the peristome teeth less markedly strate than I have seen them in Swiss specimens. *O. pallens,* Bruch. On ash near Vossevangen c. fr. *O. obtusifolium,* Schrad. Vossevangen. In small sterile tufts.

Oedipodium Griffithianum, SCHWGR. Near Eide and Ulvik in hollows in a rocky bank c. fr. and gemmæ.

Splachnum vasculosum, L. Slutemyr c. fr. not infrequent.

Tetraplodon mnioides, B. & S. Bleja and the Saddel near Maristuen. A small closely tufted form with a pale strongly urceolate capsule bearing some resemblance to that of *T. urceolatus.* This plant is a very marked form which Dr. HAGEN is disposed to recognize as identical with *T. paradoxus,* (R. BR.).[1]) It is apparently the plant referred to by SCHIMPER, Synopsis: Edit. 2 page 366 as *Splachnum urceolatum,* HEDW. *T. angustatus,* B. & S. Maabødal, c. fr. In large robust tufts.

Dissodon Frochlichianus, GREV. & ARN. Fissures of rocks and rather dry peaty ground on Bleja c. fr. *D. splachnoides,* GREV. & ARN. Stutemyr and other places near Maristuen, c. fr.

Meesia trichoides, SPR. var. *alpina,* BOULAY. Bleja, c. fr. the long narrow leaves of the variety fairly well marked.

Paludella squarrosa, BRID. Moorland bogs near Maristuen, common, but sterile.

Aulacomnium turgidum, SCHWGR. Peaty ground near Maristuen, generally sterile, but fruiting sparingly on Blejà. *A. palustre,* SCHWGR. var. *imbricatum,* B. & S. Slutemyr.

Timmia austriaca, HEDW. Simodal, Borgund and Maristuen. Fairly common, but generally rather poor; a few capsules near Maristuen. *T. bavarica,* HESSL. st. Lærdal.

Philonotis fontana, BRID. Wet rocks near Odde. Perigonial bracts sometimes pointed and sometimes obtuse, showing an approach to *Ph. cæspitosa,* WILS. A slender plant from Maristuenfos has the perigonial bracts often subacute & is probably the var. *gracilescens* SCHP., (Musci Galliæ No. 530) from which also *P. alpicola* Jur. is scarcely if at all distinct.

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[1]) Dr. Hagen also mentions that his *T pallidus* is the same thing as *T. paradoxus*, an identity overlooked at the time of description.

Webera acuminata, Schp. Stutedal c. fr. *W. longicolla*, Hedw. Eide and Maristuen c. fr. *W. gracilis*, De Not. Road side by the Horre Pass, Moraine of Buar Brae. Very fine and richly fruiting; bulbils scarce. *W. Ludwigii*, Schp. Bratlandsdal. Very variable in size and general appearance but completely sterile, Horre pass fruiting richly. *W. Schimperi*, C. M. Near the Maristuenfos. A very distinct and pretty species.

Bryum viride, Philib. Near the Maristuenfos. A species close to *B. arcticum*, R. Brown; identified by Dr. Hagen. *B. micans*, Kaur. A synoicous species with a shining capsule somewhat shape of that of *Leptobryum pyriforme* and rather obtuse peristome teeth and leaves with a longly excurrent nerve, which grew near the Maristuenfos in very small quantity has been doubtfully referred to this species. *B. purpurascens*, B. & S. Slutemyr, c. fr. Distinguished from *B. arcticum* etc. by the transversely striated peristome teeth as pointed out by Limpricht although according to Philibert this character is not constantly present in *B. purpurascens*. *B. Jørgensenii*, Kaurin, Slutedal. Another synoicous species belonging to the section Ptychostomum identified by Dr. Hagen. *B. cuspidatum*, Schp. Slutemyr, c. fr. *B. Sauteri*, B. & S. Buar Brae. c. fr.; identified by Dr. Hagen. *B. elegans*, Nees. Dry wall, Seljestad. *B. cirratum*, H. & H. Bratlandsdal, Buar Brae moraine, and rock crevices by the road between Vossevangen and Vinje c. fr. A form occurred on the Buar Brae moraine with a rather longer paler capsule. *B. pallescens*, Schleich. Blejà, c. fr. *B. alpinum*, Huds. A small greenish form having rather obtuse leaves with wide cells. Rocks, Sand; possibly an extreme form of the var. *viride*, Husn. *B. Mühlenbeckii*, B. & S. Sand, Bratlandsdal, Odde, Maristuen &c. Common and variable, but rare in fruit, Buar Brae c. fr. Maristuen, c. fr. (poor). A remarkable form was gathered at Sand and in the Bratlandsdal which is entirely green; in colouring analogous to the var. *viride* of *B. alpinum*. *B. claviger*, Kaurin. Rocks in streams; Buar

Brae; Laera near Maristuen; in small tufts on rocks occasionally overflowed by water; with somewhat the aspect of an aquatic form of *B. argenteum.*

Two more Brya, one collected between Husum and Borgund, the other on Blejà, Maristuen, are still *sub judice,* they are regarded by Dr. HAGEN as hitherto undescribed species.

Mnium affine, BLAND. Odde and Maristuen. Very fine but sterile. *M. orthorrhynchum,* B. & S. Maristuen, poor. *M. lycopodioides,* HOOK. Simodal and Maristuen; the Simodal plant had one capsule which is curved in the neck like that of *M. serratum* and has the cells of the exothecium much larger than they are in *M. orthorrhynchum,* as pointed out by the late Prof. PHILIBERT in his excellent study of the species in Rev. Bry.: 1895, p. 2. *M. medium,* B. & S. Near the Maristuenfos c. fr. The leaf cells are very distinctly collenchymatous and porous in these specimens.

M. spinosum, SCHWGR.: Simodal and Maristuen; fairly common, but sterile. *M. stellare,* REICH. Maristuen, under bushes of Betula nana. *M. Blyttii,* B. & S. Peaty ground under Salix &c. Blejà. This moss has a tendency to turn blue when bruised, like *M. stellare.* A single immature capsule was noticed. *M. hymenophylloides,* HÜBEN. Near the vein of copper below Maristuen and Blejà. When growing from the light the leaves have a marked tendency to appear distichous. *M. cinclidioides,* BLYTT. Maristuen, abundant, but sterile. *M. subglobosum,* B. & S. Maristuen c. fr.

Cinclidium subrotundum, LDB. Slutemyr, c. fr.

Fontinalis dalecarlica, B. & S. Stones in a stream near Vinje c. fr.

Dichelyma falcatum, MYRIN. Rocks by the Laera, Maristuen; fine and abundant with a few capsules mostly immature.

Neckera oligocarpa, B. & S. Rocks by the Laera, c. fr. The capsule is rather more exserted than in the figure in the Bry. Eur. It may be remarked that *N. oligocarpa* is regarded

by american bryologists as a var. of *N. pennata*. *N. pumila*, Hedw. Limestone rocks, Lærdalsøren; a rather robust form with numerous short deciduous branches with small acute leaves.

Homalia trichomanoides, Brid. Rocks, Lærdalsøren; a robust form with rather strongly nerved leaves showing some approach to *H. lusitanica*, Schp.

Leucodon sciuroides, Schwgr. var. *morensis*, B. & S. Rocks near Husum, Lærdal, c. fr.

Myurella julacea, B. & S. Lærdalsøren, c. fr. *M. apiculata*, B. & S. Maristuen, mostly in tufts of *Zygodon Mougeotii*.

Leskea nervosa, Myrin. Simodal, Maristuen &c.; on rocks and walls often bearing gemmæ on the apices of the smaller branches.

Anomodon attenuatus, Hüb. Rocks near the Buar Brae, poor and sterile.

Heterocladium dimorphum, B. & S. Slutedal.

Pseudoleskea patens, Limpr. Not infrequent near Odde c. fr. and more constant in its characters than *P. atrovirens*, B. & S. By the Old Road, Maristuen; Simodal.

Ptychodium decipiens, Limp. Rocks in a wood near the Breifond Hotel, Horre, c. fr. This specimen was submitted to Herr Kaalaas who confirmed the identification. The capsules unfortunately were very old with only fragments of the peristome left.

Thuidium Blandowii, B. & S. Damp wood by the Maristuenfos; fine but fruiting very sparingly. *Th. delicatulum*, Mitt. Birch wood, Blejà.

Lescuræa striata var. *saxicola*, B. & S. Rocks, Simodal, and several places near Maristuen. The Simodal plant and one gathering from Maristuen is more slender than usual with the branches less curved, approaching the type. Dr. Braithwaite indeed writes that he considers it to belong to the type.

Camptothecium nitens, Schp. Maristuen; rather poor & often mixed with other mosses.

Brachythecium Starkei, B. & S. Simodal. *B. glaciale*, B. & S. Blejà. c. fr. Rather variable. *B. reflexum*, B. & S. Rocks in woods, Odde and Maristuen c. fr. *B. populeum*, B. & S. var. *amœnum*. Rocks near Lærdalsøren.

Plagiothecium silesiacum, B. & S. Rotten pine trunk Eide c. fr. *P. striatellum*, Ldb. Rotten birch stumps, Eide. *P. denticulatum*, var. *obtusifolium*, H. & T., Blejà, c. fr. *P. Müllerianum*, Schp. Odde, Simodal &c. A few capsules in the Simodal. The moss was growing at Odde on the rotten stump of an alder *(Alnus incana)* in company with *P. latebricola*. *P. latebricola*, B. & S. Odde, c. fr. *P. piliferum*, B. & S.; Rocks below the Saddel, Maristuen.

Amblystegium Sprucei, B. & S. Cavern in the Simodal; a slender bright green form.

Hypnum fluitans (exannulatum) var. *brachydictyon*, Ren. A remakrable form of this plant occurred fruiting in the bog at Slutemyr. It was for the most part dioicous, but some fruiting stems bore ♂ flowers also. The leaves on the ♂ stems and on the branches of all the plants were short, shortly pointed and subobtuse, erect or nearly so (as in f. *orthophylla*, Ren., var. *orthophyllum*, Milde), and with scarcely any differentiation of the leaves from *H. pseudo-stramineum*, Müll, The lower leaves of the fertile stems were however falcate, and of the normal form and structure in the *exannulatum* group. Mons. Renauld thinks it may probably deserve varietal rank, and in that case suggests for it the name var. *Nicholsoni*.

H. incurvatum, Schrad. Near Husum, c. fr. *H. Patientiæ*, Ldb. Common in many places. *H. pratense*, Koch. Marshy ground, Blejà, rare. *H. revolutum*, Ldb. Blejà, rare; acumen of the leaves rather more serrate than in British specimens. *H. hamulosum*, B. & S. Not infrequent on rocks; also found on tree trunks in the Nærødal and at Maristuen. *H. badium*, Hart. This pretty and distinct species occurred in several places above Maristuen at an altitude of 4 to 5000 feet. *H. arcticum*.

SOMMER. Stream near Maristuen c. fr. *H. alpestre*, SW., steams near Maristuen. *H. Goulardi*, SCHP. Blejà, c. fr. Very distinct in the platter-edged margin of the leaves. *H. molle* var.: *Schimperianum*, SCHP. Blejà, c. fr., a very slender form. *H. dilatatum*, WILS. Stones in streams near Odde and other places c. fr. *H. ochraceum*, TURN. Vinje, c. fr. var.: *flaccidum*, MILDE. Stream in the Nærødal. *H. polare*, LDB. Sandy detritus by the stream in the Nærødal; a form with short julaceous branches and the leaves not at all secund. *H. Breidleri*, JUR. Wet sandy ground by the Lower Smedalsvand, Maristuen; an unsatisfactory plant betwen *H. cordifolium* and *H. giganteum*. These specimens are near to *H. cordifolium* in the areolation of the leaves. Specimens which I have examined from Carinthia show a closer approach to *H. giganteum*.

The following species and varieties are additions to Møller and Binstead's „List of Mosses collected in the neighbourhood of Maristuen" (Nyt Magazin for Naturvidenskaberne XXXI. II).

Sphagnum teres ÅNGSTR. Suletind.

Catharinea undulata W. & M. Maristuen, cfr.

Polytrichum commune var. perigoniale B. & S. Slutemyr, cfr.

Rhabdoweisia fugax B. & S. Old Bridge, cfr., a robust form.

Cynodontium fallax LIMPR. Maristuen, cfr.

Dicranella heteromalla SCHPR. Old bridge, a tall form.

Dicranum fulvellum SM. Bleja. cfr.

D. hyperboreum C. M. Maristuenfos, cfr. Saddel, cfr.

D. molle WILS. Suletind.

D. elongatum var. *Sphagni* (MÜHLENB.) Maristuen.

Campylopus flexuosus BRID. Maristuen.

Dicranodontium longirostre B. & S. Maristuen.

Grimmia elongata KAULF. Maristuen.

Gr. Doniana var. *sudetica* WILS. cfr. What appears to be a fairly well marked form of this var. was found near the „old bridge".

Hedwigia ciliata var. *leucophæa* B. & S. Near 'old bridge' cfr. Fairly good var.

Coscinodon cribrosus Spr. cfr. Old bridge.

Barbula icmadophila Schpr. Maristuen.

Zygodon Mougeotii B. & S. Maristuen.

Ulota Drummondii Brid. Maristuen. A single tuft only.

Orthotrichum rupestre var. *Sehlmeyeri* B. & S. Maristuenfos.

Tetraplodon paradoxus (B. Br.) Hagen. Bleja, cfr.

Meesia trichoides var. *alpina* Boul. Bleja, cfr.

Aulacomnium palustre var, *imbricatum* B. & S. Slutemyr.

Timmia austriaca Hedw. Maristuen. A few capsules found, but mostly barren.

Philonotis seriata Mitt. Old bridge.

Webera acuminata Schpr. Slutedal, cfr.

Webera Ludwigii Schp. Suletind and Saddel.

Webera Schimperi (C. M.) Schpr. Maristuenfos, cfr.

Bryum viride Philib. Maristuenfos, cfr.

[*B. micans* Kaur. Maristuenfos, cfr.].

B. purpurascens B. & S. Slutemyr, cfr.

B. Jörgensenii Kaur. Slutedal, cfr.

B. claviger Kaur. Old bridge.

Mnium affine var. *elatum* B. & S. Maristuenfos. Meadow near 'old bridge'.

M. lycopodioides Hook. Maristuen.

M. punctatum var. *elatum* Schpr. Maristuenfos, cfr.

Neckera oligocarpa B. & S. Maristuen, on rocks by the river, cfr.

Leucodon sciuroides Schwgr. Maristuen.

Heterocladium dimorphum B. & S. Slutedal.

Pseudoleskea patens Limpr. Old road, Maristuen, cfr.

P. radicosa Lesq. & James. Maristuen.

P. rigescens Lindb. Bleja, cfr.

Thuidium delicatulum Mitt. Bleja, in wood.

Brachythecium glaciale B. & S. Bleja, cfr.

B. albicans B. & S. Maristuen.

Eurhynchium prælongum var. *Stokesii* (TURN.) Maristuen.

Plagiothecium denticulatum var. *obtusifolium* H. & T. Bleja, cfr.

P. piliferum B. & S. Saddel, cfr.

Hypnum revolutum LINDB. Bleja.

H. arcticum SOMM. Maristuen, cfr.

H. Goulardi SCHPR. Bleja, cfr.

H. molle var. *Schimperianum* SCHPR. Bleja, cfr.

This list adds 41 species to the 240 recorded in the article above cited. Of the 26 Filefjeld species included in list, but not definitely recorded for the limited district around Maristuen worked by Miss MØLLER & the Rev. C. H. BINSTEAD, two, viz. *Cynodontium gracilescens* and *Andreæa nivalis* were verified by us within that area, so that 257 species have now been definitely recorded from the 48 square kilometres lying within the limits defined by them. It may be added that in our case, as with them, the weather was unpropitious for any careful examination of the higher grounds. Dr. G. N. BEST who has published a Revision of the N. American species of Pseudolekea (Bull. Torrey Bot. Club 27, May 1900) has paid much attention to the plants of the *atrovirens* group, and in the course of his investigation has studied the types of several of our European species. The result has been to elucidate several somewhat difficult points and to throw some welcome light on a very obscure group. What has come out most clearly is that under the term „*Pseudoleskea atrovirens* B. & S.“ have been grouped, and confused, a number of forms, some at least of which are clearly specifically distinct from one another. The first to be separated was the plant described as *Leskea? patens* by LINDBERG, (Soc. pro Fauna et Flora Fenn. 1880), subsequently defined and described by Limpricht as *Pseudoleskea patens* (LINDB.). This plant has proved to be widely distributed over the European and North

American continents, and it transpires that it was the original of the *H. atrovirens* Dicks., and the plants usually passing as *Ps. atrovirens* among European Bryologists belong to a quite distinct species (or group of species). Dr. BEST therefore following the law of 'specific' priority retains the name of *P. atrovirens* for the plant to which Lindberg gave the name *patens*; but the accuracy may be questioned of citing the figure in the Bry. Eur. as the authoritv for the name „Pseudoleskea atrovirens (DICKS) Bryol. Eur. 5: 2. pl. 477, 1852". It appears evident that some at least of the figures there given (e. g. 1,3) do not represent Dickson's type, i. e., *Ps. patens* LIMPR,, and that the citation should at least be limited by „*pro parte*". However that may be, the limits of the original *H. atrovirens* DICKSON (*Ps. patens* LIMPR.) are clearly enough defined and easily understood. This species however represents but a small proportion of the European & American plants that have until recently passed under the name of *P. atrovirens*, and the more difficult task arises how to deal with the remainder. The most usual European form, such as that found on Ben Lawers and other Scotch mountains in company with *Ps. patens* LIMPR. and more frequently in Scandinavia & other continental countries, has not been found (in its typical form at least) in North America, and it has not therefore, unfortunately for us, fallen to the lot of Dr. BEST to investigate this plant fully, nor to point out the distinctions between it and others of the group with the same minuteness that he has applied to the description of the North American forms. He suggests however that an examination of the type of *Leskea incurvata* HEDW. may probably show its identity with the above plant and settle the question of the earliest specific name.

In addition to this typical or at any rate common plant there are certain forms differing in more or less important points, as to which opinions may vary whether they should hold specific rank, but at any rate forming groups separated off from

one another and from the type by a fairly well marked *tout ensemble* of characters. Two of these at least, which find names in Dr. BEST's Revision as *P. radicosa* (MITT.) LESQ. & JAMES, and *P. rigescens* (WILS.) LINDB. (= *Ps. stenophylla* REN. & CARD.), are European and Scandinavian plants, both of which we gathered during our visit, and it is principally in connection with these and to draw the attention of European bryologists to them, that these remarks have been made.

P. radicosa LESQ. & JAMES differs from the typical European plant in the paler, brighter green colour, often yellowish green, seldom blackish, the more robust habit, larger less falcate leaves and branches, and the larger, more pellucid cells, much less strongly papillose and frequently practically smooth. I have little doubt, from an examination of the leaves of the type specimen of *Leskea brachyclados* SCHWGR. from Herb. Boissier, a slide of which was kindly lent me by Dr. BEST, and from his description of the plant, that he is quite justified in concluding that Schwaegrichen's plant and *H. radicosum* MITT. (*Ps. radicosa* LESQ. & JAMES) are practically identical. The plant which LIMPRICHT describes as *P. atrovirens* var. *brachyclados* Dr. BEST considers to be a different plant from Schwaegrichen's.

Ps. rigescens LINDB. is allied to and perhaps connected with *P. radicosa*, but is on an altogether smaller scale. The whole plant is more slender, and the leaves are not only smaller but distinctly narrower in outline with a longer acumen, the cell structure similar, the capsule smaller, suberect and almost straight, the segments of the inner peristome narrow linear instead of oblong-lanceolate as in *Ps. radicosa*.

We gathered *Ps. radicosa* in three localities, viz. fruiting on a stone wall by the roadside at Seljestad, and also near the Maristuen Hotel; and sterile on boulders below the Buarbrae glacier, Jordal, near Odde. Specimens from the first named locality have been submitted to Dr. BEST, who while admitting our plant to be identical with the American *P. radicosa*, points

out that it differs from the ordinary form of that species in being more rigid with straighter leaves more abruptly and more finely acuminate with shorter and usually somewhat wider cells, and comes close to his var. *compacta* of that species. Mons. Cardot writes that be possesses *P. radicosa,* identical with the American plant, from the Pyrenees. The recorded distribution of *Leskea brachyclados* Schwgr. (as *P. atrovirens* var. *brachyclados)* must no doubt be accepted with some hesitation, as other forms of the group have no doubt passed under this name.

Ps. rigescens Lindb. or *P. stenophylla* Ren. & Card. was gathered twice on rocks on the side of Bleja, Maristuen, at 4000—5000 ft., cfr. Dr. Best confirms the identification, remarking that it only differs from the type in its broader endostomial band and somewhat stouter leaves.

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Beitrag zur Schmetterlingsfauna Norwegens.

III.

Von

Embr. Strand.

Indem ich hiermit meinen lepidopterologischen Collegen den dritten Theil gegenwärtiger Arbeit übergebe, bemerke ich, dass derselbe, der das im Jahre 1902 gesammelte Material behandelt, ein Beitrag zur Fauna des *südlichen* Norwegens ist, während die zwei ersten Theile sich hauptsächlich mit arktischen Arten beschäftigten. Es ist jedoch nicht meine *ganze* Ausbeute von 1902, die hier besprochen wird; wegen Mangels an Zeit habe ich nämlich vorläufig einen grossen Theil der schwierigeren Gruppen unbearbeitet lassen müssen; so ist meine Ausbeute an Coleophoren, Elachisten, Nepticulen u. m. a. ganz oder wenigstens grösstentheils hier nicht mitgenommen worden. Darüber werde ich hoffentlich bei einer anderen Gelegenheit berichten können. Aus demselben Grunde, Zeitmangel, habe ich bei der Bearbeitung der „Macros“ mich oft mit dem Bestimmen der *Art* begnügen müssen, ohne den eventuell vorliegenden Varietäten und Aberrationen besondere Untersuchungen zu widmen. — Wie zuvor, erinnere ich noch daran, dass das lepidopterologische Material nur einen Theil meiner Sammelausbeute bildet; wegen des Sammelns auch von anderen Arthropoden habe ich den Nachtfang so ziemlich ganz vernachlässigen müssen, wess-

halb besonders die Nachtfalter spärlich in meinem Verzeichniss vertreten sind. Besondere Aufmerksamkeit habe ich jetzt wie zuvor den „Microlepidopteren“ gewidmet.

Die Localitäten, wo gesammelt wurde, liegen wie gesagt alle im südlichen Norwegen und zwar ungefähr bei 59° n. B.; nur Norefjeld ist ein wenig nördlich vom 60sten Breitengrad gelegen. Es wurde gesammelt:

In *Smaalenenes* Amt: Bei *Fredrikstad* 23.—27. April und 15.—17. Mai.

Auf *Hvalöerne* bei Bölingshavn (Kirkeöen) 17.—22. Mai, bei Skibstadsand (Asmal) 31. Mai—7. Juni.

In *Lister und Mandals* Amt: Bei *Sireosen* 26. Juni—1. Juli und 12.—17. Juli.

In *Siredal* 1.—12. Juli.

In *Stavanger* Amt: Bei *Tou* 18.—20. Juli.

In *Erfjord* 20. Juli—7. August.

In *Nedenæs* Amt: Bei *Ose* (Austad in Sætersdalen) 10.—18. August und 23.—24. August.

Bei *Hægstöil* (eine ziemlich hoch im Gebirge gelegene Sennhütte in Austad in Sætersdalen) 18.—23. August.

In *Buskeruds* Amt: Bei *Norefjeld* (theils im Gebirge overhalb der Waldgrenze, theils bei Sandumsæter in der Nadelholzregion) 29. August—6. September.

Bei der Ausarbeitung vorliegender Abhandlung bin ich nach demselben Plane wie früher vorgegangen. Zuerst ein Verzeichniss sämmtlicher gesammelten Arten (wo ich Arten, die nur beobachtet, nicht gefangen, wurden, mitgenommen habe, ist darauf ausdrücklich aufmerksam gemacht worden), dann Bemerkungen über die interessanteren Arten und zuletzt eine Liste der citirten Litteratur, worauf im Texte durch beigefügte Zahlen jedesmal hingewiesen wird.

Kristiania, März 1903.

A. Verzeichniss der beobachteten Arten.

	Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Pieris Schrk.									
1. P. brassicae L.	.	.	.	.	+	+	+		
2. P. napi L.	.	+							
Aporia Hb.									
3. A. crataegi L.	.	.	+	+					
Colias F.									
4. C. palaeno L.	.	.	.	+[1]	.	.	+		
Gonepteryx Leach.									
5. G. rhamni L.	+	+	+	.	.	.	+	.	+
Parnassius Latr.									
6. P. apollo L.	.	.	.	.	.	.	+		
Vanessa F.									
7. V. urticae L.	+	+	.	.	.	.	+	.	+
8. V. antiopa L.	+	+							
Melitaea F.									
9. M. athalia Rott.	.	.	.	+					
Argynnis F.									
10. A. selene Schiff.	.	.	+	+	.	.	+		
11. A. euphrosyne L.	.	.	.	+	.	.	.	+	
12. A. pales Schiff.	.	.	.	.	.	.	.	.	+
13. A. arsilache Esp.	.	.	+	.	.	.	.	+	+
14. A. ino Rott.[3]	.	.	+	.	.	.	+	+	
15. A. adippe L.[2]	.	.	+	.	.	.	+		
16. A. niobe L. c. v. eris Meig.	.	.	.	.	.	.	+		
17. A. aglaja L.	.	.	+	.	+	+	+	+	

[1] Nur gesehen, nicht gefangen.

[2] Selten, indem nur je 2 Stück gefangen wurden, während *niobe* bei Ose sehr häufig war.

[3] Sehr häufig bei Hægstöil, bei Sireosen nur ein Stück.

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
18. A. lathonia L.	.	+	.	.	.	+			
19. A. paphia L.	.	.	.	.	.	.	+		
Erebia Dalm.									
20. E. lappona Esp.[1]	.	.	.	.	.	+			
21. E. ligea L.	.	.	.	.	.	.	+	+	+
Pararge Hb.									
22. P. hiera F.	.	.	+						
23. P. maera L.	.	.	+	.	+	+	+		
Epinephele Hb.									
24. E. jurtina L.	.	.	+	.	+				
Coenonympha Hb.									
25. C. pamphilus L.	.	.	+	+	+	+	+	.	+
ab. biocellata Strand n.ab.	.	.	.	.	.	+			
ab. caeca Strand n.ab.	.	.	+						
Callophrys Billb.									
26. C. rubi L.	+	+	+	+					
Chrysophanus Hb.									
27. Ch. phlaeas L.	.	+	.	+	+	.	+	.	+
f. coeruleopuncta Strand	.	+	.	.	.	+	.		
28. Ch. virgaureae L.	.	.	+	.	.	.	+	+	
Lycaena F.									
29. L. argus L.	.	.	+	+	+	.	+		
30. L. argyrognomon Bergstr.	.	.	+	+	+	+	+	+	+
31. L. optilete Kn.	.	.	+	.	.	.	.	.	+
32. L. semiargus Rott.	.	.	+						
33. L. icarus Rott.	.	.	.	.	.	.	+		
Cyaniris Dalm.									
34. C. argiolus L.	.	+	+	+					

[1] Nur gesehen, nicht gefangen.

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Augiades Hb.									
35. A. comma L.	.	.	.	.	.	.	+	+	
36. A. sylvanus Esp.	.	.	+	.	.	.	+		
Hesperia F.									
37. H. malvae L.	+	+	+	+	.	.	+		
Thanaos B.									
33. Th. tages L.	.	+	+						
Mimas Hb. (Dilina Dalm.)									
39. M. tiliae L. ab. maculata Mütz. (Wllgr.)	.	.	+						
Choerocampa Dp. (Chaerocampa aut.)									
40. Ch. elpenor L.	[1] +								
Hemaris Dalm.									
41. H. fuciformis L.	.	+							
Lophopteryx Stph.									
42. L. camelina L.	.	.	.	+					
Pygaera O.									
43. P. pigra Hfn.	.	.	+						
Eriogaster Germ.									
44. E. lanestris L.	.	.	.	[1] +					
Lasiocampa Schrk.									
45. L. quercus L.	.	.	+						
Macrothylacia Rbr.									
46. M. rubi L.	.	.	+						
Drepana Schrk.									
47. D. falcataria L.	.	.	.	+					

[1] Nur eine Puppe gefunden.

	Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Acronycta O.									
48. A. euphorbiae F. v. obscura Strøm	.	.	.	.	.	+			
49. A. auricoma F.	.	.	.	.	.	.	.	+	
Agrotis O.									
50. A. strigula Thbg.	.	.	+	+					
51. A. augur F.	.	.	.	.	.	+			
52. A. nigricans L.	.	.	.	.	.	.	.	+	
53. A. primulae Esp. v. conflua Tr.	.	.	+	.	.	+			
54. A. hyperborea Zett. v. norvegica Strand n. v.	.	.	.	.	.	+	.	+	
Charaeas Stph.									
55. Ch. graminis L.	.	.	.	.	.	.	+		
Hadena Schrk.									
56. H. gemmea Tr. . . . Eidskogen									
57. H. lateritia Hfn.[1]	.	.	.	.	.	+	+		
Dasypolia Gn.									
58. D. templi Thbg.	+								
Caradrina Hb.									
59. C. quadripunctata L.	.	.	.	+	.	+			
Xanthia O.									
60. X. lutea Strøm . . . . Eidskogen									
Anarta Hb.									
61. A. myrtilli L.	.	+	+	+					
Plusia O.									
62. P. interrogationis L.	.	.	.	.	.	+			
Prothymnia Hb.									
63. P. viridaria Cl. ab. modesta Car.	.	.	.	+					
Bomolocha Hb.									
64. B. fontis Thbg.	.	.	+						

[1] Bei Ose wurde nur ein todtes Stück gefunden.

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Hypena Schrk.									
65. H. proboscidalis *L.*	.	.	.	.	.	.	+		
Cymatophora Tr.									
66. C. duplaris L.	.	.	.	.	+	.	.	.	+
Nemoria Hb.									
67. N. viridata L.	.	+							
Thalera Hb.									
68. Th. putata L.	.	+	+	+					
Acidalia Tr.									
69. A. incanata L.	.	.	.	.	+	+	+		
60. A. fumata Stph.	.	.	+	+					
71. A. bisetata Hfn.	.	.	.	.	+				
72. A. inornata Hw.	.	.	.	.	+		+		
73. A. remutaria Hb.	.	.	+	+					
Ortholitha Hb.									
74. O. limitata Sc.	.	.	+	.	.	.	+		
Anaitis Dp.									
75. A. paludata Thbg.	.	.	.	.	.	.	.	+	+
76. A. plagiata L.	.		.	+	.	.	+	.	
Lobophora Curt.									
77. L. carpinata Bkh.	+								
Lygris Hb.									
78. L. populata L.	.	.	.	.	.	.	+	+	+
ab. musauaria Frr.	.	.	.	.	.	.	.	.	+
Larentia Tr.									
79. L. juniperata L [1]									
80. L. taeniata Stph.	.	.	.	.	.	+	+		
81. L. truncata Hfn.	.	.	.	.	.	+	+		

[1] Todte Exemplare Ende Decbr. in Aal gefunden.

		Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Exfjord	Ose	Hægstöil	Norefjeld
82.	L. munitata Hb.	.	.	.	.	.	+			
83.	L. olivata Schiff.	.	.	.	.	.	+			
84.	L. viridaria F.	.	.	.	.	.	+			
85.	L. didymata L.	.	.	.	.	.	.	.	.	+
86.	L. cambrica Curt.	.	.	.	.	.	+			
87.	L. montanata Schiff.	.	.	+	+	.	.	+	.	+
88.	L. quadrifasciaria Cl.	.	.	.	.	.	.	+		
89.	L. ferrugata Cl. ab. spadicearia Bkh.	.	.	.	+					
90.	L. unidentaria Hw.	.	+							
91.	L. caesiata Lang v. norvegica Strand	.	.	+	.	.	+	+	+	+
92.	L. sociata Bkh.	.	.	.	.	.	+	+		
93.	L. hastata L.	.	.	+						
94.	L. minorata Tr.	.	.	.	.	.	+			
95.	L. albulata Schiff. v. dissoluta Strand	.	.	+	+					
96.	L. bilineata L.	.		.	+	+	+			
97.	L. sordidata F. c. ab. infuscata Stgr., ab. fuscoundata Don. et ab. constricta Strand n. ab.	.	.	.	.	.	.	.	.	+
	Tephroclystia Hb.									
98.	T. venosata F.	.	.	.	+	.	.	+		
99.	T. pusillata F.	.	+							
100.	T. subfulvata Hw.	.	.	.	.	.	.	+		
101.	T. nanata Hb.	.	.	+	+					
102.	T. plumbeolata Hw.	.	.	+	+					
103.	T. satyrata Hb.	.	.	+	+					
104.	T. helveticaria B.	.	.	.	+					
105.	T. vulgata Hw.	.	+	.	+					
106.	T. conterminata Z.	.	+							
	Chloroclystis Hb.									
107.	Ch. rectangulata L. ab. nigrosericeata Hw.	.	.	.	+					

	Fredrikstad	Hvaløerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Abraxas Leach.									
108. A. marginata L.	.	.	+	+					
f. naevaria Hb., ab. pollutaria Hb., ab. conflua Strand	.	.	.	+					
Deilinia Hb.									
109. D. pusaria L.	.	.	+	+	+	+	+		
110. D. exanthemata Sc.	.	.	.	+	.	.	+		
Numeria Dup.									
111. N. pulveraria L.	.	.	.	+					
Metrocampa Latr.									
112. M. margaritata L.	.	.	.	.	.	+	+		
Gonodontis Hb.									
113. G. bidentata Cl.	.	.	.	+					
Opisthograptis Hb.									
114. O. luteolata L.	.	.	.	+					
Semiothisa Hb.									
115. S. liturata Cl.	.	.	+						
Boarmia Tr.									
116. B. punctularia Hb.	.	+							
117. B. repandata L.	.	.	+	+	.	+	+		
Gnophos Tr.									
118. G. obscuraria Hb. ab. bivinctata Fuchs	.	.	+						
119. G. myrtillata Thbg.	.	.	.	.	.	.	+		
ab. anastomosis Strand n. ab.	.	.	+						
Pygmaena B.									
120. P. fusca Thbg.	.	.	.	.	.	+	.	+	+
ab. destrigata Strand n. ab.	.	.	.	.	.	.	.	+	
ab. unistrigata Strand n. ab	.	.	.	.	.	.	.	.	+

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Ematurga Ld.									
121. E. atomaria L.	+	+	+	+					
Bupalus Leach.									
122. B. piniarius L.	.	+	+	+					
Thamnonoma Ld.									
123. Th. brunneata Thbg.	.	.	+	.	.	+	+	+	+
Phasiane Dp.									
124. Ph. petraria Hb.	.	+							
Scodiona B.									
125. S. fagaria Thbg.	.	+							
Sarrothripus Curt.									
126. S. revayana Sc. v. degenerana Hb.	.	+							
Phragmatobia Stph.									
127. Ph. fuliginosa L. v. borealis Stgr.	.	+							
Parasemia Hb.									
128. P. plantaginis L.	.	.	.	+					
Diacrisia Hb.									
129. D. sanio L.	.	.	+	+					
Arctia Schrk.									
130. A. caja L.[1]	.	.	.	.	+				
Endrosa Hb.									
131. E. irrorella Cl.	.	.	+	+	.	.	.	+[2]	
Lithosia F.									
132. L. lurideola Zinck.	.	.	.	.	.	+	+		
Zygaena F.									
133. Z. exulans Hochw. & Reiner	.	.	.	.	.	.	.	.	+
v. vanadis Dalm.	.	.	.	.	.	.	.	.	+

[1] Nur gesehen, nicht gefangen.
[2] Nur ein todtes Exemplar gefunden.

	Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Ino Leach.									
134. I. statices L.	.	.	+	+	.	.	+		
Acanthopsyche Heyl.									
135. A. opacella H. S.[1]	.	.	.	.	.	+			
Pachytelia Westw.									
136. P. unicolor Hfn. s. villosella O.[1]	.	.	.	+					
Sterrhopteryx Hb.									
137. S. hirsutella Hb.[1]	.	.	.	.	.	+			
Phalacropteryx Hb.									
138. Ph. Graslinella B.[1]	.	+	.	.	.	.	.	.	+
Hepialus F.									
139. H. hecta L.	.	.	.	+					
Crambus F.									
140. C. pascuellus L.	.	.	+	+	+	+	+	+	
141. C. ericellus Hb.	.	.	.	+	.	.	.	+	
142. C. alienellus Zk.	.	.	.	+					
143. C. pratellus F.	.	.	+	+	.	+	+		
144. C. dumetellus Hb.	.	.	+	+	.	.	+		
145. C. hortuellus Hb. c. ab. cespitellus Hb.	.	.	+	+	.	.	+		
146. C. falsellus Schiff.	.	.	+	.	+	+	+		
147. C. pinellus L.	.	.	.	.	+	+			
148. C. myellus Hb.	.	.	.	.	.	+	+		
149. C. margaritellus Hb.	.	.	+	.	.	+	.	+	+
150. C. culmellus L.	.	.	+	+	+	+	+		
151. C. inquinatellus Schiff.	.	.	.	.	+	+	+		
ab. ambiguellus Strand n. ab.	.	.	.	.	.	+			

[1] Nur Säcke gefunden.

	Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
152. C. tristellus Schiff. ab. fuscelinellus Stph.	.	.	.	.	.	.	+		
ab. culmella Hb.	.	.	.	.	+	+			
153. C. perlellus Sc.	.	.	+	.	.	+	+		
ab. warringtonellus Stt.	.	.	+	+	.	+	+		
Platytes Gn.									
154. P. cerusellus Schiff.	.	.	+						
Ephestia Gn.									
155. E. elutella Hb.	.	.	+	+	.	+			
Salebria Z.									
156. S. fusca Hw.	.	.	+	+					
Scoparia Hw.									
157. S. ambigualis Tr.	.	.	+	+	.	+[1]			
158. S. murana Curt.	.	.	+	+	.	.	.	+	
159. S. crataegella Hb.	.	.	.	.	.	+			
160. S. sudetica Z.	.	.	.	.	.	+	+	.	+
Diasemia Gn.									
161. D. litterata Sc.	.	.	.	.	.	.	+		
Pionea Gn.									
162. P. pandalis Hb.	.	.	+						
163. P. decrepitalis H. S.	.	.	.	+					
Pyrausta Schrk.									
164. P. fuscalis Schiff.	.	.	+						
165. P. cespitalis Schiff.	+	+							
f. sordidalis Hb.	.	+	.	.	+	+			
166. P. purpuralis L.	.	+							
f. ostrinalis Hb.	.	+	.	.	.	.	+		
167. P. porphyralis Schiff.	.	.	.	.	.	.	.	+[2]	

[1] Geflogenes, zweifelhaftes Stück.
[2] Siehe unten.

		Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
	Oxyptilus Z.									
168.	O. hieracii Z. (?)	.	.	.	.	.	.	+		
	Platyptilia Hb.									
169.	P. tesseradactyla L.	.	.	.	.	.	+			
170.	P. acanthodactyla Hb.	.	+	+						
	Pterophorus Geoffr.									
171.	P. tephradactylus Hb.	.	.	.	.	.	.	+		
172.	P. osteodactylus Z.	.	.	.	.	.	.	+		
	Stenoptilia Hb.									
173.	S. bipunctidactyla Hw.	.	.	.	.	.	+			
	Acalla Hb.									
174.	A. Schalleriana F.	.	+							
175.	A. mixtana Hb.	.	+							
176.	A. hastiana L. c. ab. psorana Froel.	.	+							
	Amphisa Curt.									
177.	A. prodromana Hb.	+								
	Dichelia Gn.									
178.	D. gnomana Cl.	.	.	.	.	+	.	+		
179.	D. rubicundana H. S.	.	.	.	.	.	.	.	.	+
	Cacoecia Hb.									
180.	C. musculana Hb.	.	+	+	+					
181.	C. piceana L.	.	.	.	.	.	+			
	Eulia Hb.									
182.	E. ministrana L.	.	.	+	+					
183.	E. politana Hw.	.	+							
	Tortrix L.									
184.	T. rusticana Tr.	.	+							
185.	F. Forsterana F.	.	.	.	.	.	.	.	.	+
186.	T. viburniana F.	.	.	.	+	.	.	.	+	

	Fredrikstad	Hvaltöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Cnephasia Curt.									
187. C. osseana Sc.	.	.	.	+	.	+	.	+	+
188. C. Penziana Thbg.	.	.	.	.	+	+	.	+	
189. C. Wahlbomiana L. v. alticolana H. S.	.	.	.	.	.	.	.	+	+
Conchylis Tr.									
190. C. nana Hw.	.	.	+	+					
191. C. ciliella Hb.	.	.	.	+					
192. C. Hartmanniana Cl.	.	.	.	.	.	.	+		
193. C. dubitana Hb. v. discordana Strand n. v.	.	.	+						
Euxanthis Hb.									
194. E. angustana Hb. (cruentana aut.)	.	.	+	+	.	+			
Evetria Hb.									
195. E. duplana Hb.	+								
Olethreutes Hb.									
196. O. sororculana Zett.	.	.	.	+	.	+			
197. O. dimidiana Sod.	.	.	+	+	.	.	.	+	
198. O. variegana Hb.	.	.	.	.	.	+			
199. O. arbutella L.	.	+	+	.	.	+			
200. O. mygindana Schiff.	.	.	+	+					
201. O. metallicana Hb.	.	.	+	+	.	+	.	+	
202. O. palustrana Z.	.	.	.	+	.	.	.	+	
203. O. Schulziana F.	.	.	+						
204. O. micana Hb. (olivana Tr.)	.	.	+						
205. O. rivulana Sc.	.	.	.	.	.	+	+		
ab. Stangeana Teich	.	.	.	.	.	+			
206. O. urticana Hb.	.	.	+	+	.	+			
207. O. lacunana Dp.	.	.	.	+	.	+	.	.	+
208. O. lucivagana Z.	.	.	.	.	.	.	+		
209. O. cespitana Hb.	.	.	+	+	+	+	+		
210. O. bipunctana F.	.	.	+	+					

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Steganoptycha Stph.									
211. S. cruciana L.	.	.	.	+	.	.	.	+	+
212. S. quadrana Hb.	.	+							
213. S. vacciniana Z.	.	.	+	+					
214. S. ustomaculana Curt.	.	.	.	.	+				
Bactra Stph.									
215. B. lanceolana Hb.	.	.	.	+	.	.	.	+	
Semasia Stph.									
216. S. hypericana Hb.	.	.	.	.	.	.	+		
Epiblema Hb.									
217. E. cana Hw. Odnes									
218. E. nemorivaga Tgstr.	.	+	+						
219. E. subocellana Don.	.	.	.	+					
220. E. Penkleriana F. R.	.	.	.	.	+	+			
221. E. ophthalmicana Hb.	.	.	.	.	.	.	.	.	+
222. E. Solandriana L. ab. sinuana Hb.	.	.	.	.	.	.	.	.	+
223. E. bilunana Hw.	.	.	+						
224. E. tetraquetrana Hw.	.	+	.	+					
225. E. immundana F. R.	.	+							
226. E. crenana Hb.	.	+							
Grapholitha Tr.									
277. G. duplicana Zett.	.	.	+	+					
Ancylis Hb.									
228. A. uncana Hb.	.	+							
229. A. unguicella L.	.	+	+						
230. A. myrtillana Tr.	.	.	+	+					
231. A. lundana F.	.	.	+						
232. A. siculana Hb.	.	+							
Rhopobota Ld.									
233. Rh. naevana Hb.	.	.	.	.	+				

	Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
Lipoptycha Ld.									
234. L. plumbana Sc.	.	.	+						
Simaethis Leach.									
235. S. diana Hb.	.	.	.	.	.	.	.	.	+
Glyphipteryx Hb.									
236. G. Haworthana Stph.	.	+							
Yponomeuta Latr.									
237. Y. Stannellus Thbg.	.	.	+						
Swammerdamia Hb.									
238. S. griseocapitella Stt.	.	.	+	+	+	.	+		
Argyresthia Hb.									
239. A. sorbiella Tr.	.	.	.	+	.	+	+	+	
240. A. conjugella Z.	.	.	.	+	+	+			
241. A. cornella F.	.	.	.	.	+				
242. A. retinella Z.	.	.	.	.	.	+	.	+	
243. A. pygmaeella Hb.	.	.	.	.	.	.	+	+	
244. A. Goedartella L.	.	.	+	.	+	+	+		
ab. litterella Hw.	.	.	.	.	+				
ab. oppositella Strand n. ab.	.	.	.	.	+	.	+		
245. A. Brockeella Hb.	.	.	+	.	.	+			
246. A. arceuthina Z.	.	.	+	+					
247. A. praecocella Z.	.	+							
Cedestis Z.									
248. C. Gysseleniella Dp. c. ab. lativittella Strand n. ab.	.	.	+						
249. C. farinatella Dp.	.	.	+						
Plutella Schrk.									
150. P. annulatella Curt.[1]									Aal
251. P. maculipennis Curt.	.	+	+	+	.	+	+	.	+
f. major Strand n. f.	.	.	.	.	.	.	.	.	+

[1] Ein überwinterndes Exemplar wurde am 26. Decbr. 1902 in Moos an einer Felsenwand gefunden.

		Fredrikstad	Hvalöerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
	Cerostoma Latr.									
252.	C. vittella L.	.	.	.	.	.	.	.	.	+
253.	C. radiatella Don.	.	+							
254.	C. parenthesella L.	.	.	.	.	.	.	+		
	Bryotropha Hein.									
255.	B. terrella Schiff.	.	.	+	+	+	+	+		
256.	B. umbrosella Z.	.	.	+						
	Gelechia Hb.									
257.	G. distinctella Z.	.	.	.	.	.	.	+		
258.	G. velocella Dp.	.	+							
259.	G. ericetella Hb.	.	+	+	+					
260.	G. infernalis H. S.	.	.	+	+					
261.	G. galbanella Z.	.	.	.	.	.	+			
262.	G. continuella Z.	.		+						
263.	G. virgella Thbg.	.	+	+	+	.	.	.	+	
264.	G. diffinis Hw.	.	.	.	+					
265.	G. (Lita) leucomelanella Z.	.	.	.	+	.	+			
266.	G. (Lita) atriplicella F. R. v. infumatella Fs.	.	+							
267.	G. (Teleia) notatella Hb.	.	.	+	+					
268.	G. (Teleia) proximella Hb.	.	.	+	+	.	+			
	Acompsia Hb.									
269.	A. cinerella Cl.	.	.	.	.	.	.	+		
	Xystophora Hein.									
270.	X. tenebrella Hb.	.	.	+	+	+	+	+		
	Endrosis Hb.									
271.	E. lacteella Schiff.	.	.	.	+					
	Plevrota Hb.									
272.	P. bicostella Cl.	.	.	+	+	.	+	.	+	
	Semioscopis Hb.									
273.	S. strigulana Schiff.	.	+							

		Fredrikstad	Hvaloërne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
	Epigraphia Stph.									
274.	E. Steinkellneriana Schiff.	.	+							
	Depressaria Hw.									
275.	D. arctica Strand	.	.	.	.	.	.	.	.	+
276.	D. heracliana D. G.	.	+							
277.	D. applana F. Aal	+	+							
278.	D. ciniflonella Z. Aal									
	Borkhausenia Hb.									
279.	B. flavifrontella Hb.	.	.	.	+					
280.	B. pseudospretella Stt.	.	.	.	.	+				
281.	B. fuscescens Hw.	.	.	.	.	.	+			
282.	B. similella Hb.	.	.	.	+	.	.	+		
	Epermenia Hb.									
283.	E. chaerophyllella Goeze	.	+							
	Scythris Hb.									
284.	S. disparella Tngstr.	.	.	+						
285.	S. variella Stph.	.	+							
	Pancalia Stph.									
286.	P. Leuwenhoekella L.	.	+							
	Coleophora Hb.									
287.	C. anatipennella Hb.	.	.	.	+					
288.	C. gryphipennella Bché.	,	.	.	.	+				
	Elachista Tr.									
289.	E. Gleichenella F.	.	.	+						
290.	E. albidella Tgstr.	.	.	+						
	Gracilaria Hw.									
291.	G. auroguttella Stph.	.	+	.	.	.	.	+		
292.	G. elongella L.	.	+							
293.	G. syringella F.	.	.	.	.	.	+			
294.	G. alchimiella Sc.	.	+							
295.	G. phasianipennella Hb.	.	+							

		Fredrikstad	Hvaloerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstöil	Norefjeld
	Ornix Tr.									
296.	O. avellanella Stt.	.	+							
297.	O. torquilella Z.	.	.	.	+					
	Lithocolletis Hb.									
298.	L. Cramerella F.	.	+							
299.	L. alniella Z.	.	+							
300.	L. alpina Fr.	.	.	.	.	.	.	+		
301.	L. strigulatella Z.	.	.	.	.	.	.	+		
302.	L. ulmifoliella Hb.	.	+	.	+					
303.	L. spinolella Dp.	.	+							
304.	L. Blancardella F. c. ab. conjunctella Sorh. (confluella Strand)	.	+	.	+					
305.	L. junoniella Z.	.	.	.	.	?	+			
306.	L. quinqueguttella Stt.	.	+							
307.	L. quercifoliella Z.	.	+							
308.	L. betulae Z.	.	.	.	+					
309.	L. stettinensis Nic. c. ab. bistrigella Strand n. ab.	.	+							
	Lyonetia Hb.									
310.	L. Clerckella L. c. ab. aereella Tr.	.	+							
	Opostega Hb.									
311.	O. salaciella Tr.	.	.	+	+	.	+	+		
	Talaeporia Hb.									
312.	T. tubulosa Retz.	.	+							
	Solenobia Dp.									
313.	S. pineti Z.	.	+							
	Acrolepia Curt.									
314.	A. cariosella Tr.	.	.	.	+					
	Roesslerstammia Z.									
315.	R. Erxlebella F.	.	.	.	+					

		Fredrikstad	Hvaløerne	Sireosen	Siredal	Tou	Erfjord	Ose	Hægstøil	Norefjeld
	Scardia Tr.									
316.	S. boleti F.	.	.	+						
	Monopis Hb.									
317.	M. rusticella Hb.	.	.	+	+	.	+	.	.	[1] +
	Trichophaga Rag.									
318.	T. tapetzella L.	.	.	.	+	.	+			
	Tinea L.									
319.	T. fuscipunctella Hw.	.	.	.	.	.	.	+		
320.	T. granella L.	.	.	.	.	.	.	+		
321.	T. cloacella Hw.	.	.	.	.	.	+			
322.	T. pellionella L.	.	.	+	+	.	+			
	Phylloporia Hein.									
323.	Ph. bistrigella Hw.	.	.	.	+					
	Incurvaria Hw.									
324.	I. pectinea Hw.	.	+							
325.	I. muscalella F.	.	.	+						
	Nemophora Hb.									
326.	N. Swammerdamella L.	.	+							
327.	N. Schwarziella Z.	.	+							
	Adela Latr.									
328.	A. cuprella Schiff.	+								
	Eriocrania Z.									
329.	E. Sparmannella Bosc	.	+							
330.	E. fastuosella Z.	.	+							
	Micropteryx Hb.									
331.	M. aureatella Sc.	.	.	.	+					

[1] Nur ein todtes Exemplar gefunden.

B. Bemerkungen über schon bekannte und Beschreibungen neuer Formen.

1. *Argynnis euphrosyne* L.

Diese Art ist mir sehr spärlich vorgekommen, indem nur 2 Stück erbeutet wurden; das eine in Siredal, das andere bei Hægstøil. Das letzterwähnte Stück, das also nach Mitte August gefunden wurde, war dennoch ziemlich frisch und dürfte desshalb entweder einer zweiten Generation angehören oder auch sehr verspätet worden sein.

2. *Argynnis pales* Schiff.

Auf Norefjeld wurde ein einziges Stück erbeutet. Dies Stück ist insofern erwähnenswerth, als die Oberseite desselben mit Hübners Fig. von *napaea*, die Unterseite mit derjenigen von *isis* stimmt; die Flügelspannung ist 37 mm.

3. *Argynnis arsilache* Esp.

Auch von dieser Art wurde auf Norefjeld nur ein Unicum erbeutet; die Flugzeit war ja schon weit vorgerückt, und ausserdem war die Witterung für die heliophilen Arten keine günstige. — Bei Hægstøil flog *arsilache* zahlreich; keines der davon mitgebrachten Exemplare misst mehr als 35 mm., die durchschnittliche Grösse ist 33—34 mm. *Arsilache* ist durchgehends kleiner als *pales*, wenigstens ist dies bei norwegischen Exemplaren der Fall; Wallengren (1), wohl nur älteren Verfassern (Treitschke (2), Herrich-Schäffer (3) u. m.) nachschreibend, giebt dagegen an, dass sie grösser sei. Uebrigens kann *arsilache* in Betreff der Grösse ziemlich variirend sein; die diesbezüglichen Angaben *ausländischer* Verfasser lauten etwas verschieden. Während Frey (4) schweizerische *arsilache* als „klein . . . . norwegischen Stücken sehr nahe kommend“, beschreibt, erwähnt er gleich-

zeitig, dass norddeutsche Exemplare bedeutend grösser sind; die *arsilache*-Exemplare Nolckens (5) übertrafen alle *pales* in der Grösse; Hensel (6) hat dieselbe Erfahrung wie Nolcken gemacht und ebenso die meisten anderen mitteleuropäischen Verfasser; schon der alte Engramelle (7) bezeichnet *arsilache* als „la pales grande espèce", *pales* dagegen als „la pales petite espèce". Bei norwegischen Exemplaren ist dagegen wie gesagt *arsilache* kleiner als *pales*; das ist die Regel, die ich sowohl durch meine eigene Sammlung als diejenige des Kristiania Museums bestätigt finde, und die auch mit den Angaben in der norwegischen Litteratur stimmt. (Cfr. Sparre Schneider (8, 9)).

4. *Argynnis niobe L. v. eris Meig.*

Flog zahlreich auf den Wiesen bei Ose, wo sie bei weitem die häufigste *Argynnis*-Art war. Die Hauptform war selten; unter den mitgenommenen Exemplaren gehört nur ein Zehntel der Hauptform an, die übrigen sind unzweifelhafte *v. eris*.

5. *Argynnis lathonia* L. cum *ab. obscurascens* Strand *n. ab.*

Ist nur in zwei Stücken gesammelt worden und zwar auf Kirkeöen und in Erfjord.

In der Lepidopteren-Sammlung des verstorbenen Hauptmann Grüner, welche Sammlung mir vor Kurzem zur Determination, bezw. Revision anvertraut wurde, fand sich eine eigenthümliche, erwähnenswerthe Aberration dieser Art.

Dieselbe fällt mit keiner der in Staudinger-Rebels Cataloge aufgeführten Abänderungen zusammen, ebenso wenig mit *ab. paradoxa* Fuchs, die im Cataloge fehlt. Was die Oberseite betrifft, könnte sie mit *ab. valdensis* Esp. zusammenfallen, aber die Silberflecke der Unterseite sind anders. Ich werde sie desshalb beschreiben, indem ich sie mit dem Namen *ab. obscurascens* Strand bezeichne.

Auf der Unterseite der Hinterflügel sind keine anderen Abweichungen bemerkbar, als dass die zwei grossen Silberflecken

in Zelle 8 zusammengeflossen sind, und dass die Silberflecken in Zelle 1 c aussen und innen deutlicher schwarz begrenzt sind. Die schwarzen Flecken der Unterseite der Vorderflügel sind viel grösser als gewöhnlich. Die Oberseite beider Flügelpaare schwarz; die Vorderflügel mit der Basalhälfte des Vorderrandes, einem schmalen, mondförmigen, quergestellten Flecken innerhalb der Mitte der Mittelzelle und einer schmalen Einfassung der Flecken der äusseren Reihe (der Bogenreihe) und der zwei Mittelflecken der nächst äusseren Fleckenreihe mehr oder weniger deutlich röthlich; ausserdem die Rippen z. Th. gelblich bestäubt. Mit Ausnahme der genannten sind alle Flecken zusammengeflossen und desshalb nicht zu unterscheiden. Auf den Hinterflügeln sind die vier Mittelflecken der äusseren Querreihe durch eine gelbe einfassende Linie deutlich, ebenso sind die Flecken der Bogenreihe durch gelbliche Aufblickung angedeutet. Sonst schwarz gefärbt.

Gelegentlich der Beschreibung seiner *ab. paradoxa* weist Fuchs (10) nach, dass *Arg. lathonia* bisweilen als Imago überwintert. Dies wurde jedoch auch schon von älteren Verfassern angegeben; so von Meigen (11), der mit dürren Worten sagt, dass „Spätlinge überwintern“, während von Prittwitz (12) *glaubt*, dass dies der Fall sei, es jedoch nicht mit Bestimmtheit behaupten darf.

6. *Erebia lappona* Esp.

Diese Art wurde auf Natlandsnuten in Erfjord, weit oberhalb der Waldgrenze, am 27sten Juli beobachtet, aber nicht gefangen. In Stavanger Amt nicht zuvor gefunden.

7. *Coenonympha pamphilus* L. *abb. biocellata, albula* et *caeca* Strand *nn. abb.*

In Erfjord wurde eine eigenthümliche Form gefunden, welche sich dadurch auszeichnet, dass die Vorderflügel auf der Unter-

seite mit zwei Augen versehen sind. Neben und hinter dem gewöhnlichen Auge findet sich nämlich ein zweites, kleineres Auge, welches jedoch keine weisse Pupille hat. Der Zwischenraum der zwei Augen ist ein wenig kleiner, als der Durchmesser des kleineren Auges. Beide werden von demselben gelben Ring eingeschlossen. Innerhalb des kleineren Auges, zwischen demselben und dem gelben Ring, finden sich eine oder zwei schwarze Schuppen. Ich schlage für diese Form den Namen *ab. biocellata* Strand vor. — Das Vorhandensein eines solchen zweiten Auges wird übrigens auch von älteren Verfassern z. B. Herbst (VIII, P. 41) (13) erwähnt.

Eine andere Form, wovon ich ein Stück aus Sireosen besitze, und welche im Kristiania Museum u. a. durch Exemplare von Ogne vertreten ist, zeichnet sich dadurch aus, dass die Augen der Oberseite der Vorderflügel völlig fehlen. Dieselbe möge als *ab. caeca* Strand bezeichnet werden. Auch diese Form findet bei Herbst Erwähnung.

Noch eine bemerkenswerthe Aberration dieser Art, bei der die Grundfarbe gelblich weiss statt ockergelb ist, wird erwähnt und beschrieben von Esper Tab. 78, 4, Herbst Tab. 187, 3 u. 4, und Meigen Pag. 153. Dieselbe möge den Namen *ab. albula m.* führen.

8. *Callophrys rubi* L.

Nur ein einziges der gesammelten Exemplare hat 6 deutliche Augenpunkte auf der Unterseite; bei den übrigen Exemplaren findet sich nur einer oder zwei, indem derjenige am Vorderrande immer, einer bei der Mitte bisweilen, vorhanden ist.

9. *Hesperia malvae* L.

Diese gemeine Art wurde, wie oben angegeben, an vielen Orten gesammelt. Alle Exemplare sind ganz wie gewöhnlich

gefärbt und gezeichnet; weder *ab. Moryi* STRAND, noch andere nennenswerthe Abänderungen finden sich darunter.

Bemerkenswerth ist, dass die Art so spät als im Juli (Siredalen), ja sogar im August (Ose), angetroffen wurde. Man möchte hier eine zweite Generation vermuthen. Zwar ist das einzige Exemplar, das ich von Ose besitze, stark geflogen (jedoch sicher bestimmbar), dass es aber der Frühlingsgeneration hätte angehören sollen, ist wenigstens zweifelhaft. Auch die im Juli gefundenen Exemplare, die obendrein ziemlich schön waren, können kaum im Frühjahre entschlüpft sein. Aber als *sichere* Beweise einer zweiten Generation können diese Funde nicht anzusehen sein; wissen wir ja, wie oft die Entwicklung der Schmetterlinge verspätet wird, so dass die Imagines nach den gewöhnlichen Zeiten erscheinen.

Die Ansichten der Verfasser über die Flugzeit dieser Art sind sehr verschieden. Von nordischen Autoren geben AURIVILLIUS (14) und BANG-HAAS (15) bestimmt eine Generation an (Mai—Anfang Juni). — WALLENGREN (l. c.) giebt den Mai als Flugzeit an, fügt aber hinzu, dass der Falter bisweilen auch im Juni angetroffen wird, nur bei SIEBKE (16) wird eine zweite Generation vermuthet, indem er einmal den Falter in August erbeutet hat. Von mitteleuropäischen Autoren werden 2 Generationen behauptet von u. a. BRAMSON (17) („Mai, August"), MEIGEN (l. c.) („fliegt im Mai und im Sommer"), BERGE (18) („im April und Mai und wieder vom Juli an"), SCHMID (19) („im Mai, hin und wieder auch im August"), HOFMANN u. HERRICH-SCHÄFFER (20) („Mai; Anfang Juni bis August"); HAUDER (21) hat in Oberösterreich nur *eine* Generation (April, Mai) beobachtet, aber er fügt hinzu: „eine II Generation soll vom Juli bis September fliegen". Dagegen wird nur eine Generation erwähnt von MEYRICK (22) (Mai, Juni), FREY (l. c.) („vom Ende April bis Ende Mai und länger in dem Tieflande; höher im Gebirge noch bis tief in den Juli"), KRULIKOWSKI (23) („Mitte Mai bis Juli"), TEICH (24) und NOLCKEN (l. c.) („April—Juni") u. s. w.

Es geht hieraus zur Genüge hervor, dass die Biologie dieser Art noch lange nicht völlig erforscht ist, trotzdem sie eine so gemeine Art ist. Es sei desshalb die Aufmerksamkeit der Lepidopterologen auf diese Frage gelenkt.

10. *Agrotis hyperborea* Zett. *v. norvegica* Strand *n. v.*

Von dieser Art, die im südlichen Norwegen bisher nur auf Dovre von Wocke (25) gefunden war, wurden zwei Exemplare erbeutet, das eine (♂) am Gipfel des Gebirges Natlandsnuten in Erfjord, das andere (♀) bei Hægstöil in Sætersdalen.

Beide Exemplare gehören einer von der Hauptform so abweichenden Form an, dass sie eine nähere Besprechung verdienen. Ich werde mich darunter am meisten an das Erfjord-Exemplar halten, da das andere Stück etwas abgeflogen ist.

Bekanntlich sind von dieser Art zwei Localvarietäten benannt und zwar *v. alpina* Humphr. et Westw. aus Schottland und Irland und *v. carnica Her.* von den Kärnthner Alpen. Dazu kommt die von Hüber als *Agrotis Iveni* beschriebene Form, die jedoch nach seiner Beschreibung und Abbildung (26) von der Hauptform von *hyperborea,* wie diese im arktischen Norwegen vorkommt, sich nicht trennen lässt. Der einzige Unterschied scheint derjenige zu sein, dass *Iveni* ein wenig grösser sein soll; letztere Form wird als in der Grösse mit *Agrotis sincera* übereinstimmend angegeben, also wohl zwischen 36 und 42 mm. (das Typeexemplar von *Iveni* war ein Weibchen). Die im Kristiania Museum vorhandenen Exemplare von *hyperborea* messen 32—33 (aus Kistrand), 36 (aus Südvaranger), 37 (von Dovre) und 39 mm. (aus Vesteraalen); man sieht also, dass *hyperborea* ebenso gross als *Iveni* sein kann. — Von den beiden anderen genannten Formen ist *v. carnica* Her. als in Norwegen vorkommend angegeben worden und zwar von Wallengren (27) und nach ihm von Siebke (l. c.), Schøyen (28) und Lampa (29). Sie ist jedoch, trotzdem auf Dovre viel gesammelt

wurde, nie wiedergefunden, und die WALLENGREN'sche Angabe, die sich auf ein einziges, von BOHEMAN erbeutetes und von ZETTERSTEDT als *Hadena alpicola* beschriebenes (30) Stück gründet, muss am besten bis auf weiteres ganz unberücksichtigt gelassen werden, da es gar nicht erwiesen ist, dass diese *Hadena alpicola* mit *carnica* synonymisch ist; wahrscheinlich ist *alpicola* eine Abänderung von *hyperborea*, wohin sie auch im neuen Lepidopteren-Cataloge (mit „?") gezogen wird, aber sicher gedeutet worden ist sie noch nicht. Mit vollem Recht werden daher alle Angaben über das Vorkommen von *carnica* in Skandinavien unberücksichtigt gelassen sowohl von AURIVILLIUS l. c. als von SCHØYEN in einer seiner neueren Arbeiten (31). WOCKE, der *Agrotis hyperborea* auf Dovre in Mehrzahl sammelte (l. c.), bemerkt ausdrücklich von seinen Exemplaren, dass „sie gleichen durchaus den aus Finmarken".

Uebrigens werden nordische Exemplare von *Agrotis hyperborea*, die mit *carnica* Aehnlichkeit haben, meines Wissens nur von SCHØYEN (32), TENGSTRÖM (33) und REUTER (34) erwähnt. SCHØYEN beschreibt ein Stück aus Vesteraalen, TENGSTRÖM und REUTER ein finnisches; die Beschreibungen zeigen zur Genüge, dass die betreffenden Exemplare derselben Form wie mein Erfjord-Exemplar angehörten. Zu der Beschreibung TENGSTRÖMS bemerke ich nur, dass „frånvaron af den tydliga serien af svarta pilfläcken å brämfältet" (das Fehlen der deutlichen Reihe schwarzer Pfeilflecken im Saumfelde), welche Flecken auch bei meinem Exemplare, wenn auch nicht ganz fehlend, so doch höchst undeutlich sind, nicht als für diese Abänderung characteristisch angesehen werden kann, indem diese Flecken oft auch bei ganz typischen Exemplaren von *hyperborea* fehlen. Das Exemplar aus Vesteraalen, welches zu untersuchen ich Gelegenheit gehabt, sowie die Beschreibung SCHØYENS, stimmen mit meinem Exemplar. Die kleinen vorhandenen Verschiedenheiten beschränken sich auf folgendes. Während die dunkelbraune Färbung des Erfjord-Exemplars in der Mitte und am Vorderrande

(welcher nur schwach gelichtet ist) sich bis zur Wurzel verbreitet, so dass nur das Innenrandsfeld die grauliche Grundfarbe behält, ist das Wurzelfeld des Vesteraals-Exemplars grau, nur in der Mitte verdunkelt, und am Vorderrande dehnt sich die graue Grundfarbe bis zur Nierenmakel aus. Auch im Saumfelde ist die graue Färbung die vorherschende beim Vesteraals-Exemplar, nur ist das Saumfeld ein wenig dunkler als das Wurzelfeld, und die Pfeilflecken sind gross und deutlich, wenn auch nicht schwärzlich, sondern mehr braun oder gelblich braun. An meinem Exemplare dehnt die braune Färbung sich über das ganze Saumfeld, dessen Zeichungen kaum bemerkbar sind; die äussere Hälfte des Flügels ist übrigens stark röthlich angeflogen. Bei beiden Exemplaren ist die Flügelfläche innerhalb und hinter der grossen Ringmakel, deren grauweisse Färbung gegen die dunkle Umgebung scharf absticht, am dunkelsten. Uebrigens ist das Vesteraals-Exemplar mehr geflogen als das meinige, so dass dessen hellere Färbung wohl zum Theil darin begründet ist; vielleich auch darin, dass sie nicht gleichen Geschlechts sind.

Mit der Varietät *alpina* Humphr. et Westw. kann die norwegische Form nicht zusammenfallen. Der am meisten in die Augen fallende Unterschied dürfte die bei *v. norvegica* grosse, scharf markirte, weissgrau ausgefüllte Ringmakel sein, welche auch vorn, aber undeutlich, dunkel begrenzt ist. Dieselbe ist bei *v. alpina* sehr wenig auffallend; man vergleiche nur die Figuren Jenner Weir's (35). Auch die Nierenmakel ist bei *v. norvegica* sehr deutlich, scharf begrenzt, rostgelb ausgefüllt ohne dunklen Kern, am Rande schmal gelichtet. Durch die deutlicheren Makeln unterscheidet sich *v. norvegica* sowohl von der Hauptform als von *v. alpina*. Die letztere ist weder am Vorder-, noch am Innenrande auffallend heller gefärbt, was wenigstens am Innenrande bei *v. norvegica* der Fall ist; auch ist die dunkle Färbung der Flügelfläche bei *norvegica* mehr zusammengeflossen, nicht so gestreift, wie bei *alpina*. Die bei letzterer so scharf hervortretenden, langen, schwarzen Pfeilflecken

im Saumfelde sind bei *v. norvegica* nicht mehr angedeutet als bei der Hauptform. Was den röthlichen Anflug von *v. norvegica* betrifft, so kann dieser als ein Unterscheidungsmerkmal gegenüber der Hauptform dienen, dagegen nicht gegen *v. alpina*, wo er bisweilen noch stärker ist; bisweilen fehlt er bei letzterer auch ganz. *V. alpina* ist nach allen Verfassern eine sehr variirende Form (cfr. z. B. Wheeler (36), Jenner Weir (l. c.), „The Entom. Monthly Mag.“ XIII (1876), Pag. 110), wesshalb es schwer ist, ihr gegenüber Distinctionsmerkmale anzugeben, die für alle Fälle stichhaltend sind. — Die Hinterflügel sind bei *v. norvegica* ein wenig dunkler, mehr bräunlich grau als bei der Hauptform und wohl auch als bei *v. alpina*.

Von *v. carnica* dürfte die norwegische Form sich u. a. dadurch unterscheiden, dass die kleine Basal-Querlinie bei *v. norvegica* ebenso wie bei der Hauptform deutlich sichtbar ist. Uebrigens wird sie wohl durch die oben gegebene Beschreibung ohne Schwierigkeit von *carnica* unterschieden werden können.

In wie weit die neue Form als Aberration oder als Localvarietät auftritt, mögen weitere Untersuchungen entscheiden. Da das Exemplar von Hægstöil, sowohl was Grösse (39 mm. Expansion) als was Färbung und Zeichnung betrifft, mit dem Erfjord-Exemplar gut übereinstimmt, dürfte man vielleicht schliessen können, dass die neue Form im südwestlichen Norwegen als Localvarietät auftritt.

Ueber die Biologie von *Agrotis hyperborea* liegen schon mehrere Beiträge vor, so von Staudinger (37), Sandberg (38), Hellins (39), Meek (40) u. m.

11. *Hadena gemmea* Tr.

Von dieser Art gibt Sparre Schneider in seiner neuesten lepidopterologischen Arbeit (41) an, sie sei bisher nur in Kristians und Akershus Amt beobachtet. Er hat dabei übersehen, dass ich sie zuvor sowohl in Lærdal (42) als in Aal (43) gefunden hatte.

12. *Dasypolia templi* Thbg.

Diese Art führt Herr Schneider in der soeben genannten Abhandlung als neu für Buskerud auf. Er hat dabei vergessen, dass ich sie schon zuvor in Hallingdal gefunden hatte, was er sogar selbst in einer anderen Abhandlung erwähnt hat (44).

13. *Prothymnia viridaria* Cl. *ab. modesta* Car.

Diese Form war bisher nicht in die Fauna Norwegens eingeführt worden, trotzdem die Art im südlichen Norwegen keine seltene ist.

14. *Cymatophora duplaris* L.

Das Erbeuten eines schönen Exemplars so spät als im September kann wohl nur durch die Annahme einer zweiten Generation erklärt werden. Eine solche muss aber bei dieser Art sehr selten entwickelt werden, denn nur die wenigsten Verfasser wissen etwas davon zu berichten. Nur Frey l. c. sagt ausdrücklich: „Falter im Tieflande mit doppelter Generation, im höheren Gebirge mit einfacher“.

15. *Acidalia incanata* L., *bisetata* Hfn. und *inornata* Hw.

Alle drei Arten sind neu für Stavanger Amt.

17. *Lygris populata* L. *c. ab. musauaria* Frr.

Viele der bei Sandumsæter pr. Norefjeld erbeuteten Exemplare sind ausgeprägte *ab. musauaria* Frr., dunkel rauchfarbig, mit undeutlichen Zeichnungen. Trotzdem die Flugzeit so weit vorgeschritten war, waren die Falter noch ziemlich schön.

18. *Larentia bicolorata* Hfn.

In Grüners Sammlung fand sich diese Art angeblich aus der Umgegend von Kristiania, woher sie bis jetzt nicht bekannt war (nach Schøyen (31)); in Siebke (16) steht sie als „In Tøien“ gefunden.

19. *Larentia taeniata* Stph.

Die bei Ose gesammelten Exemplare waren stark abgerieben, so dass die eigentliche Flugzeit anscheinend schon vorüber war. Dieselbe soll aber nach den meisten Angaben auch den August umfassen. — Neu für Stavanger Amt.

20. *Larentia olivata* Schiff.

Von dieser sehr seltenen Art, die bei uns bisher nur bei Kristiania und in Geiranger gefunden war (Schøyen (45)), wurde ein einziges Stück in Erfjord erbeutet. Wahrscheinlich ist es gerade in den Westlandsdistricten, dass diese Art bei uns am häufigsten ist.

21. *Larentia montanata* Schiff.

Bemerkenswerth ist es, dass diese Art in einem, obendrein *schönen*, Exemplar bei Norefjeld, also im September, gefunden wurde. Als Flugzeit wird ja gewöhnlich Mai—Juli angegeben; in diesem Falle flog also das Thier mehr als einen Monat nach dem Ende der gewöhnlichen Flugzeit. Aus südlicheren Gegenden werden zwar zwei Generationen angeführt, so z. B. von Treitschke und Hormuzaki (46), bei uns dürfte davon wohl kaum die Rede sein. — In Stavanger Amt muss die Art selten sein, da es mir nicht gelungen ist, sie dort zu finden; ebenso wenig führt Lie-Pettersen (47) sie in seiner Liste (von Jæderen) an.

22. *Larentia quadrifasciaria* Cl.

Ein einziges, etwas geflogenes Stück wurde bei Ose erbeutet. Im südwestlichen Norwegen bisher nicht beobachtet.

23. *Larentia unidentaria* Hw.

Auch diese bei uns seltene Art wurde nur in einem Stück gesammelt. Ihre Aehnlichkeit mit *ferrugata* hat früher vielleicht Verwechslungen verursacht, so dass sie in der That häufiger als angenommen vorkommt.

24. *Larentia caesiata* Lang *v. norvegica* Strand.

Weder aus Lister und Mandal noch aus Stavanger Amt war diese gemeine Art bisher verzeichnet. — Sie wurde meist ganz vereinzelt und sparsam angetroffen; so fing ich bei Sireosen 1 Stück, bei Ose und Hægstøil je 2, bei Norefjeld 3 Stück; in Erfjord wurde sie zwar in mehreren Exemplaren gesammelt, war aber auch da bei weitem nicht häufig. — Ueber die Varietätsrechte vergleiche man den zweiten Theil dieses „Beitrages" (48).

25. *Larentia hastata* L.

Diese Art war in der Grüner'schen Sammlung angeblich als bei Kristiania gesammelt vertreten. Ihr hiesiges Vorkommen wurde zwar schon von Siebke l. c. angegeben, aber im Verzeichniss von Schøyen (31) ist sie nicht als in Akershus Amt vorkommend aufgenommen. — Jedenfalls muss sie hier selten sein.

26. *Larentia sordidata* F. cum *ab. infuscata* Stgr., *ab. fuscoundata* Don., et *ab. constricta* Strand *n. ab.*

Von 6 Stück aus Krødsherred gehört eins zu *ab. infuscata Stgr.*, drei zu *ab. fuscoundata* Don. (übrigens wenig ausgeprägt), und eins, das sich durch die in Flecke aufgelöste (abgeschnürte), helle Mittelbinde auszeichnet, bezeichne ich als *ab. constricta n. ab.*, ganz ähnlich wie bei *ab. constricta* Strand von *Larentia autumnalis* Str.

27. *Tephroclystia subfulvata* Hw.

Bei Ose wurde ein Unicum dieser bisher nur bei Næs Værk und Kristiania gefundenen Form erbeutet.

28. *Tephroclystia nanata* Hb.

Von dieser spärlich vorkommenden und wenig verbreiteten Art wurde ein schönes Stück bei Sireosen und zwei weniger

schöne, aber dennoch sicher bestimmbare Stücke in Siredal gefunden. Bisher auf Jæderen (Schøyen), Dønna (Strand) und bei Bergen (Schneider) beobachtet.

29. *Chloroclystis rectangulata* L. *ab. nigrosericeata* Hw.

Unicum aus Siredal. Die Art wurde bisher nur in Akershus, Smaalenene und bei Bergen beobachtet.

30. *Chloroclystis chloërata* Mab. *v. hadenata* Fuchs.

Diese Art war in Skandinavien bisher nur aus Tysfjorden bekannt (Strand (49)). Sie scheint aber im nördlichen Norwegen weit verbreitet zu sein, denn nach gefälliger brieflicher Mittheilung von Dr. Einar Wahlgren (Stockholm) hat er im vorigen Sommer die Art in Rombaksbotn erbeutet, und Custos Sparre Schneider theilte mir mündlich mit, dass er sie auch gefunden hätte. In wie weit die von den Herren Wahlgren und Schneider gesammelten Exemplare alle der *v. hadenata* angehörten, weiss ich nicht, aber wahrscheinlich war dies der Fall; Herr Schneider, der meine Exemplare sah, bemerkte ausdrücklich, dass die seinigen ganz ähnlich aussähen.

31. *Abraxas marginata* L.

Die unter den gesammelten Exemplaren vertretenen Formen waren die folgenden: *ab. conflua* Strand und *ab. pollutaria* Hb., je ein Stück; f. *naevaria* Hb., wozu auch Exemplare gerechnet wurden, die von der Figur Hübners dadurch abweichen, dass sie ein oder zwei kleine schwarze Flecken in der Mitte der Vorderflügel besitzen, durch sechs Stück vertreten, die alle aus Siredal waren. Die übrigen Exemplare (3 aus Siredal, 1 aus Sireosen) haben ein Paar kleine schwarze Flecken auf den Vorderflügeln und ebenso auf den Hinterflügeln und unterscheiden sich auch von Hübners Fig. 79 dadurch, dass die Saumbinde der Hinterflügel in der Mitte unterbrochen ist.

Huene (50) beschreibt und bildet eine *ab. mediofasciata* dieser Art ab. Da aber dieser Name schon von Höfner angewandt worden ist, muss die von Huene beschriebene Form, falls man sie als distinct auffassen will, neu benannt werden. Ich schlage den Namen *ab. Huenei* Strand vor.

32. *Boarmia punctularia* Hb.

Diese seltene Art wurde in einem Stück auf Hvaløerne erbeutet. — Nach Lampa l. c. gebührt dieser Art der Thunberg'sche Name *scopularia*. Die Beschreibung Thunbergs giebt jedoch keinen sicheren Aufschluss, und seine Art wurde desshalb bald für *Larentia didymata L.* (von Werneburg), bald für *Boarmia glabraria* Tr. (von Wallengren) erklärt.

33. *Gnophos obscuraria* Hb. *ab. bivinctata* Fuchs.

Bei Sireosen wurde ein Stück dieser bei uns sehr seltenen Spanner erbeutet. Die Stammform war einmal bei Kristiania (Schøyen (51)) gefunden, die Aberration ist neu für die Fauna.

34. *Gnophos myrtillata* Thbg. cum *ab. anastomosis* Strand *n. ab.*

Bei Ose wurden zwei gewöhnliche Exemplare gesammelt.

Bei Sireosen fing ich ein Stück, das eine nähere Besprechung verdient. Es ist ein Männchen von gewöhnlicher Grösse und Grundfarbe; die beiden Querlinien der Vorderflügel sind aber sehr scharf schwarz und *hinter der Mitte zusammenhängend*, indem sie scharf gegen einander gebrochen sind. Die beiden Querlinien bilden in dieser Weise eine Acht (8-förmige Figur), die vorn und hinten offen ist, und deren vordere Hälfte die grössere ist. Die Wellenlinie, wenigstens auf den Vorderflügeln, sehr deutlich und innen sehr breit, tief schwarz, begrenzt; diese

Begrenzung setzt sich auch auf den Hinterflügeln deutlich fort. Die Mittelmakeln gross. — Ich nenne diese Form *ab. anastomosis* STRAND.

35. *Pygmaena fusca* THBG. cum *ab. destrigata* STRAND *n. ab.* et *ab. unistrigata* STRAND *n. ab.*

Von Erfjord brachte ich nur ein Unicum mit, das ich im Gebirge Natlandsnuten erbeutete. — Trotz der weit vorgechrittenen Flugzeit waren die auf Norefjeld gefangenen Exemplare ziemlich schön.

Von Hægstöil besitze ich eine interessante Aberration, welcher ich den Namen *ab. destrigata* STRAND gegeben habe. Sie zeichnet sich dadurch aus, dass die schwarzen Querlinien sowohl an Vorder- als Hinterflügeln ganz fehlen; nur der Mittelpunct ist deutlich. Das Exemplar ist ganz frisch, so dass das Fehlen der Querzeichnungen nicht durch Abreiben entstanden ist. — Eine andere Aberration wurde auf Norefjeld erbeutet. Bei dieser ist nur die äussere der zwei Querlinien sichtbar; die innere ist verschwunden. Die äussere Querlinie ist aber sehr deutlich an den beiden Flügelpaaren. Der Mittelpunct wie gewöhnlich deutlich (*ab. unistrigata* STRAND).

Die von HÜBNER als *venetaria* abgebildete Form (mit einfarbigen Hinterflügeln) scheint überall häufiger zu sein als die Form, bei der die Hinterflügel mit schwarzer Querlinie versehen sind. Es ist desshalb wenig berechtigt, wenn HERRICH-SCHÄFFER (l. c. III. P. 103) die HÜBNER'sche Figur tadelt, weil diese nicht die letztere Form darstellt.

36. *Phasiane petraria* HB.

Ein Stück auf Hvalöerne gefangen. — War bisher bei Kragerø (Ullmann sec. SCHØYEN (52)), in Akershus (SCHØYEN (31)), Ødemark (STRAND (53)), Ulefos (STRAND (42)) gefunden.

37. *Scodiona fagaria* Thbg.

Ebenfalls ein Unicum von Hvalöerne. *Neu für die Fauna Norwegens.* — Da die Art im südlichen Schweden vorkommt, war ihr Vorkommen in den angrenzenden norwegischen Districten eigentlich kein auffallendes. Sie ist jedoch auch in Schweden sehr selten; Lampa l. c. kannte nur den von Thunberg angegebenen Fundort Halland; seitdem ist sie auch in Skaane gefunden (Aurivillius l. c.). — Die Raupe an *Erica, Calluna* und *Globularia.*

38. *Sarrothripus revayana* Sc. *v. degenerana* Hb.

Wieder eine der seltneren norwegischen Arten und auch nur in einem Stück erbeutet. In Smaalenene bisher nicht gefunden.

39. *Lithosia lurideola* Zinck.

Das eine der bei Ose gesammelten Exemplare ist monströs, indem der eine Hinterflügel nur als ein sehr kleines, rundes Läppchen entwickelt ist. Eine ähnliche Monstrosität findet sich an dem einen meiner Exemplare von *Crambus inquinatellus* Schiff. *ab. ambiguellus* Strand (aus Erfjord). Es ist hier der eine Vorderflügel, der nur als ein Läppchen (ca. 1/4 der Länge des normalen Flügels) entwickelt ist. — Eine interessante Abhandlung über dergleichen Monstrositäten und deren Entstehung bei Lepidopteren verdanken wir Trouvelot (54).

40. *Crambus alienellus* Zinck.

Das Vorkommen dieser Art in Siredal war insofern von Interesse, als sie bisher nur im östlichen Norwegen, sowie in Saltdalen (Schøyen (55)) gefunden war. Ich fing nur ein Stück.

41. *Crambus pratellus* L.

War sehr zahlreich bei Sireosen und wurde auch häufig in Siredal gefunden. Von Erfjord brachte ich nur ein Stück mit und ebenso von Ose, aber die Flugzeit war ja schon weit vorgeschritten. Einige wenige sehr hell gefärbte Exemplare dürften der *ab. angustellus* Wd. zuzurechnen sein, während 4—5 Stück von Sireosen sowie das Ose-Exemplar allerdings *ab. obscurellus* Mn. nahe stehen.

42. *Crambus dumetellus* Hb.

Auffallend ist, dass diese Art in Ryfylke nicht angetroffen wurde. Dass sie dort fehlen sollte, ist wenig wahrscheinlich. — Bei Sireosen und in Siredal war dieselbe ziemlich häufig; bei Ose dagegen wurden, wohl der vorgeschrittenen Flugzeit wegen, nur zwei Stück erbeutet.

43. *Crambus hortuellus* Hb. *c. ab. cespitellus* Hb.

Auch diese Art wurde in Ryfylke nicht gefunden, war dagegen bei Sireosen, in Siredal und bei Ose sehr häufig. — Während die Aberration bei Sireosen häufig war, wurde bei Ose nur ein Unicum davon erbeutet; dagegen wurde die Hauptform daselbst in Menge gesammelt. Die kleinsten Exemplare messen 17, die grössten 22 mm.

44. *Crambus falsellus* Schiff.

Diese Art scheint in Ryfylke ziemlich häufig zu sein; ich habe sie daselbst überall angetroffen (auch in Suldal (48)), nie aber in grosser Anzahl. — In Nedenæs nicht zuvor gefunden.

45. *Crambus pinellus* L.

Von dieser seltenen Art, die bisher bei Kristiania (Siebke), Geiranger, Lister u. Mandals Amt (Schøyen), Lærdal, Stryn (Lie-Pettersen (56, 57)), Lavik (Strand) gefunden war, wurden 2 Stück bei Tou und 1 in Erfjord erbeutet. — Aus den bisherigen Localitätsangaben scheint hervorzugehen, dass die Art am Westlande am meisten verbreitet ist, kommt aber wohl überall spärlich vor. Ihre mehr nächtliche Lebensweise (cfr. Leech (38)) ist vielleicht zum Theil die Ursache dazu, dass sie so selten angetroffen wird.

46. *Crambus myellus* Hb.

Weder in Nedenæs noch Stavanger Amt zuvor gefunden. Beider Orten fing ich nur je zwei Stück; von den Ose-Exemplaren war das eine ganz frisch, das andere stark abgeflogen. — In den Westlandsdistricten war die Art bisher in einem Unicum in Valdalen (Romsdal) (Schøyen (45)) und selten bei Bergen (Sp. Schneider (44)) gefunden.

47. *Crambus margaritellus* Hb.

Noch im Anfange September wurde diese Art fliegend gefunden (Norefjeld), aber in einem etwas abgeriebenen Exemplar. — In der Grüner'schen Sammlung steckte ein Stück als bei Kristiania gefunden; die Art war zuvor nicht aus Akershus Amt bekannt.

48. *Crambus inquinatellus* Schiff. *c. ab. ambiguellus* Strand *n. ab.*

Diese Art war bei Ose und in Erfjord sehr häufig, und eine grosse Anzahl Exemplare wurden mitgenommen. Die kleinsten Stücke messen 20, die grössten 26 mm.

In Erfjord wurde eine eigenthümliche Form, welche ich als *ab. ambiguellus m.* bezeichne, gefunden. Die Grundfarbe der Vorderflügel bleich ockergelb wie bei der Hauptform, anscheinend ohne irgend andere Zeichnungen als einen kleinen dunklen Längsfleck in der Falte in dem Punkte, wo dieselbe bei gewöhnlich gezeichneten Individuen vom inneren Schrägstreif geschnitten wird. Dieses Fleckchen ist keilförmig, mit der Spitze gegen die Wurzel. Sieht man genauer nach, bemerkt man, wenigstens mit Hülfe einer Loupe, Andeutung beider Schrägstreifen in der Innenrandshälfte der Flügel. Dieselben sind jedoch so undeutlich, dass sie mit unbewaffnetem Auge kaum zu sehen sind.

Ueber das Variiren dieser Art findet sich in der Litteratur nur wenig. Jedoch erwähnt schon Treitschke Abänderungen, so u. a. auch unsere Form, welcher er ganz richtig viel Aehnlichkeit mit *paleella* Hb. zuschreibt.

Ueber eine Monstrosität dieser Form siehe No. 39. *Lithosia lurideola* Zinck.

49. *Crambus tristellus* Schiff. *ab. fuscelinellus* Stph. et *ab. culmella* Hb.

Diese Art war an den besuchten Localitäten selten, indem bei Ose zwei Stück von *ab. fuscelinellus,* in Erfjord und Tou je ein Stück von *ab. culmella* angetroffen wurden; die Hauptform (Hb. 404) wurde gar nicht gefunden.

50. *Platytes cerusellus* Schiff.

Bei Sireosen wurde diese Art, die bei uns bisher nur von Esmark in den Jahren 1845 und 1848 bei Kristiania gefunden war, nicht selten angetroffen; ebenso besitze ich ein Stück aus Siredal. Sie flog an dürren, beinahe vegetationslosen, sonnenwarmen Localitäten, besonders auf sandigen Anhöhen. Das

Weibchen scheint sehr selten zu sein, wenigstens fand ich nur 1 Weibchen bei 44 Männchen.

Mit der Zeit wird die Art wohl an vielen Orten im südlichsten Norwegen aufgefunden werden; aber ein so kleines, unscheinbar gefärbtes Ding entzieht sich ja sehr leicht der Aufmerksamkeit. Ihre Färbung fällt auch so gänzlich mit derjenigen des Bodens der Flugplätze zusammen, und da sie auch sehr kurz und niedrig fliegt, ist es schwer sie zu sehen. — In Schweden ist sie in Skaane und Gotland ziemlich gemein (Wallengren (59)).

51. *Ephestia elutella* Hb.

Diese Art wurde sehr spärlich gefunden und zwar je zwei Stück von Sireosen und Siredal und eins von Erfjord. Sie ist bekanntlich sehr variirend; das Exemplar aus Erfjord hat Aehnlichkeit mit *E. cautella* Wlk. (*fissulella* (Barr.) Leech), ist jedoch sicher *elutella*. Das eine der Siredal-Stücke misst nur 13 mm. (Expansion).

Diese Art war bisher nur in Akershus, Lister u. Mandal, und in S. Bergenhus gefunden.

52. *Salebria fusca* Hw.

An höher gelegenen Localitäten bei Sireosen und in Siredal kam diese in der arctischen Region so gemeine Art stellenweise häufig vor. War im südlichen Norwegen bisher nur in Akershus, Smaalenene und bei Bergen beobachtet worden.

53. *Scoparia sudetica* Z.

Wurde bei Ose und in Erfjord häufig gefunden; bei Sandumsæter pr. Norefjeld ein Stück, das trotz der späten Flugzeit noch schön war.

54. *Scoparia crataegella* Hb.

Wurde in Erfjord in vielen Exemplaren gesammelt.

Was ihr Verhältniss zu *S. frequentella Stt.* betrifft, so muss ich letztere als eine Varietät von *crataegella* ansehen, wenigstens kann ich nach einer sorgfältigen Prüfung der vielen im Kristiania Museum, sowie in meiner eignen Sammlung, vorhandenen Exemplare beider Formen, *kein einziges* stickhaltiges Unterscheidungsmerkmal finden. *Alle* Verschiedenheiten gehen allmählich in einander über. Auch die Raupen sehen nach den vorliegenden Beschreibungen ähnlich aus oder weichen nur in ganz unwesentlichen Punkten ab. Ebenso ist das Raupenleben nach Schmid l. c. bei beiden Formen gleich. In Betreff der behaupteten Verschiedenheiten zwischen den Faltern stimmen die Beschreibungen nicht überein, so z. B. ist nach deutschen Autoren *crataegella*, nach englischen *frequentella* die grösste Art. Auch sind ja schon vielfach die Artrechte von *frequentella* von berufener Seite bestritten worden, so z. B. von Staudinger (60), oder wenigstens angezweifelt worden, so z. B. von Frey l. c., Schmid l. c., Laharpe (61), Steudel (62) u. a. Im Cataloge führt aber Rebel beide Formen als distinkt auf.

55. *Pionea decrepitalis* H. S.

Im Gebirge bei Espetveit in Siredal fing ich ein leider etwas geflogenes Exemplar, das *wahrscheinlich* der angegebenen, bisher nur im arktischen Gebiete gefundenen Art angehört.

56. *Pyrausta cespitalis* Schiff. *c. f. sordidalis* Hb.

Während die Hauptform mir nur in zwei Stück (von Hvaløerne) begegnet ist, habe ich von *sordidalis* 26 gesammelt, wovon 2 von Hvaløerne, 1 von Tou, die übrigen aus Erfjord.

Auch nach meinen früheren Erfahrungen ist *sordidalis* die bei uns häufigste Form. — Ausserdem beobachtete, fing aber nicht, die Art bei Fredrikstad.

57. *Pyrausta purpuralis* L.

Da diese Art im Mai und August gefunden worden ist, muss man wohl zwei Generationen annehmen.

58. *Pyrausta porphyralis* Schiff.

Im kahlen Gebirge bei Hægstøil fing ich am 22. August eine Spinne (*Tarentula aculeata* Cl.), die im Maule die Ueberreste einer *Pyr. porphyralis* trug. Sowohl die Vorder- als Hinterflügel waren so gut erhalten, dass die Bestimmung sicher ist. Sonst ist mir die Art diesmal nicht begegnet.

59. *Oxyptilus hieracii* Z. (?)

Bei Ose fing ich, leider nur in einem einzigen, jedoch gut erhaltenen, Exemplar eine *Oxyptilus*-Art, die jedenfals neu für die Fauna ist, und die unter den bekannten Arten mit *hieracii* am nächsten verwandt ist. Ich werde ein anderes Mal auf diese Sache zuruckkommen.

60. *Platyptilia tesseradactyla* L.

War in den Westlands-Districten bisher nur bei Bergen gefunden. Scheint im arktischen Norwegen am häufigsten zu sein.

61. *Acalla mixtana* Hb.

Von dieser für die Fauna neuen Art fing ich mehrere Exemplare auf Hvaler. Da die Art schon aus Skåne bekannt

war (WALLENGREN (63)), war ihr Vorkommen auch im südlichsten Norwegen kein überraschendes. Die Raupe lebt an Heidekraut.

62. *Amphisa prodromana* HB.

Das Erbeuten dieser Art bei Fredrikstad war ein interessanter Fund, da sie bisher nur in Odalen (SCHØYEN (64)), und bei Odnes (STRAND (48)) gefunden war. Da die Art im ersten Frühjahr fliegt, entzieht sie sich leichter der Aufmerksamkeit der Sammler.

63. *Dichelia rubicundana* H. S.

Die Heimath dieser Art ist eigentlich die arktische Region, wo sie weit verbreitet ist. Im südlichen Norwegen war sie bisher nur in Kristians Amt (SCHØYEN), Hol und Aal (Hallingdal) (STRAND) gefunden worden. Es war daher interessant, noch eine Localität aufzufinden, indem ich ein Stück auf Norefjeld erbeutete.

64. *Cacoecia piceana* L.

Kristiania war bisher der einzige norwegische Fundort dieser Art. Dazu kann ich, wie oben angegeben, Erfjord hinzufügen, indem ich dort ein Stück erbeutete.

65. *Eulia politana* HW.

Auch noch eine für die Fauna neue Art von Hvaløerne. Es gilt übrigens von dieser Art dasselbe wie für *Acalla mixtana* HB., dass ihr Vorkommen auch bei uns zu erwarten war, da sie schon aus Skåne bekannt war. — Die Raupe ist polyphag, und zwar ist sie an *Potentilla, Ranunculus acris, Ledum palustre, Calluna* etc. gefunden worden. BÜTTNER (65) hat in

Pommern zwei Generationen beobachtet, was auch schon von Treitchke angegeben wurde; Meyrick l. c., Heinemann u. a. erwähnen nur eine Generation.

66. *Tortrix Forsterana* F.

Das Vorkommen auf Norefjeld von dieser im südlichen Norwegen nur an wenigen Localitäten beobachteten Art war an und für sich interessant genug, und ebenso bemerkenswerth ist es, dass sie so spät als im September und obendrein in einem schönen Stück gefunden wurde. Die gewöhnliche Flugzeit ist ja der Juni und Juli. Das Norefjeld-Exemplar wäre also mehr als einen Monat verspätet worden.

67. *Conchylis nana* Hw.

Wurde in Mehrzahl bei Sireosen und Siredal gefunden. Nur an wenigen Localitäten im südlichen Norwegen beobachtet.

68. *Conchylis ciliella* Hb.

Die einzige in Schøyens Verzeichniss aufgeführte Localität für diese Art ist Akershus, und zwar wie an einer anderen Stelle (64) berichtet wird Kristiania Umgegend. In der letzteren Arbeit wird aber auch Randøsund als Fundort angegeben. Jedenfalls ist also *ciliella* eine unserer seltensten Arten, so dass ihr Auffinden in Siredal nennenswerth ist. — In Schweden scheint sie nach Wallengren l. c. überall bis zu den Lappmarken verbreitet zu sein; sie wird jedoch nicht in einer von Fredberg (66) publicirten Liste aufgeführt.

69. *Conchylis Hartmanniana* Cl.

Nur ein einziges, ziemlich geflogenes Exemplar wurde bei Ose erbeutet. Im südlichen Norwegen spärlich vorkommend.

70. *Conchylis dubitana* Hb. *v. discordana* Strand *n. v.*

Alle norwegischen Exemplare dieser Art, die ich gesehen habe, weichen von der Figur Hübner's darin ab, dass der schwarze Innenrandsfleck nicht in zwei Flecken, einen grössern wurzelwärts und einen kleineren am Innenwinkel aufgelöst (getheilt) ist.

Letzterer (derjenige am Innenwinkel) fehlt immer an norwegischen Exemplaren, allerdings findet sich dann und wann an dessen Stelle ein olivenfarbener Fleck, der wie derjenige bei Hübner dargestellte gestaltet ist, nur ein wenig breiter; aber auch dieser Fleck ist immer undeutlich und fehlt oft ganz. Das Fehlen dieses schwarzen Fleckes giebt unseren Exemplaren der Art ein von Hübner's Form so abweichendes und characteristisches Aussehen, dass sie mit vollem Recht einen eigenen Varietätsnamen verdienen (*v. discordana* Strand).

71. *Euxanthis angustana* Hb.

Diese Art war bisher nur im südöstlichen Norwegen gefunden und zwar bei Kristiania, Sarpsborg und auf Helgøen (Mjøsen). Bei Sireosen und in Siredal fing ich sie in Mehrzahl, und ein Paar Stück wurden auch aus Erfjord mitgebracht, so dass ihr Vorkommen auch im südwestlichen Norwegen nachgewiesen ist.

72. *Evetria duplana* Hb.

Ein einziges, aber sicheres, Exemplar wurde bei Fredrikstad erbeutet. Bisher war sie nur in Odalen, Akershus Amt (Schøyen (52, 31)), und bei Larkollen (Strand (48)) gefunden.

73. *Olethreutes dimidiana* Sod.

In der arktischen Region weit verbreitet, war diese Art im südlichen Norwegen bisher nur aus Hedemarken (Schøyen) und

bei Bergen (Schneider) bekannt. Ich fing sie in Siredal ziemlich häufig, dagegen wurden bei Sireosen und Hægstøil nur Unica erbeutet. Die weit vorgeschrittene Flugzeit war wohl die Ursache dazu, dass sie so selten bei Hægstøil gefunden wurde.

74. *Olethreutes arbutella* L.

Kam sehr zahlreich sowohl auf Asmal (Hvaløerne) als bei Sireosen vor; an einigen Stellen wimmelte es von diesen schönen Thierchen. In Erfjord fing ich nur ein Stück.

75. *Olethreutes metallicana* Hb.

Weder in Lister und Mandal, Nedenæs noch Stavanger zuvor gefunden, demnach neu für das südwestliche Norwegen.

76. *Olethreutes palustrana* Z.

Ebenso neu für das südwestliche Norwegen. In der arktischen Region anscheinend häufiger.

77. *Olethreutes Schulziana* F.

Diese gemeine und weit verbreitete Art kam diesmal sehr spärlich an den betreffenden Localitäten vor, indem ich nur ein einziges Stück (bei Sireosen) auffinden konnte. In wie weit die Art wirklich so spärlich im südwestlichen Norwegen vorkommt, mögen künftige Untersuchungen klarlegen; die vorliegenden Angaben bieten wenig Aufschluss darüber. Jedenfalls ist die arktische Region die eigentliche Heimath der Art.

78. *Olethreutes rivulana* Sc. cum *ab. Stangeana* Teich.

Bei Ose wurden mehrere Exemplare der Hauptform erbeutet; in Erfjord kam mir ausser einem Stück der Hauptform auch

eins von *v. Stangeana* Teich vor. Letztere Form, die bei uns wohl als Aberration auftritt, ist neu für die Fauna.

79. *Olethreutes lacunana* Dp.

Diese gemeine Art kam mir spärlich vor, indem in Siredal 5 Stück, in Erfjord und bei Norefjeld je eins erbeutet wurden. Bemerkenswerth ist, dass die Art noch im September flog; zwar war aber das Exemplar ziemlich abgerieben.

80. *Olethreutes lucivagana* Z.

Nur ein Stück bei Ose gefangen. Neu für Nedenæs und gehört unter die wenig gemeinen Arten. — Fuchs (67) hat eine zweite Generation beobachtet; bei uns dürfte sie wohl immer nur einmal fliegen.

81. *Olethreutes cespitana* Hb.

Trat an allen oben angegebenen Localitäten in grosser Anzahl auf, so dass er wahrscheinlich der häufigste der dort vorkommenden Wickler war.

82. *Steganoptycha cruciana* L. *(Gyllenhaliana aut.)*.

Neu für Lister und Mandal, Nedenæs und Buskerud. Ebenfalls eine der dies Jahr sehr spät auftretenden Arten, indem sie noch im September flog. — Kam mir überall in 1—2 Exemplaren vor.

83. *Steganoptycha vacciniana* L.

Einer unserer seltensten Wickler, der auch bei Sireosen und in Siredal spärlich vorkam, indem ich nur je zwei Stück auffinden konnte.

84. *Steganoptycha ustomaculana* Curt.

Diese ebenfalls sehr seltene Art wurde nur in einem Stück erbeutet.

85. *Bactra lanceolana* Hb.

Auf feuchten Waldwiesen in Siredal und bei Hægstøil stellenweise in grosser Anzahl.

86. *Epiblema cana* Hw.

Bei Odnes pr. Randsfjord erbeutete ich 1901 ein bis jetzt unbestimmt dastehendes, weil beschädigtes, Exemplar dieser selten vorkommenden Art.

87. *Epiblema nemorivaga* Tengstr.

Bei Sireosen wurde diese Art zahlreich gefunden, auf dürren Heiden stellenweise in Menge fliegend, aber die kleinen, unscheinbaren, niedrig fliegenden Thierchen waren desungeachtet nicht immer leicht zu erbeuten. Aus Lister und Mandal war die Art schon zuvor bekannt, dagegen nicht aus Smaalenene. Sonst ist sie nur in Kristians Amt (Dovre (Wocke (25)), Ringebo (Schøyen)) gefunden.

88. *Epiblema bilunana* Hw.

Von dieser bisher nur bei Kristiania (Siebke) gefundenen Art wurde ein Stück bei Sireosen erbeutet.

89. *Epiblema crenana* Hb.

Ein Unicum von dieser, wie es scheint, immer spärlich vorkommenden Art wurde auf Hvaløerne gefunden. Ihr Vorkommen

in Smaalenene habe ich aber schon zuvor (48) nachgewiesen, ebenso dasjenige in Ryfylke (Suldal). SCHØYEN (31) giebt sie von Akershus, Hedemarken und Kristians Amt an. Sie ist demnach, wenn auch spärlich vorkommend, weit verbreitet. Da sie im ersten Frühlinge fliegt, entzieht sie sich leicht der Aufmerksamkeit.

90. *Ancylis uncana* HB.

Vier Stück auf Hvaler erbeutet. In SCHØYENS Verzeichniss steht sie aus Hedemarken, Kristians Amt und — Finmarken angegeben. Seit dieser Zeit ist sie in Aal, Aasgaardstrand und Hatfjelddalen (STRAND (43, 48, 53)) nachgewiesen, und mit der Zeit wird sie wohl auch in den zwischenliegenden Districten aufgefunden werden. — Die Raupe soll von JOURDHEUILLE (68) auf Heidekraut gefunden worden sein; von WESTON (69) wird sie jedoch auf Birken und Weiden (*Salix repens*) vermuthet.

91. *Ancylis siculana* HB.

Zusammen mit der vorigen Art gesammelt. Zu den wenigen älteren Fundorten sind neuerdings hinzugekommen: Ulefos, Røikenviken (STRAND (42, 48)).

92. *Rhopobota naevana* HB.

Ein Unicum bei Tou; im südwestlichen Norwegen zuvor nur in Suldal (STRAND) gefunden. Uebrigens neuerdings bei Bergen (SCHNEIDER (44)) nachgewiesen; am nördlichsten in N. Trondhjems Amt (nicht S. Trondhjem, wie SCHNEIDER l. c. angiebt) beobachtet.

93. *Simaethis diana* HB.

Ein einziges Stück wurde bei Sandumsæter (Norefjeld) gesammelt. Trotzdem es so spät flog, war es ganz frisch; die

Flugzeit wird übrigens von Wallengren (59) als Juli—August angegeben, von anderen Autoren wird nur der Juli genannt.

94. *Glyphipteryx Haworthana* Stph.

Das Vorkommen dieser Art auf Hvaløerne war etwas überraschend, da sie bisher nur in der arktischen Region, sowie auf Dovre, gefunden war.

95. *Yponomeuta Stannellus* Thbg.

Nur ein Stück bei Sireosen erbeutet. Bisher nur in Akershus und Kristians Amt gefunden.

96. *Argyresthia retinella* Z.

Ich fing zwei Stück in Erfjord, zahlreiche bei Hægstøil. Die letzteren wurden sämmtlich an Birken gefangen; Weiden kamen in der nächsten Nähe nicht vor. Ich möchte desshalb Büttner (65) beistimmen, wenn er die Raupe eher an Birken als an Weiden vermuthet. Auch giebt Meyrick l. c. an: „Larva in shoots of birch"; Weiden nennt er nich. Die alte Frey-Wocke'sche Angabe von Sahlweiden als Raupennahrung dürfte desshalb nur ausnahmsweise richtig sein. Sie gründet sich vielleicht nur darauf, dass Zeller (70) die Art an Sahlweiden beobachtet hatte und daraus geschlossen „dass sie ohne Zweifel auch als Raupe daran lebt" (l. c.), also ohne den Falter erzogen und den Beweis für seine Vermuthung gebracht zu haben.

97. *Argyresthia Goedartella* L. *c. ab. litterella* Hw. et *ab. oppositella* Strand *n. ab.*

Unter den 42 Stücken, die ich von Tou mitbrachte, gehörten 11 der *ab. litterella* Hw. an; dieselbe kam demnach ziemlich

häufig am Orte vor. — Auch in den baltischen Provinzen ist diese Form (von NOLCKEN l. c.) ziemlich häufig beobachtet worden; andere Autoren geben sie als selten an.

Ausserdem fand ich einige Exemplare, die der von ZELLER l. c. als *var. d.* beschriebenen Form angehören. Sie zeichnet sich dadurch aus, dass der hintere Ast der goldbraunen Gabelbinde in der Mitte sich mit der Saumbinde verbindet, wodurch der schräge bindenförmige Raum der weissen Grundfarbe in zwei Gegenflecke getrennt wird. Diese Form, die bei uns anscheinend nicht selten ist, dürfte einen eigenen Namen verdienen; ich nenne sie *ab. oppositella m.* Drei Exemplare von Tou, sowie das einzige bei Ose gefundene, gehören der neuen Aberration an. Nach den Angaben anderer Verfasser sollte sie sehr selten sein; so kannte ZELLER nur ein einziges Stück davon und NOLCKEN hatte sie nie gefunden, trotzdem er die Art „in manchen Jahren in ungeheuren Schaaren" (l. c.) beobachtet hatte.

Arg. Goedartella wird hier zum ersten Mal aus Nedenæs und Stavanger angegeben.

98. *Argyresthia arceuthina* Z.

Wurde sowohl bei Sireosen als in Siredal nicht selten angetroffen und in vielen Exemplaren mitgebracht. War bisher nur von SIEBKE bei Kristiania gefunden worden (SCHØYEN (64)). In Schweden ist sie auch selten beobachtet worden: Skåne, Gotland (WALLGR. (71)), Dal (FREDBERG l. c.).

99. *Argyresthia praecocella* Z.

Auf Hvaløerne wurden mehrere Exemplare dieser Art gefangen, was um so interessanter war, als die Art bisher nur mit Zweifel für Norwegen angegeben (SCHØYEN (64)) und in Schweden meines Wissens gar nicht beobachtet worden ist; aus Finnland

wurde sie jedoch aufgeführt (Tengström (72)). — Nach Heinemann (73) lebt sie an Wachholder.

100. *Cedestis Gysseleniella* Dp. *c. ab. lativittella* Strand *n. ab.*

Bei Sireosen wurden zwei Stück gesammelt. Das eine bildet eine eigenthümliche Aberration, indem die zweite, hell goldbraune Binde stark erweitert und zwar bis zum Querast ausgedehnt ist, so dass sie ungefähr die Hälfte der Flügellänge bedeckt. Sie ist saumwärts gerade abgeschnitten und nicht besonders scharf markirt. Ich nenne diese Form *ab. lativittella m.*

Bisher war *Ced. Gysseleniella* nur bei Kristiania (Esmark sec. Schøyen) und in Suldal (Strand) gefunden.

101. *Cedestis farinatella* Dp.

Wurde zusammen mit der vorigen Art und zwar in mehreren (8) Exemplaren gefunden. Sonst nur von Kristiania bekannt.

102. *Plutella maculipennis* Curt. *f. major* Strand *n. f.*

Bei Norefjeld wurde ein Stück (also von II. Gen.) gefangen, das auf den ersten Blick an *P. annulatelta* erinnerte, indem es so gross wie letztere war (18 mm. Exp.), bei genauerer Untersuchung sich jedoch in allen Puncten als zu *P. maculipennis* gehörend erwies. Es ist dunkel, selbst am Innenrand dunkelbraun gefärbt; die Zeichnung ist dennoch deutlich. Für diese auffallende Form möchte ich den Namen *f. major m.* vorschlagen; dieselbe ist wahrscheinlich für die zweite Generation characteristisch.

103. *Cerostoma vittella* L.

Von dieser bisher nur bei Kristiania gefundenen Art fing ich ein Stück bei Sandumsæter (Norefjeld).

104. *Cerostoma parenthesella* L.

Zwei Stück bei Ose erbeutet. — Bisher war sie bei Kristiania (Siebke l. c.), Bodø (Wocke (74)), in Hatfjelddalen, Lavik und Suldal (Strand (42, 53, 48)) gefunden worden.

105. *Bryotropha terrella* Schiff.

In Erfjord wurden zahlreiche Exemplare, bei Tou und Sireosen einige wenige, in Siredal und bei Ose ein Paar Stück gesammelt. Die Exemplare von Ose sind übrigens so abgerieben, dass die Art nicht mit voller Sicherheit bestimmbar ist; nur so viel ist abgemacht, dass es eine *Bryotropha* von der Grösse der *terrella* gewesen ist, und es ist dann wahrscheinlich diese Art gewesen.

Bryotropa decrepitella H. S. ist mir nicht vorgekommen. Nach Siebke l. c. soll sie bei Næs in Nedenæs von Schneider gefunden worden sein. Aus Schweden ist sie erst neuerdings angegeben worden (Andersson (75)); Wallengren (71) kannte sie nicht.

106. *Bryotropha umbrosella* Z.

Bei Sireosen wurden ein Paar Stück dieser Art gefunden. Sie war bisher nur aus Beiern, Maalselvdalen (Schneider (8, 76)), Saltdalen (Schøyen (55)) und Tysfjorden (Strand (42)) bekannt und ist demnach neu für das südliche Norwegen.

107. *Gelechia distinctella* Z.

Bei Ose wurden mehrere Exemplare dieser für die Fauna neuen Art gesammelt. Da sie schon längst aus dem südlichen Schweden bekannt war (Wallengren (71)), war es ja kein Wunder, dass sie auch in Norwegen gefunden wurde. Auch aus Finnland, den Ostseeprovinzen, Norddeutchland, Dänemark,

England, also aus allen Nachbarländern Norwegens, war sie seit lange angegeben. — Ueber die Raupe ist anscheinend nichts sicheres bekannt; Frey l. c. vermuthet: „vielleicht an *Thymus serpyllum*“, Schmid l. c. berichtet, dass „die Raupe soll im April in einer Seidenröhre im Moss an Steinen leben“.

108. *Gelechia ericetella* Hb.

Auf Hvaløerne wurden zahlreiche Exemplare dieser Art erbeutet. Die meisten gehören *f. ramentella* Hein. an. Einige Stücke fing ich bei Sireosen und viele, meist stark geflogene, in Siredal.

Während *G. ericetella* zahlreich auf Hvaløerne vorkam, begegnete mir daselbst von *G. velocella* Dup. nur ein Unicum.

109. *Gelechia galbanella* Z.

Nur zwei Stück in Erfjord gefunden. — Es ist eine über das ganze Land verbreitete, aber spärlich vorkommende Art, die bisher an folgenden Localitäten beobachtet wurde: Kristiania (Siebke), Romsdal, Saltdalen (Schøyen), Alten (Wocke), Hatfjeldalen, Kaafjord und Komagfjord (Strand). — Aus den bisherigen Beobachtungen scheint hervorzugehen, dass sie in der arktischen Region am häufigsten ist; im südlichen Norwegen kommt sie besonders in den Westlandsdistricten vor.

110. *Gelechia continuella* Z.

Ebenso spärlich über das ganze Land verbreitet; aber in den Westlandsdistricten bisher nicht beobachtet. — Ihre europäische Verbreitung ist im ganzen genommen eine östliche; so fehlt sie in England und Frankreich, kommt dagegen in Deutschland, in den Alpen, den Ostseeprovinzen etc. vor. Im östlichen Russland fehlt sie nach den Arbeiten Krulikowsky's.

111. *Gelechia virgella* Thbg.

Wurde auf Hvaløerne und in Siredal häufig gefunden, bei Sireosen und Hægstøil dagegen in bezw. ein und zwei Exemplaren. Bemerkenswerth ist es, dass sie noch bei Hægstøil (d. h. nach Mitte August) flog. Ihre eigentliche Flugzeit ist ja im Vorsommer, selbst in der arktischen Region fliegt sie nur ausnahmsweise so spät als im Juli. Ich habe sie dort nur dreimal im Juli angetroffen und zwar im Gebirge Sandskarfjeldet (Susendalen) am 25. Juli 1899 (53), auf Hammerø in der ersten Hälfte von Juli und in Tysfjorden Mitte Juli 1900 (42); in Finmarken fand ich sie nur im Juni (48). Schneider hat sie, soweit ich aus seinen Schriften herausfinden kann, nur einmal nach dem 1. Juli gefunden, und Schøyen fand sie in Saltdalen Anfang Juli. Von ausländischen Verfassern weiss, so viel ich erinnern kann, nur Frey l. c. davon zu berichten, dass sie noch im Juli und August fliegt; dies ist aber nur in den Hochalpen der Fall. — Jedenfalls ist der Fund bei Hægstøil von Interesse; wären nicht die zwei Stück ein wenig geflogen, könnte man versucht sein, sie als einer zweiten Generation angehörend anzusehen.

Nach unserem jetztigen Wissen fehlt die Art dem Westlande ganz. Mit der Zeit wird sie jedoch wohl auch dort aufgefunden werden.

112. *Gelechia* (Lita) *leucomelanella* Z.

In Siredal und Erfjord selten angetroffen (bezw. 1 und 3 Exp.). — Im westlichen Norwegen bisher in Romsdal (Schøyen (45), Lavik und Suldal (Strand (77)) gefunden.

113. *Xystophora tenebrella* Hb.

Diese bei uns nur selten beobachtete, aber sicherlich weit verbreitete, Art wurde in Siredal und bei Sireosen in Mehrzahl,

an den anderen angegebenen Localitäten in Unica erbeutet. Ein Viertel der Exemplare war Weibchen.

Im westlichen Norwegen bisher nur aus Romsdal angegeben.

114. *Semioscopis strigulana* Schiff.

Drei Stück auf Hvaløerne erbeutet. — Zuvor nur aus Saltdalen (Schøyen (85)) und Hallingdal (Strand (43)) bekannt. — Dass die Flugzeit in den Frühling fällt, ist oft die Ursache dazu, dass Arten als „selten“ angesehen werden, die es gar nicht sind.

115. *Depressaria arctica* Strand.

Es war mir eine grosse und angenehme Ueberraschung, diese bisher nur im hohen Norden (78) gefundene Art in zwei Exemplaren auf Norefjeld zu erbeuten. Es ist ein neues Zeugniss davon, wie eng die arktische Fauna mit derjenigen der Hochgebirge des südlichen Norwegens verbunden ist. — Die Exemplare sind ein wenig geflogen, jedoch nicht mehr, als dass die Bestimmung zweifellos richtig ist. Sie weichen in nichts von meinen Typenexemplaren ab.

Nach mündlicher Mittheilung des Herrn Sparre Schneider hat auch er die Art in der arktischen Region angetroffen.

116. *Depressaria heracliana* D. G.

Bei Bølingshavn (Kirkeøen, Hvaløerne) wurden mehrere Exemplare erbeutet. Sie war bisher nur bei Kristiania (Siebke) und in Nedenæs (Schneider) gefunden worden.

117. *Depressaria ciniflonella* Z.

Wurde im December 1902 in mehreren Exemplaren in Aal erbeutet. Sie überwinterten unter der Rinde von halbverfaulten

Espen (*Populus tremula*). — Ebenso wurde in Aal zu derselben Zeit *D. applana* gesammelt, theils unter Rinde von Kiefern und Fichten, theils unter Steinen.

Depr. ciniflonella ist bis jetzt nur an wenigen Localitäten beobachtet worden, geht aber gegen Norden sogar bis zu Südvaranger (Schneider (79)).

118. *Borkhausenia pseudospretella* Stt.

Bei Tou wurde ein Stück erbeutet, das dritte, das bis jetzt in Norwegen gefunden worden ist. Es ist von normaler Grösse und weicht in nichts von dem gevöhnlichen Aussehen der Art ab. (Cfr. Strand (48)). — Die anderen Fundorte der Art sind Kristiania (Schøyen) und Stavanger (Strand).

119. *Borkhausenia fuscescens* Hw.

Ein Stück in Erfjord gefangen. — Bisher nur in Geiranger, sowie in Kristians und Akershus Amt (Schøyen) gefunden.

120. *Scythris disparella* Tengstr.

Ich fing ein Stück bei Sireosen von dieser für Skandinavien neuen Art. Nach Staudinger-Rebels Catalog kommt sie in den Alpen, Holland, Livland und Finnland vor. Sie wurde aber auch aus Württemberg (Steudel l. c.) angegeben.

121. *Scythris variella* Stph.

Bei Skibstadsand auf Asmal (Hvaløerne) sammelte ich zahlreiche Exemplare dieser Art. Auf sandigen Abhängen in der Nähe des Meeres „hüpften“ sie in Menge, paarten sich und liessen sich ganz ruhig einschachteln. Einige waren ganz frisch, andere etwas geflogen. — Die Art ist neu für die Fauna

Norwegens. WALLENGREN führt sie (71) als in Schweden vorkommend auf die Autorität ZELLER's hin an; dagegen giebt er die nahestehende *Scythris siccella* Z. als in Skåne und Gotland gefunden an. In REBELS Catalog wird aber diese letztere nur als in Mitteleuropa, Italien und fraglich in Finnland angegeben, während *Sc. variella* als in Schweden vorkommend aufgeführt wird. Demnach hätte WALLENGREN die Arten verwechselt.

122. *Coleophora anatipennella* HB.

Unicum in Siredal gefunden. Neu für die Fauna. — Aus Schweden schon längst bekannt und daselbst weit verbreitet. Die Raupe an Sahlweiden, *Prunus spinosa*, *Tilia* und verschiedenen Waldbäumen.

123. *Coleophora gryphipennella* BCHÉ.

Ebenso nur ein Stück erbeutet (Tou) und gleichfalls neu für die Fauna. — Die Raupe soll die Blätter von Rosen ausminiren. — Auch diese Art ist seit lange aus den Nachbarländern bekannt.

124. *Elahista Gleichenella* F.

Wurde bei Sireosen in einem Stück gefangen. In Norwegen bis jetzt nur aus Tysfjorden bekannt (STRAND).

125. *Elachista albidella* TENGSTR.

Drei Exemplare wurden bei Sireosen gefangen. War bei uns bisher nur in Ørskog (Romsdal) (SCHØYEN (45)) gefunden; in Schweden kommt sie ziemlich weit verbreitet vor.

126. *Gracilaria syringella* F.

In Erfjord wurden 3 Stück dieser zuvor bei Kristiania (Siebke), Romsdal (Schøyen), Bergen (Schneider), Sande in Jarlsberg, Kristiania, Lavik (Strand) gefundenen Art erbeutet.

127. *Gracilaria alchimiella* Sc.

Ein Stück auf Hvaløerne gefunden. Sonst ist sie von Kristiania (Siebke), Suldal und Kristiania (Strand) bekannt.

128. *Gracilaria phasianipennella* Hb.

Zwei Stück auf Hvaløerne gesammelt. War zuvor in der Aberration *quadruplella* Z. von Sandberg in Aurdal gefunden (Schøyen (64)). Die Hauptform wird demnach jetzt zum ersten mal in die Fauna eingeführt.

129. *Ornix avellanella* Stt.

Auf Hvaløerne wurden zwei Stück dieser für die Fauna neuen, in Schweden aber weit verbreiteten, Art gefunden. Die Raupe soll in Haselnussblättern leben.

130. *Ornix torquilella* Z.

Ein nicht ganz reines Stück aus Siredal scheint dieser ebenfalls für die Fauna neuen Art anzugehören. Aus Schweden giebt sie Wallengren l. c. nur aus Skåne an; ebenso wird sie aus Finnland aufgeführt. (Tengstrøm (72)). — Die Raupe lebt an den Spitzen der Schlehenblätter.

131. *Lithocolletis Cramerella* F.

Mehrere Exemplare wurden auf Hvaløerne gesammelt. Sonst ist sie bei Kristiania (Schøyen (80)), Kristiania, Skien, Ulefos (Strand (42)) gefunden worden.

132. *Lithocolletis alniella* Z.

Wurde in zahlreichen Exemplaren auf Asmal (Hvaler) an Erlengehölz gesammelt. — In Norwegen ist sie sonst nur bei Vallø (STRAND (48)) gefunden; im südlichen Schweden ist sie nach WALLENGREN eine der häufigeren *Lithocolletis*-Arten.

133. *Lithocolletis alpina* FREY.

Ein bei Ose gesammeltes Stück gehört wahrscheinlich dieser Art an.

134. *Lithocolletis strigulatella* Z.

Viele Exemplare bei Ose gesammelt.

In REBELS Catalog wird L. *alpina* FREY als sichere norwegische Art angeführt, dagegen wird für *strigulatella* Z. unter den Patria-Angaben „? Scand. (an *alpina* Frey?)“ notiert. Die Auffassung von *alpina* als sichere, *strigulatella* als unsichere norwegische, bezw. skandinavische, Art gründet sich wahrscheinlich darauf, dass ZELLER s. Z. ein von SCHØYEN erhaltenes Exemplar als *Lith. alpina* FREY bestimmte, unter welchem Namen auch das Stück in SCHØYEN's Uebersicht der arktischen Lepidopteren erwähnt wird. Aber wie SCHØYEN später (55) konstatiren konnte, war diese ZELLER'sche Bestimmung nicht richtig; das Exemplar war in der That eine *strigulatella*. Diese Berichtigung SCHØYEN's hat wohl REBEL nicht gesehen oder sie auch als unzuverlässig angesehen, wenn er oben angeführtes in seinem Cataloge schreibt. Gewiss ist es dennoch, dass wie von WOCKE (74), SIEBKE, SCHØYEN, WALLENGREN (81) und mir angegeben, die in Skandinavien weit verbreitete und gemeine Art der „Formenkreis“ *strigulatella-alpina* wirklich *strigulatella* Z. ist; ob auch *alpina* FREY hier vorkommt, ist noch nicht ganz abgemacht; jedenfalls ist sie hier viel seltner als *strigulatella* Z.

Die Patria-Angaben im Cataloge wären daher dahin zu verbessern, dass *strigulatella* als die sichere, *alpina* als die unsichere skandinavische Art anzugeben wäre.

135. *Lithocolletis ulmifoliella* Hb.

Gesammelt wurden 3 Stück in Siredal und eins auf Hvaløerne. Letzteres ist nicht ganz rein, so dass die Bestimmung nicht ganz sicher ist. Die Art ist zuvor von Dovre (Wocke), Tromsø (Schneider), Alten (Wocke), Kristiania (Strand) angegeben worden.

136. *Lithocolletis spinolella* Dp.

Nur ein Stück von Hvaløerne; dasselbe ist obendrein ein wenig zweifelhaft, weil nicht ganz rein. Das Vorkommen auf Hvaløerne ist übrigens ein wenig überraschend, indem nach den bisherigen Angaben diese Art in der arktischen Region Skandinaviens ihre Heimath haben sollte. Sie wurde in Norwegen bisher bei Rognan (Schilde sec. Schøyen (55)), in Alten (Wocke), bei Sopnes (Strand) beobachtet. Von Wallengren wurde sie s. Z. (71) nur aus „Lapponia Sueciae“ angegeben; in seiner Monographie dieser Gattung (81) giebt er sie als über das ganze Land verbreitet an. Die letztere Angabe ist wohl die richtigste.

137. *Lithocolletis Blancardella* F.

Ausser einigen zweifelhaften wurden 4 Stück dieser Art bei Skibstadsand (Hvaløerne) erbeutet; ausserdem 2 Stück der ab. *conjunctella* Sorh. (confluella Strand). In Siredal fing ich ein Stück. — Bisher war sie nur bei Kristiania (Schøyen, Strand) gefunden.

138. *Lithocolletis junoniella* Z.

In Erfjord wurden zwei sichere Exemplare, bei Tou ein zweifelhaftes (geflogenes) gefunden. Sonst ist die Art aus Alten (Wocke), Tysfjorden und Susendalen (Strand) bekannt.

139. *Lithocolletis quinqueguttella* Stt.

Diese war einer der besten *Lithocolletis*-Fünde von Hvaløerne, indem die Art, soweit ich herausfinden kann, neu für Skandinavien ist. Nur zwei Stück wurden erbeutet. Im Lepidopteren-Cataloge wird die Verbreitung der Art als Norddeutschland, Holland, Schweiz und England angegeben. Sie wurde aber auch aus den baltischen Provinzen (Teich 24)) gemeldet. Jedenfalls ist der Nachweis ihres Vorkommens in Skandinavien interessant. Die Raupe miniert nach Sorhagen (82) in den Blättern von *Salix repens* und *S. fusca* in unterseitiger Mine.

Die von Sorhagen l. c. gegebene Abbildung gewährt guten Nutzen zur leichteren und sicheren Bestimmung der Art.

140. *Lithocolletis quercifoliella* Z.

Mehrere Exemplare auf Asmal gefangen. Sonst war sie nur bei Kristiania (Strand) gefunden.

141. *Lithocolletis betulae* Z.

Ein einziges, aber zweifelloses Stück in Siredal gefunden. Zuvor war die Art bei uns nur in Saltdalen von Schilde gefunden worden. Wallengren giebt sie nur aus dem südlichen Schweden an (81).

142. *Lithocolletis stettinensis* Nic. cum *ab. bistrigella* Strand *n. ab.*

Wieder eine für Skandinavien neue Art. Sie kam auf Asmal häufig vor, so dass ich zahlreiche Exemplare einsammeln konnte. Ein Paar Stück davon, die in allem übrigen mit *stettinensis* übereinstimmen und auch zusammen mit zweifellosen Exemplaren letzterer gefunden wurden und desshalb wohl nur eine Aberration davon bilden, zeichnen sich dadurch aus, dass die Anzahl der Costalflecke zwei statt drei ist, indem der äusserste (derjenige, welcher der Spitze am nächsten stehen sollte) verschwunden ist. Ich nenne diese Aberration *bistrigella* m.

Mit Ausnahme von Schweden wird die Art sonst aus den Nachbarländern Norwegens angegeben. Die Raupe miniert in *Alnus glutinosa* in oberseitiger Mine.

143. *Opostega salaciella* Tr.

Bei Sireosen wurden mehrere Exemplare, in Siredal, Erfjord und Ose Unica erbeutet. In Norwegen nur einmal zuvor gefunden und zwar bei Porsgrund (Strand). In Schweden nur in Skåne gefunden (Wallengren (83)).

144. *Talaeporia tubulosa* Retz.

Aus einem auf Kirkeøen (Hvaløerne) am 20. Mai gefundenen Sack schlüpfte der Falter am 20. Juni. — Zuvor nur an ein Paar Localitäten im südlichsten Norwegen (Kragerø, Mandal (Schøyen (85)) gefunden. Unsere zweite *Talaeporia*-Art, *T. borealis* Wk., ist dagegen über das ganze Land verbreitet.

145. *Acrolepia cariosella* Tr.

Zwei Stück in Siredal gefunden. — Nach den vorliegenden Beschreibungen scheint es mir, dass die Exemplare mit wenig-

stens ebenso viel Recht zu *A. arnicella* Heyd. zu ziehen wären. Da ich inzwischen von letzterer Art kein Vergleichsmaterial besitze und von *A. cariosella* nur mit einem einzigen Stück vergleichen kann, ziehe ich bis auf weiteres meine Exemplare zu der sowohl bei uns als in den Nachbarländern gefundenen Art *A. cariosella* Tr.

146. *Rösslerstammia Erxlebella* F.

Neu für die Fauna. Ein Stück aus Siredal. Diese Art ist meines Wissens in Skandinavien seit Thunberg's Tagen nicht gefunden. Wallengren (71) giebt sie nämlich als schwedische Art nur auf die Autorität Thunberg's hin an. Obendrein wird die Thunberg'sche Beschreibung seiner *Tinea Erxlebella* von Werneburg (84) als sich auf *Nemotois cupriacellus* Hb. beziehend gedeutet; falls diese Deutung die richtige, wäre also die Art nie zuvor in Skandinavien gefunden worden. Da aber *R. Erxlebella* in allen Nachbarländern, wenn auch überall spärlich, vorkommt, wäre es auffallend, falls sie in Skandinavien gänzlich fehlen sollte.

147. *Scardia boleti* F.

Ein Stück bei Sireosen. Sonst nur bei Kristiania und in Odalen gefunden.

148. *Phylloporia bistrigella* Hw.

Ein Stück aus Siredal. — Im südlichen Norwegen war sie bisher nur auf Dovre (Wocke) gefunden. In der arktischen Region ist sie weiter verbreitet; ich habe sie dort auf Hadsel und in Tysfjorden gefunden (77).

149. *Incurvaria pectinea* Hw. cum *ab. costimaculata, ab. dorsimaculata, ab. demaculata, ab. analimaculata* et *ab. plicamaculata* Strand *nn. abb.*

Von dieser Art wimmelte es auf Kirkeøen (Hvaløerne) und zahlreiche (80) Exemplare wurden mitgenommen. Darunter finden sich sechsmal so viel Männchen als Weibchen. Von den von Zeller (86) angeführten Varietäten finden sich in diesem Materiale die folgenden vertreten.

Von Var. b Z., welche sich durch weisse verloschene Tröpfchen auf dem Vorderrande auszeichnet, habe ich nur ein einziges Stück und zwar ein Weibchen, das ein weisses Tröpfchen bei 2/3 des Vorderrandes hat. Auch Zeller's einziges Stück dieser Form war weiblichen Geschlechtes. Ich nenne diese Form *ab. costimaculata* m.

Var. c Z., die keinen Analfleck besitzt, ist durch 4 Männchen vertreten. Der Innenrandfleck ist gross und sehr deutlich; die einzige Andeutung eines Analflecks ist, dass die Franzen an der betreffenden Stelle ein wenig aufgeblickt sind. Da diese Form sehr characteristisch ist und anscheinend nicht eben selten vorkommt, möge sie mit vollem Recht einen eigenen Namen tragen. Ich nenne sie *ab. dorsimaculata* m. Auch die beiden Zeller'schen Exemplare waren Männchen.

Var. d Z., welcher der Dorsalfleck fehlt, die anstatt dessen dagegen einen Plicalfleck besitzen soll, ist mir nicht vorgekommen. Zeller kannte davon nur ein einziges Weibchen.

Var. e Z., die keine Flecke besitzt, also ganz einfarbig ist, scheint ziemlich häufig vorzukommen, indem 7 meiner Exemplare dazu gehören; auch Herrn Zeller war diese Form in Mehrzahl vorgekommen. Aber nur im männlichen Geschlecht ist sie bis jetzt bekannt. Ich schlage den Namen *ab. demaculata* m. für dieselbe vor.

Ebenso häufig ist unter meinen Exemplaren eine von Zeller nicht gekannte Form, die einen Analfleck, aber keinen Dorsal-

fleck besitzt, und die ich als *ab. analimaculata* m. bezeichne. Auch nur durch Männchen vertreten.

Auch zwei andere von Zeller nicht beschriebene Formen mögen erwähnt werden. Die eine, wovon ich ein einziges Männchen erbeutete, besitzt keine der oben gedachten Flecke, hat dagegen in der Falte an der Stelle, wo bei der ausgebildetsten Zeichnung die Spitze des Dorsalflecks ist, ein eiförmiges, helles Tröpfchen. Diese Form stimmt demnach so ziemlich gut mit Var. d Z. überein, nur dass diese letztere sich auch eines Analfleckes erfreut. Diese beiden Formen, die also mit Plicalfleck versehen, dagegen bald mit, bald ohne Analfleck sind, mögen mit dem Namen *ab. plicamaculata* m. bezeichnet werden. Der Plicalfleck ist offenbar als ein besonders gebildeter Dorsalfleck aufzufassen.

Noch eine neue Form besitze ich, die sich dadurch auszeichnet, dass zwischen dem Analfleck und der Falte, dem Saume ein wenig näher, sich ein heller, übrigens sehr verwischter, Fleck findet. Diese Form liegt nur in zwei Männchen vor.

Es ergiebt sich also, dass von meinen 80 Exemplaren 22 mehr oder weniger von der Hauptform abweichen, während 58 mit derselben zusammenfallen. Die Art dürfte demnach als eine zum Variiren ziemlich geneigte anzusprechen sein. Auch in Betreff der Grösse sind erhebliche Verschiedenheiten wahrnehmbar. Während die Weibchen gewöhnlich 15—16 mm. messen, finden sich Exemplare, die nur 11 mm. sind; die Flügelspannung der Männchen schwankt zwischen 12 und 15 mm. Die Farbe der Kopfhaare ist in vielen Fällen schwarz oder schwärzlich.

150. *Incurvaria muscalella* F.

Ein schönes und desshalb sicher bestimmbares Männchen, sowie ein abgeflogenes, unsicheres, Weibchen wurden bei Sireosen gefangen. Im südlichen Norwegen war diese Art bisher nur bei Vallø (Strand) gefunden.

151. *Adela cuprella* Schiff.

Der Fang dieser Art bei Fredrikstad war insofern von Interesse, als sie bisher nur bei Kristiania (Schøyen, (80)), Vallø und Skien (Strand (42, 48)) gefunden war.

152. *Eriocrania fastuosella* Z.

Mehrere Exemplare auf Hvaløerne erbeutet. Sonst nur bei Kristiania gefunden.

153. *Micropteryx aureatella* Sc.

Nur ein Stück dieser, wohl die gemeinste unserer Micropterygiden, wurde in Siredal gefunden.

C. Verzeichniss der citirten Litteratur.

1. Wallengren: Skandinaviens dagfjärilar. Malmø 1853.
2. Treitschke: Schmetterlinge von Europa.
3. Herrich-Schäffer: Systematische Bearbeitung der Schmetterlinge von Europa.
4. Frey: Die Lepidopteren der Schweiz. 1880.
5. Nolcken: Lepidopterologische Fauna von Esthland, Livland und Kurland. („Arbeiten des Naturforscher-Vereins zu Riga". N. F. 2—4 (1868—71)).
6. Hensel: Ueber die *Argynnis pales*-Formen. („Berliner entom. Zeitschrift", H. 3—4 (1900)).
7. Engramelle et Ernst: Insectes d'Europe. Paris 1779.
8. Sparre Schneider: Tromsø Lepidopterfauna. („Tromsø Museums Aarshefter", 15).
9. — Oversigt over de i Nedenes Amt bemerkede Lepidoptera. („Kristiania Vidensk.-Selskabs Forh." 1882).
10. Fuchs: Macrolepidopteren der Loreley-Gegend u. verwandte Formen VI. („Jahrb. d. Nassauischen Vereins f. Naturk." 52).
11. Meigen: Systematische Beschreibung der europäischen Schmetterlinge. 1829.
12. v. Prittwitz: Die Generationen und Winterformen der in Schlesien beobachteten Falter. (Stett. entom. Zeit." (1861)).
13. Jablonsky u. Herbst: Natursystem aller bekannten in- und ausländischen Insecten. Schmetterlinge. 1782—1804.
14. Aurivillius: Nordens fjärilar. 1891.
15. Bang-Haas: Fortegnelse over de i Danmark levende Lepidoptera. („Naturhistorisk tidsskrift", 3 R. 9, 10, 13).
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Trykt den 11te April 1904.

Bemerkninger til Myntmester Münsters „Nye norske Coleoptera".

Av

Embr. Strand.

Hr. Myntmester Münster har i sin opsats om nye norske Coleoptera (i dette tidsskrifts 41. bind, 3. hefte) skrevet en petitanmerkning paa $1^1/_2$ side + et par mindre anmerkninger for at paavise, at mine coleopterologiske arbeider har liden videnskabelig værdi. I den anledning skal jeg herved tillade mig at komme med nogle bemerkninger, idet jeg forbeholder mig senere ved given leilighed at komme tilbage til sagen. Da jeg nemlig for tiden opholder mig i udlandet og hverken har min samling eller synderlig av litteratur, i hvert fald ikke av skandinavisk coleopterologisk litteratur, til disposition og desuden er optaget med ganske andre zoologiske studier, saa kan jeg nu ikke i alle tilfælde give fuld udredning; dette skal der forhaabentlig senere blive anledning til.

Jeg har, netop for at sikre mig, at mit materiale kunde blive saa rigtig bestemt som overhovedet muligt, sendt dette til Europas første specialister, som f. eks. Bernhauer og Fauvel. Dette er efter hr. Münsters mening ganske forkjert. Hr. Münster hævder den anskuelse, hvorom han vistnok turde være saa temmelig alene, at bestemmelser og faunistiske arbeider kun kan blive paalidelige, naar de udføres av indenlandske fagmænd. Tiltrods for at Fauvel og Bernhauer i lange tider udelukkende har studeret staphylinider og vel at merke staphylinider fra de forskjelligste lande, saa er de dog ifølge hr. Münster ikke kompetente til at give paalidelige bestemmelser av norske staphylinider; det kan kun norske fagmænd. — Konsekvenserne af dette hr. Münsters princip turde blive av en noksaa eiendommelig art. Saaledes vil alt hvad Bernhauer eller Fauvel har skrevet om respektive ikke-østerrigske eller ikke-franske arter blive at anse for upaalideligt; saalænge f. eks. Fauvels bestemmelser af nordafrikanske staphylinider ikke „er granskede og påny gjennemgåede" av en afrikaner, tør hr. Münster ikke stole paa dem.

Tachinus scapularis Steph. fra Kongsberg og Vefsen skal være *T. laticollis* Grav. ifølge hr. Münster. Dr. Bernhauer har bestemt mig vedkommende eksemplarer som *scapularis* og i tillid dertil har jeg optaget dem i min fortegnelse i „Arch. f. math. og naturv." XXII, nr. 3, under dette

navn. Hvorvidt der foreligger nogen forveksling for de til universitetsmusæet indleverede eksemplarers vedkommende, og hvordan den kan være foregaaet, fra Bernhauers eller min side, derom kan jeg nu ikke sige noget bestemt. I hvert fald er Münsters „sic!" i dette tilfælde ganske unødvendigt; thi arterne er ifølge alle forfattere nærstaaende (saaledes opfører f. eks. Erichson: Genera et spec. Staph., pag. 261, *Tachinus pallipes* var. (= *scapularis* Stph.) som nr. 28, *T. marginellus* (= *laticollis* Gr.) som nr. 31 og sammenligner begge med *T. rufipes*; likesaa behandles de som nærstaaende i Dejeans Catalogue des Coleoptères, pag. 80, og i Reitters katalog), hvorfor i tilfælde en forveksling vilde være baade lettere forstaaelig og mere undskyldelig.

Hr. Münster fortæller, at Siebkes *Tachyporus brunneus* er synonym med *Tachyporus nitidulus* Fbr. Dette skulde man saavist ikke have ventet; thi paa Siebkes tid var den almindelige antagelse netop den, at *T. brunneus* rigtignok var synonym med *T. nitidulus* Oliv., men ikke med *nitidulus* Fbr. (= *hypnorum* Fbr. if. Gemminger og Harolds kat.). (Cfr. herom Erichson l. c. pag. 234 og 241; Kraatz: Naturg. d. Ins. Deutschlands, II, pag. 423; Gemminger og Harolds kat. o. s. v.). At Siebke i dette synonymispørsmaal skulde have dannet sig en selvstændig mening, modsat nævnte autoriteters, er der ingen grund til at tro, og at han overhovedet opfører arten som *brunneus*, tyder paa, at han ikke har anset sin form for synonym med *nitidulus* Fbr., da han i saa fald vilde brugt dette, det ældste, navn. Saa det er ganske ugrundet, naar hr. Münster dadler mig for at jeg ikke havde anelse om at Siebkes *brunneus* var lik min *nitidulus* Fbr.; det havde heller ikke hr. Münster kunnet finde ud uden ved undersøgelse av Siebkes eksemplar.

Saa faar vi vide, at *Ocypus globulifer* Fourcr. er synonym med *Anodus morio* Grav., at arten allerede var opført av Siebke, og at jeg selv tidligere havde angivet den under navn av *Oc. edentulus* Bl. Til disse oplysninger føier saa hr. Münster en insinuation om, at jeg ikke kjender Reitters katalog. — Jeg kan fortælle hr. Münster, at jeg kjender meget godt Reitters katalog (1891), og at der staar aldeles ikke *Ocypus globulifer* og *morio* opført som synonymer. Likesaalidt i Grills katalog. Og Gemminger og Harolds katalog (p. 584) identificerer heller ikke *globulifer* og *morio*, likesaalidt Kraatz l. c. pag. 556. — Man kan her fristes til at anvende Münsters egne ord om at lidt mere kritik i publikationerne vilde være heldigt.

Med hensyn til *Amara torrida* Ill. saa havde jeg, som allerede angivet i vedkommende avhandling, ikke selv samlet og etiketteret vedkommende eksemplar, saa for lokaliteten kan jeg ikke indestaa. — For *Stenus bilineatus* og *Falagria sulcata* gjælder samme bemerkning som for *Tachinus scapularis*.

Fremdeles kjender Myntmester Münster en hel del findesteder for arter, som jeg har betegnet som „sjeldne". — Jeg tviler ikke paa, at hr. Münster kjender endnu flere findesteder for en hel del av de av Siebke som „sjeldne" betegnede arter. Hvorfor saa ikke likesaa godt gjøre Siebke bebreidelser som mig? — Hvad der findes, eller ikke findes i Münsters

private samling, det kan man dog ikke forudsættes at have kjendskab til, saalænge derom ingenting er publiceret.

Saa erklærer hr. Münster det for „absolut uriktig", at *Otiorrhynchus atroapterus* D. G. og *Nebria brevicollis* Fabr. skulde kunne forekomme i Hallingdal, fordi de er begge udprægede maritime former. — At *Ot. atroapterus* kan betegnes som en maritim form er sandt nok; den kan dog ogsaa forekomme i indlandet. Saaledes staar det i Stierlins Revision der europ. Otiorhynchus-Arten, pag. 103, at den forekommer „namentlich (altsaa ikke udelukkende!) an den Küsten". Naar det er tilfældet i andre lande, skulde det ikke være utænkeligt, at den ogsaa hos os kunde forekomme som en sjeldenhed i indlandet. I hvert fald har ikke Münster fnug av bevis for at min opgave om dens forekomst i Hallingdal er „absolut uriktig"; lidt mindre bestemte udtryk kunde derfor gjort det. — Endnu mindre holdbar blir hr. Münsters paastand for *Nebria brevicollis* Fbr.'s vedkommende. Det er hr. Münster forbeholdt at opdage, at dette er en udpræget maritim art; andre forfattere kjender ikke til det. Jeg skal anføre nogle opgifter om dens forekomst. — Sturm: Deutschlands Insecten, III, pag. 140, siger: „Fast überall in Deutschland. Ich traf ihn .... in Wäldern .... oft in grosser Menge". — Dejean: Spécies générale .. II, pag. 234, anfører: „Elle se trouve très-communément dans toute l'Europe, sous les pierres et au pied des arbres, sous les feuilles sèches". — Schaum: Naturg. Ins. Deutschlands, I, pag. 97, har kort og godt: „Ueber ganz Europa". — Hochhuth: Enum. d. in Kiew u. Volhynien aufgef. Käfer, pag. 9, har fundet den „in Laubwäldern unter Baumrinde und faulen Blättern". Og Gyllenhal (II, pag. 39) skriver: „Habitat in truncis putridis, ad radices arborum et sub lapidibus, locis umbrosis". Fremdeles: i Reitters katalog mangler betegnelsen „mar." (= maritim) for denne art. O. s. v. Ingen av disse autorer nævner med et ord, at denne art skulde være udpræget maritim. — Men hr. Münster tager ikke i betænkning at betegne min opgift om dens forekomst i et indlandsdistrikt som „absolut uriktig"! Og det til trods for at han hverken har set mine eksemplarer eller selv samlet paa vedkommende lokaliteter eller har nogetsomhelst andet sikkert at støtte sin paastand til!

Hr. Münster omtaler, ovenikjøbet to gange, temmelig umotiveret, at O. M. Reuter har havt noget at udsætte paa et hemipterologisk arbeide av mig. Hertil bemerker jeg kun, at hr. Münster burde have oppebiet mit svar til Reuter (dette var nemlig endnu ikke trykt, da Münsters avhandling udkom), før han opkasted sig til dommer i sagen. For dem som maatte interessere sig derfor henvises til „Entomologisk tidsskrift" 1903, hvor saavel Reuters „kritik" som mit svar findes.

Marburg i Hessen, decbr. 1903.

Trykt den 11te April 1904.

Om vegetationen i Granvin.

Af

S. K. Selland.

Granvin[1] hører til de inderste bygder i Hardanger. Herredet er 189,04 km.[2] stort og grænser mod nord og vest til Voss, mod syd til Ullensvang og mod øst til Ulvik. Fra den 8 km. lange Granvinsfjord, en gren af Hardangerfjorden, og Granvinsvandet hæver bygden sig for det meste brat opover mod de fjeldstrækninger, der fører over til nabobygderne.

Det faste underlag dannes især af grundfjeld og blødere skifere. Sidstnævnte er særlig fremtrædende paa vestsiden af Granvinsvandet, samt paa østsiden af dette i den fjeldstrækning, der fører over til Ulvik. De høieste fjeldtoppe i herredet naar op til over 1500 m. o. h., men dækkes ingensteds af store stedseliggende snemasser.

Ifølge de meteorologiske iagttagelser paa den 345 m. o. h. liggende gaard Espeland[2], i et trangt dalføre, som fører over til Ulvik, er aarets middeltemperatur 4,2° C. For de enkelte maaneder stiller forholdet sig saaledes:

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[1] Tidligere skrivemaade Graven.

[2] Se „Klima“ i J. Vibe, Beskrivelse over Søndre Bergenhus amt.

Januar . . .	— 3,6° C.	Juli	+13,5
Februar . .	— 4,1	August . . .	+13,2
Mars	— 2,4	September .	+ 8,8
April	+ 2,7	Oktober . .	+ 3,9
Mai	+ 7,8	November .	— 0,1
Juni	+13,0	December .	— 2,7

Den laveste observerede temperatur er — 23° C. og den høieste + 28,5 C. Den aarlige nedbørmængde er gjennemsnitlig 1442 mm. hvoraf i

Januar . .	150 mm.	Juli	133 mm.
Februar .	107 „	August . .	130 „
Mars . . .	101 „	September	159 „
April . . .	55 „	Oktober .	161 „
Mai	84 „	November	146 „
Juni . . .	69 „	December	148 „

I den ældre litteratur foreligger kun ganske faa og spredte angivelser om plantefund i Granvin. Saaledes anfører Marcus Schnabel i „Udkast til en Beskrivelse over Hardanger“, udgivet af Hans Strøm 1781, fra kjendte steder i Granvin 4 plantearter, nemlig *Lobelia Dortmanna*, *Prenanthes flosculis quinis* (= *Lactuca muralis*), *Potentilla norvegica* og *Alchemilla vulgaris*. S. C. Sommerfelt nævner i sine „Bemerkninger paa en botanisk Excursion til Bergens Stift“ (Mag. for Naturv. IX 1828) granens forekomst paa grænsen af Granvin og Voss. I M. N. og A. Blytt „Norges Flora“ angives kun 17 arter, deraf 7 hieracier, efter iagttagelse af A. Blytt, H. Greve, C. J. Lindeberg, Meinich, H. L. Sørensen og N. Wulfsberg. I tre „Nye bidrag til kundskaben om karplanternes udbredelse i Norge“ (Christiania Videnskabsselskabs Forhandlinger 1882, 1892 og 1897) har A. Blytt øget antallet med henholdsvis 1, 12 og 5 arter, fundne af Craig, Jan Greve, J. Havaas, A. Landmark, S. K. Selland samt ham selv. Endelig nævner S. O. F. Omang i sine „Hieraciologiske undersøgelser i Norge I“ en for

Granvin ny *Hieracium*, samlet af nærværende forfatter. Ialt angives saaledes i litteraturen kun 41 arter karplanter som fundne i Granvin; disse er i fortegnelsen merkede med en stjerne (*). 4 *Hieracium*-arter er ikke gjenfundne.

I en aarrække har jeg leilighedsvis botaniseret i min hjembygd Granvin. Ved et offentligt stipendium blev jeg sommeren 1901 sat istand til at gjøre undersøgelserne mere fuldstændige. Som indberetning om anvendelsen af dette stipendium fremkommer nærværende skildring af bygdens vegetation. Eksemplarer af de merkeligere fundne planter er indsendt til universitetets botaniske museum.

Til professor, dr. N. Wille, konservator ved botanisk museum, cand. mag. O. Dahl, adjunkt S. O. F. Omang og amanuensis Jens Holmboe, der har bistaaet mig med veiledning og bestemmelse af planter, frembæres min bedste tak. Ligesaa til herr J. Havaas, der velvillig har meddelt mig mange specielle voksesteder og en del lokalnavne paa planter.

Granvins flora tæller 557 kjendte arter af karplanter. Angaaende vegetationsforholdene i sin almindelighed kan anføres følgende:

Løvskogen dannes særlig af bjerk og graaor; men ogsaa hassel, rogn, ask, lind, asp, heg, alm og tildels ek danner en vigtig del af skogbestanden og dækker de bratte, solvarme lier. Furuen er skogdannende særlig i Nestaas- og Kollenesaasen paa vestsiden af Granvinsvandet og i Espelandsdalen med nærmeste omgivelser. Gran findes enkeltvis paa de fleste gaarde, men i større antal kun paa gaarden Moe, som grænser ind til granskogen paa Voss[1]. I Nestaas- og Kollenesaasen, der skraaner mod nord og nordøst, har i de senere aar spiret frem en mængde

[1] Cfr. A. T. Gløersen, Vestlandsgranen og dens Indvandringsveie. (Den norske Forstforenings Aarbog 1884).

selvsaaede granplanter, men de hugges væk efterhvert for at skaffe plads for furuen.

Lavlandsfloraen i Granvin har meget tilfælles med den østlandske, paa samme tid som mange kystplanter gaar ind her. Af strandplanter, som vokser ved Granvinsfjorden, kan nævnes: *Elymus arenarius, Carex maritima, Blysmus rufus, Plantago maritima, Armeria maritima, Haloscias scoticum, Cochlearia officinalis, Silene maritima.* Granvins flora tæller ogsaa mange kystplanter, f. eks. *Polystichum Oreopteris, Blechnum Spicant, Holcus mollis, Carex pulicaris, C. silvatica, Luzula maxima, Narthecium Ossifragum, Taxus baccata, Galium saxatile, Lonicera Periclymenum, Digitalis purpurea, Chrysosplenium oppositifolium.*

De interessanteste botaniske felter i Granvin er de bratte styrtninger fra Aadnagavedln mod Granvinsfjorden ved Eide, Granvinsvandet, urerne under Joberget, fjeldet mellem Granvin og Ulvik samt strøget omkring Krokavatnet paa grænsen mellem Granvin og Voss.

Aadnagavedln naar op til en høide af omkring 400 m. De bratte styrtninger, der dannes dels af lerskifer, dels af grundfjeld, vender mod syd og dækkes af en frodig vegetation af løvtrær, de for urer almindelige vekster og en del sjeldnere arter. Allerede tidlig vækkes vaarplanterne af sin dvale. I slutten af mars findes almindelig *Saxifraga oppositifolia* i blomst i en høide af 330—350 m. o. h., og *Carex digitata* allerede i april. I disse styrtninger vokser *Asplenium Breynii, A. ruta muraria, Carex muricata, C. silvatica, Epipactis Helleborine, Pyrola media, P. chlorantha, Hypericum montanum, H. perforatum, Orobus vernus.* Endvidere *Hieracium hyalotrichum* Omang *n. f.*

Granvinsvandet er 3,64 km.^{2} stort og ligger henimod 30 m. over havfladen. Det modtager elvene og bækkene fra den største del af bygden og har afløb til Granvinsfjorden ved Eide. Dets største dybde er 86 m., men flere steder findes større grunde

strækninger. Paa disse vokser *Equisetum fluviatile, Isoëtes lacustris, I. echinospora, Phragmites communis* i mængde ved Nesheim, *Potamogeton natans, Sparganium affine, Callitriche stagnalis, C. verna, C. hamulata, Littorella lacustris, Lobelia Dortmanna.* Paa Nesheim ved Seimselvens udløb i Granvinsvandet vokser *Bulliarda aquatica.* Langs stranden vokser paa flere steder *Carex vesicaria, C. ampullacea, Lysimachia thyrsiflora, L. vulgaris, Ranunculus reptans, Nasturtium palustre, N. silvestre, Subularia aquatica.* Paa et enkelt sted findes *Carex pulicaris,* paa et andet *Iris Pseudaçorus.*

Mellem Joberget og Granvinsvandet ligger store stenurer, dels nøgne, dels dækkede af en frodig plantevekst. De almindeligste urteagtige karakterplanter i disse urer er følgende: *Polypodium vulgare, Woodsia ilvensis, Dactylis glomerata, Festuca gigantea, Triticum caninum, Carex muricata, Urtica dioica, Polygonum dumetorum, Valeriana sambucifolia, Artemisia vulgaris, Tanacetum vulgaris, Lappa minor, Lampsana communis, Lactuca muralis, Asperula odorata, Galeopsis Tetrahit, Calamintha Acinos, C. Clinopodium, Origanum vulgare, Verbascum nigrum, V. Thapsus, Scrophularia nodosa, Linaria vulgaris, Æthusa Cynapium, Torilis Anthriscus, Sedum album, Thalictrum minus, Erysimum hieracifolium, Hypericum quadrangulum, Geranium Robertianum, Epilobium montanum, Geum urbanum, Agrimonia Eupatoria, Lathyrus pratensis, Vicia silvatica, V. Cracca, V. sepium, Ervum tetraspermum.*

Paa fjeldstrækningen mellem Granvin og Ulvik findes en hel del skifer, og vegetationen fremviser flere af de arter, der fortrinsvis holder sig paa de løsere bergarter. Her er to findesteder for *Dryas octopetala,* nemlig i Granvin i nærheden af Kvasshovd og paa skraaningen af Ravnanuten i Ulvik, paa førstnævnte sted i en høide af ca. 1100 m., paa sidstnævnte sted 950—1000 m. o. h. Paa begge steder er følgende arter fundne

sammen med *Dryas octopetala: Festuca ovina, Salix reticulata, Polygonum viviparum, Vaccinium uliginosum, V. vitis idæa, Arctostaphylos alpina, Thalictrum alpinum, Silene acaulis, Empetrum nigrum, Alchemilla alpina, Potentilla verna* major.* Ved Ravnanuten desuden: *Selaginella spinulosa, Aira alpina, Poa alpina, Carex capillaris, Juncus trifidus, Tofieldia borealis, Antennaria dioica, Campanula rotundifolia, Gentiana nivalis, G. campestris, Euphrasia officinalis, Pinguicula vulgaris, Andromeda hypnoides, Phyllodoce coerulea, Saxifraga oppositifolia, S. aizoides, Parnassia palustris, Cerastium alpinum, Alchemilla vulgaris* alpestris, Astragalus alpinus.* Ved Kvasshovd: *Carex saxatilis, Saussurea alpina, Solidago virga aurea, Vaccinium Myrtillus, Andromeda polifolia.*

Krokavatnet ligger 572 m. o. h. og er 0,70 km.^{2} stort. Grænselinjen mellem Granvin og Voss gaar omtrent midt over vandet. Dets afløb, der gaar gjennem flere mindre fjeldvande, falder i Granvinsfjorden ved Folkedal. De omliggende fjelde bestaar dels af haardere, dels af blødere bergarter, og særlig paa de sidste udfolder sig en rig plantevekst. I Krokavatnet vokser: *Equisetum fluviatile, Isoëtes lacustris, I. echinospora, Carex ampullacea, Potamogeton natans, Sparganium affine, S. hyperboreum, Lobelia Dortmanna, Utricularia minor.* I flere tjern, som dannes af den fra vandet rindende elv, vokser *Nuphar pumilum,* ved elvekanten *Lycopodium inundatum.* Nær Krokavatnet ligger sæteren Nyastøl (Sellandsstøl), hvor der paa et indhegnet stykke mark findes *Equisetum hyemale* (kun en enkelt tue; ellers ikke bemerket i Granvin), *Hieracium scandicum* N. & P. *(= H. aurantiacum β glaucescens)* og *Dentaria bulbifera.* Paa vestsiden af Krokavatnet hæver Skaandalshorgen sig til en høide af 1024 m. o. h. Størstedelen hører Voss til, men en del af dens sydøstlige skraaninger ligger i Granvin. Skifer, gneis og blaakvarts veksler. *Thalictrum minus,* der sedvanlig holder sig i de laveste egne, vokser her i en høide af

800 m. o. h. I samme høide vokser *Vicia silvatica, Actæa spicata, Arenaria serpyllifolia, Rosa villosa* (med hvide blomster), *Sedum album, Viburnum Opulus* og *Verbascum Thapsus.* Her findes endvidere *Woodsia hyperborea, Arabis petræa, Draba hirta;* paa underlag af blaakvarts vokser den af adjunkt S. O. F. Omang som ny form betegnede *Hieracium perlanatum,* ca. 800 m. o. h.

Nesheimshorgen kaldes den fjeldryg, som gaar fra Krokavatnet over til Skjervet ved gaarden Moe. Her vokser *Carex rufina, Poa laxa* (sparsomt), *Gentiana purpurea;* længere nede vokser *Adoxa moschatellina* i en høide af ca. 900 m. o. h. Paa de nordlige grænsefjelde mod Voss, der for det meste dannes af haarde bergarter, findes *Carex rufina* og *Poa laxa* i mængde. Her vokser endvidere *Luzula arcuata* og *Viscaria alpina.*

Fortegnelse over de i Granvin fundne karplanter.

Equisetaceæ D. C.

Equisetum arvense L. Almindelig.

E. pratense Ehrh. Sjelden: Ystaas 300 meter over havfladen; ved Granvinsvand.

E. sylvaticum L. „Kjeringarokk“ [1]. Alm.

E. palustre L. Flere steder.

E. fluviatile L. Alm.

E. hyemale L. „Skavgras“. Sj.: Nyastøl, 590 m. o. h. Kun en liden tue.

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[1] De norske plantenavne, der bruges i bygden, er overalt tilføiede i anførselstegn; deres skrivemaade er lagt saa nær udtalen, som det har været muligt.

Filices L.

Polypodium vulgare L. „Siseljerot". Alm.
P. Phegopteris L. „Fuglaburtn". Alm.
P. rhæticum L. Alm.
P. Dryopteris L. Alm.
Woodsia ilvensis R. Br. Alm.
**W. hyperborea* R. Br. Sj.: Skaandalshorgen og ved Krokavatnet.
Aspidium Lonchitis Sw. Alm.
**A. angulare* W. K. Alm.
Polystichum Oreopteris D. C. Alm.
P. Filix mas Roth. Alm.
P. spinulosum D. C. Alm.
P. dilatatum Bl. Hist og her.
Cystopteris fragilis Bernh. Alm.
Asplenium Filix femina Bernh. „Burtn". Alm. („Burtn" bruges ogsaa som fællesnavn for de fleste bregner).
A. Trichomanes L. Alm.
A. viride Huds. Ikke saa alm. som foregaaende.
A. septentrionale Sw. Alm.
A. Breynii Retz. Sj.: Aadnagavedln.
A. ruta muraria L. Sj.: Ved Krokavatnet; Aadnagavedln; Nestaasgeilane (J. Havaas).
Pteris aquilina L. „Einstabbe". Alm.
Blechnum Spicant Roth. Alm.
Struthiopteris germanica Willd. Alm.
Allosurus crispus Bernh. „Hestaspreng". „Torrbola". Alm.
Botrychium Lunaria Sw. Hist og her.

Isoëteæ Rich.

Isoëtes lacustris (L.) Dur. Findes baade i Granvinsvandet og flere af fjeldvandene.
**I. echinospora* Dur. Ligesaa.

Lycopodiaceæ D. C.

Lycopodium Selago L. „Lusagras“. Alm.
**L. inundatum* L. Flere steder.
L. annotinum L. Alm.
L. alpinum L. „Javne“. Alm.
L. clavatum L. Alm. (*L. annotinum* og *L. clavatum* gaar under navn af „kraokefot“).
Selaginella spinulosa A. Br. Alm.

Gramineæ Juss.

Alopecurus pratensis L. I kunstig eng.
A. geniculatus L. Alm.
Phleum pratense L. Især i kunstig eng.
P. alpinum L. Alm.
β *commutatum* Gaud. Sj.: Nesheimshorgen (J. Havaas).
Phalaris arundinacea L. Alm.
Holcus mollis L. Flere steder paa vestsiden af Granvinsvandet.
H. lanatus L. I kunstig eng.
Anthoxanthum odoratum L. Alm.
Milium effusum L. Paa østsiden af Granvinsfjorden.
Agrostis spica venti L. I kunstig eng (J. Havaas).
A. vulgaris With. Alm.
A. alba L. Flere steder.
A. canina L. Alm.
A. rubra L. Alm.
Calamagrostis Epigeios Roth. Flere steder.
C. Pseudophragmites (Link) Rchb. Alm.
Phragmites communis Trin. Granvinsvandet ved Nesheim.
Aira cæspitosa L. Alm.
A. alpina L. Alm.
A. flexuosa L. Alm.
β *montana* L. Flere steder tilfjelds.
Vahlodea atropurpurea Fr. Mange steder.

Trisetum flavescens P. B. Nesheim i kunstig eng.
Triodia decumbens P. B. Alm.
Poa annua L. Alm.
P. laxa HAENKE. Paa de høieste fjelde, især alm. paa de nordlige af dem.
P. alpina L. Alm.; i Aadnagavedln gaar den ned til 35 m. o. h.
P. trivialis L. Alm.
P. nemoralis WAHLENB. Alm.
P. glauca VAHL. Nesheimshorgen.
P. cæsia SM. Alm.
P. pratensis L. Alm.
Glyceria fluitans WAHLENB. Alm.
Melica nutans L. Alm.
Molinia cærulea MOENCH. „Flisagras". Alm.
Dactylis glomerata L. Mange steder.
Cynosyrus cristatus L. Af og til i kunstig eng.
Festuca ovina L. Alm.
β vivipara. Alm.
F. rubra L. Alm.
F. elatior L. Mange steder.
F. gigantea VILLARS. Er funden i urerne under Joberget og i Nestaasberget.
Bromus mollis L. Alm.
**Brachypodium sylvaticum* R. & S. Mange steder.
Lolium perenne L. I kunstig eng.
Triticum repens L. Mange steder.
T. caninum SCHREB. Alm.
Elymus arenarius L. Ved Granvinsfjorden.
Nardus stricta L. „Fintopp". Alm.

Cyperaceæ D. C.

Carex dioica L. Alm.
C. pulicaris L. Sj.: Lines ved Granvinsvandet.

C. pauciflora LIGHTF. Alm.

C. microstachya EHRH. Sj.: En myr nedenfor Nesheimshorgen, ca. 760 m. o. h., i selskab med *C. dioica, C. canescens, C. vulgaris* og *C. irrigua.*

C. helvola BL. Funden ved Geituren og mellem Hondalsnuten og Augnasæt i Granvin.

C. muricata L. Aadnagavedln; urerne under Joberget; Nesheimslien.

C. lagopina WAHLENB. Alm.

C. leporina L. Alm.

C. stellulata GOOD. Alm.

C. Persoonii SIEB. Alm.

C. canescens L. Alm.

C. rufina DR. I mængde paa Stavaskardnut ca. 1180 m. o. h.; Kvasshovd; Hondalsnut paa grænsen mellem Granvin og Voss; Nesheimshorgen og Smøreggen (J. HAVAAS).

C. alpina SW. Geituren.

C. atrata L. Alm.

C. saxatilis GUNN. Alm.

C. pulla GOOD. Kvasshovd og nedenfor Hondalsnuten.

C. vulgaris FR. Alm.

C. juncella TH. FR. Især ved Granvinsvandet.

C. maritima MÜLLER. Ved Granvinsfjorden.

C. pilulifera L. Alm.

C. flava L. Alm.

C. Oederi EHRH. Alm.

C. vaginata TAUSCH. Alm.

C. panicea L. Alm.

C. pallescens L. Alm.

C. limosa L. Flere steder.

C. irrigua SM. Alm.

C. sylvatica HUDS. Sj.: Aadnagavedln.

C. capillaris L. Alm.

C. digitata L. Alm.

C. filiformis L. Flere steder.
C. vesicaria L. Granvinsvandet.
C. ampullacea Good. „Stòrgras“. Alm.
Rhynchospora alba Vahl. Kun funden i Espelandsdalen og paa fjeldet mellem Granvin og Ulvik.
Blysmus rufus Link. Ved Granvinsfjorden.
Scirpus cæspitosus L. Alm.
S. pauciflorus Lightf. Ved Granvinsfjorden.
Heleocharis palustris R. Br. Flere steder.
H. uniglumis Koch. Alm.
Eriophorum alpinum L. Flere steder.
E. vaginatum L. Alm.
E. capitatum Host. Alm.
E. angustifolium Roth. „Fivedl“. Alm.

Alismaccæ R. Br.

Triglochin maritimum L. Ved Granvinsfjorden.
T. palustre L. Flere steder.
Scheuchzeria palustris L. Flere steder.

Juncaceæ Agardh.

Juncus conglomeratus L. Sj.: Espelandsdalen; Folkedal.
J. filiformis L. Alm.
J. castaneus Smith. Sj.: Mellem Krokavatnet og Skaandalshorgen; nedenfor Nesheimshorgen. (J. Havaas).
J. biglumis L. Alm.
J. triglumis L. Alm.
J. trifidus L. Alm.
J. articulatus L. Alm.
J. alpinus Vill. Alm.
J. bulbosus L. Ved Granvinsfjorden.
J. buffonius L. Alm.

J. supinus Moench. Alm.
Luzula pilosa Willd. Alm.
L. maxima Desv. Ved Granvinsfjorden.
L. campestris D. C. Alm.
L. arcuata Hook. Sj.: Stavaskardnut; Hondalsnut paa grænsen mellem Granvin og Voss[1].
L. spicata Desv. Alm.

Melanthaceæ R. Br.

Narthecium Ossifragum Huds. Alm.
Tofieldia borealis Wahlenb. Alm.

Liliaceæ Juss.

Gagea lutea Schult. Alm.

Smilaceæ R. Br.

Paris quadrifolia L. „Trodlagras". Alm.
Convallaria verticillata L. Alm.
C. Polygonatum L. „Sentògerot". Alm.
C. majalis L. „Blaosarespire". Gjeitøyra. Alm.
Majanthemum bifolium D. C. Alm.

Irideæ R. Br.

**Iris Pseudacorus* L. Sj.: Nesheim ved Granvinsvandet. Den angives af Blytt i „Norges Flora" at skulle vokse ved Eide; dens voksested der har det ikke lykkedes mig at gjenfinde.

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[1] *L. hyperborea* R. Br. er funden nær grænsen af Granvin paa Grimsnut i Ulvik 1200 m. o. h.

Orchideæ R. Br.

Malaxis paludosa Sw. Sj.: Storemyr paa Havaas, ca. 540 m. o. h.

Corallorhiza innata R. Br. Flere steder.

Orchis mascula L. Mange steder.

O. maculata L. „Marihaand". Alm.

Gymnadenia conopsea R. Br. Flere steder.

Platanthera bifolia Rchb. Mange steder.

Peristylis viridis Lindl. Mange steder.

β bracteata. Sj.: Nesheimshorgen.

P. albidus Lindl. Sj.: Aasene.

Listera cordata R. Br. Flere steder.

Epipactis Helleborine Cr. Sj.: Aadnagavedln.

**Goodyera repens* R. Br. Sj.: Kollenes- og Nestaasaasen.

Potameæ Juss.

Potamogeton natans L. Alm.

Typhaceæ D. C.

Sparganium affine Schnitzl. Alm.

S. glomeratum Læst. En form i Seimselven ved dens udlob i Granvinsvandet synes at tilhøre denne art.

S. hyperboreum Læst. Alm. i fjeldvandene.

Cupressineæ Rich.

Juniperus communis L. „Brakje". Alm.

Abietineæ Rich.

Pinus silvestris L. „Fùra". Alm.

**Picea excelsa* Link. „Gròn". Hist og her enkeltvis; i større antal paa gaarden Moe, der grænser til granskogen paa Voss.

Taxineæ Rich.

Taxus baccata L. „Barlind". Barlindskaar paa vestsiden af Granvinsfjord; Barlindskaar paa Haugse; Kjerlandsskaarane; Hamre; Folkedal. Kun faa eksemplarer paa hvert sted.

Callitrichaceæ Lindl.

Callitriche stagnalis Scop. Granvinsvandet.

C. verna Kützg. Alm.

**C. hamulata* Kützg. I vasdraget fra Moevandet til Granvinsvandet.

Myriceæ Rich.

Myrica Gale L. „Post". Flere steder, især i den østlige del af bygden.

Betulaceæ Bartl.

Betula verrucosa Ehrh. Mange steder.

B. odorata Bechst. Alm. Fællesnavn for *Betula*-arter: „Bjørk".

B. intermedia Thom. Hist og her.

B. alpestris Fr. Hist og her.

B. nana L. Mange steder.

Alnus incana D. C. „Orr". Alm.

A. glutinosa Gærtn. „Svartorr". Sj.: Ved Granvinsfjorden.

Cupuliferæ Rich.

Quercus pedunculata Ehrh. „Eik". Mange steder.

Corylus Avellana L. „Hatl". Alm.

Ulmaceæ Mirb.

Ulmus montana Sm. „Alm". Alm.

Urticaceæ Endl.

Urtica dioica L. „Brennenaata“. Alm.
U. urens L. Flere steder.

Cannabineæ Endl.

Humulus Lupulus L. „Humle“. Hunplanten findes flere steder; blev tidligere dyrket.

Salicineæ Rich.

Salix caprea L. „Selja“. Alm.
S. aurita L. Mange steder.
S. repens L. Alm.
S. hastata L. Mange steder.
S. phylicifolia (L.) Sm. Eksemplarer fra Havaas synes at tilhøre denne art.
S. nigricans Sm. Mange steder.
S. glauca L. Alm.
S. lapponum L. Eksemplarer fra Stavaskardnut synes at tilhøre denne art.
S. lanata L. Flere steder.
S. herbacea L. Alm.
S. polaris Wahlenb. Sj.: Kvasshovd (J. Havaas).
S. reticulata L. Mange steder.
S. myrsinites L. Flere steder. De fleste *Salix*-arter gaar under navn af „vier“.
Populus tremula L. „Osp“. Alm.

Salsolaceæ Moq.

Chenopodium album L. Alm.
β viride (L.). Alm.
Atriplex patula L. Mange steder.

Polygoneæ Juss.

Oxyria reniformis Hook. Alm.
Rumex obtusifolius L. Sj.: Nesheim.
R. crispus L. Ved Granvinsfjorden.
R. domesticus Hartm. „Høymòla“. Alm.
R. Acetosella L. „Taksyra“. Alm.
R. Acetosa L. „Syra“. „Syrestylk“. Alm.
Polygonum aviculare L. Alm.
P. Hydropiper L. Alm.
P. Persicaria L. Alm.
P. lapathifolium L. Flere steder.
P. viviparum L. „Bakkarot“. Alm.
P. Convolvulus L. Alm.
P. dumetorum L. Flere steder i urer.
Fagopyrum tataricum Gærtn. Flere steder.

Plantagineæ Vent.

Littorella lacustris L. Granvinsvandet.
Plantago major L. „Lækjesblokka“. Alm.
P. lanceolata L. Alm.
P. maritima L. Ved Granvinsfjorden.

Plumbagineæ Vent.

Armeria maritima Willd. Ved Granvinsfjorden.

Valerianeæ D. C.

Valeriana sambucifolia Mikan. Alm.

Dipsaceæ Juss.

Knautia arvensis Coult. Alm.
Succisa pratensis Moench. Alm.

Compositæ Vaill.

Tussilago Farfara L. Alm.

Solidago virga aurea L. „Spanskurt". Alm.

β *alpestris* Rchb. Tilfjelds.

Erigeron acre L. Hist og her.

E. alpinum L. Alm.

γ *leucocephalum* Fr. Sj.: Nesheimshorgen.

E. uniflorum L. Sj.: Kvasshovd (J. Havaas).

Bellis perennis L. Forvildet paa Eide.

Gnaphalium silvaticum L. Alm.

G. norvegicum Gunn. Alm.

G. uliginosum L. Alm.

G. supinum L. Alm.

Antennaria dioica Gærtn. Alm.

β *hyperborea* G. Don. Sj.: Skaandalshorgen; Aadnagavedln.

γ *corymbosa* Hn. Alm., især tilfjelds[1].

Artemisia vulgaris L. Alm.

Tanacetum vulgare L. „Reinfann". Findes plantet paa flere gaarde; vildtvoksende i urerne under Joberget.

T. Leucanthemum Schz. Mange steder.

Matricaria inodora L. „Kaunasoleia". Alm.

Anthemis tinctoria L. Af og til i kunstig eng. Første gang funden 1890.

A. arvensis L. I kunstig eng (J. Havaas).

Achillea Millefolium L. „Rýlik". Alm.

A. Ptarmica L. I kunstig eng (J. Havaas).

Senecio vulgaris L. Alm.

Cirsium lanceolatum Scop. Alm.

C. palustre Scop. Alm.

C. heterophyllum All. „Hestablokke". Alm.

C. arvense Scop. Flere steder.

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[1] *A. alpina* Gærtn. er funden nær grænsen af Granvin paa Midtfjeld i Ulvik.

Carduus crispus L. Alm. (*Cirsium lanceolatum*, *C. palustre* *C. arvense* og *Carduus crispus* kaldes „tistedl").

Centaurea Jacea L. Alm.

Saussurea alpina D. C. Alm.

Lappa minor D. C. Alm.

Lampsana communis L. Mange steder.

Leontodon autumnale L. Alm.

β Taraxaci Hartm. Alm. tilfjelds.

Taraxacum officinale Web. „Kjæsoleia". „Kvellsvæva". Alm.

**Lactuca muralis* Fres. Alm.

Sonchus asper Vill. Flere steder.

S. arvensis L. Flere steder.

Mulgedium alpinum Less. „Turta". Flere steder.

Soyeria paludosa Godr. Alm.

Hieracium. Granvins hieracier er endnu for lidet undersøgte. Jeg har indsamlet følgende arter og former, der er bestemte af adjunkt S. O. F. Omang:

H. pilosella L. *f.* Gaarden Selland.

H. auricula L. Selland og flere steder.

H. scandicum N. & P. (= *H. aurantiacum* L. *v. glaucescens* Lbg.). Nyastøl og flere steder.

H. subprœaltum Lbg. Nyastøl.

H. hyalotrichum Omang *n. f. in litteris*. Tilhører gruppen *Cymosa*. Fra de beslegtede former udmerker den sig ved meget smaa svøb, tæt glinsende haarklædning paa svøb og stængelbasis, fuldstændig mangel af glandeler, samt smale svøbblade. Findested: Aadnagavedln.

H. perlanatum Omang *n. f. in litteris*. Nær beslegtet med foregaaende, fra hvilken den især afviger ved bladenes form. Den udmerker sig navnlig ved meget tæt, uldlignende haarklædning paa stængel, kurvstilke og svøb. Findested: Skaandalshorgen.

H. glomeratum Froel. *subsp.* Nyastøl.

H. Schmidtii Tausch. *formæ.* Flere steder.

v. Hardangerense Omang *n. v.* Aadnagavedln. („Udmerket ved grove, mørke haar paa svøb og rigelige glandeler paa kurvstilkene". Omang *in litteris*).

H. Lindebergii Nym. *f.* Nyastøl; under Joberget.

H. saxifragum Fr. *v. nemorosum* Lbg. Ystaas.

v. basifolium Lbg. Ystaas.

v. ariglaucum Omang. Nyastøl.

H. trichopleum Omang. Under Joberget; Nedre Vatsenden.

H. stenolepis Almqu. *Modif.* Aadnagavedln.

H. cæsiiflorum Almqu. *f.* Gjermundstrædet.

H. incanatum Omang *n. f. in litteris.* Tilhører gruppen *Silvatica.* Nedre Vatsenden.

H. triangulare Almqu. Gjermundstrædet; Aadnagavedln.

H. philanthrax Stenstr. Aadnagavedln.

H. galbanum Dahlst. *formæ.* Havaas; Kollenes.

H. gravastellum Dahlst. *f.* Nyastøl.

H. basifolium (Fr.) Almqu. *f.* Ystaas.

H. angustatum Lbg. Nyastøl; Ystaas.

**H. nitens* Lbg. *f.* Ystaas; Nyastøl; Kollenes; Kjerland.

H. diaphanoides Lbg. Gjermundstrædet.

**H. subramosum* Lönnr. *v. xanthostylum* Dahlst. Gjermundstrædet.

H. subrigidum Almqu. Selland[1].

H. rigidum Hn. *f.* Selland.

subsp. Stuvanes; Prestgardstveit.

v. spaniophyllum Omang (*ad. int.*). Kjerland.

H. tridentatum Fr. *f.* Ystaas.

H. dovrense Fr. *v. pachycephalum* Lbg. Nyastøl.

v. lasiolepium Omang (*ad. int.*) Nyastøl.

**H. prenanthoides* Vill. *f.* Nesheimshorgen.

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[1] Cfr. S. O. F. Omang, Hieraciologiske undersøgelser i Norge I. p. 243 (N. Mag. f. Naturv. B. 39).

H. alpinum (L.) Backh. *Modif.* Nesheimshorgen.
H. crispum Elfstr. *f.* Stavaskardnut.
H. corymbosum Fr. *f.* Ved Krokavatnet.
f. hirtellum Lindeb. Eide (Blytt).
H. angustum Lbg. Ved Krokavatnet.
H. umbellatum L. Mange steder.
v. lineare Lbg.[1].

Lobeliaceæ Bartl.

**Lobelia Dortmanna* L. Alm. saavel i Granvinsvandet som i fjeldvandene (f. eks. Krokavatnet, 572 m. o. h.).

Campanulaceæ Bartl.

Campanula latifolia L. „Kvita røvabjødle". Mange steder.
C. rotundifolia L. „Bjødle". „Fingerbjør". Alm.

Rubiaceæ Juss.

Galium boreale L. „Mauragras". Alm.
G. palustre L. Alm.
β decipiens Hn. Aasene.
G. Mollugo L. Sj.: Kollenestveiten i kunstig eng, hvor den har holdt sig adskillige aar.
G. verum L. Mange steder.
G. saxatile L. Eide; Skaalsæte, 550 m. o. h.
G. uliginosum L. Alm.
G. Aparinė L. „Tene". Alm.
Asperula odorata L. Mange steder.

Caprifoliaceæ A. Rich.

Linnæa borealis L. Alm.
Lonicera Periclymenum L. Ved Granvinsfjorden.
Viburnum Opulus L. „Beinve(d)". Alm.

[1] Cfr. S. O. F. Omang, Hieraciologiske undersøgelser i Norge II. p. 365 (N. Mag. f. Naturv. B. 41).

Oleaceæ LINDL.

Fraxinus excelsior L. „Ask“. Alm.

Gentianaceæ LINDL.

Gentiana purpurea L. „Søterot“. Mange steder.
G. nivalis L. Mange steder.
G. campestris L. Flere steder.
Menyanthes trifoliata L. „Bukkabla(d)“. Alm.

Labiatæ JUSS.

Mentha arvensis L. „Krusemynta“. Alm.
Ajuga pyramidalis L. Alm.
Stachys silvatica L. „Fulenòta“. Mange steder.
S. palustris L. Mange steder.
Lamium purpureum L. Alm.
Galeopsis Tetrahit L. Alm.
G. speciosa MILL. „Dæe“. Alm.
G. Ladanum L. Som ugræs paa Eide 1903.
**Calamintha Acinos* CLAIRV. Alm.
C. Clinopodium BENTH. Alm.
**Origanum vulgare* L. „Kùng“. Mange steder.
Prunella vulgaris L. Alm.
Scutellaria galericulata L. Alm.

Asperifoliæ L.

Echium vulgare L. Funden flere gange; første gang 1883.
Myosotis lingulata SCHULTZ. Ved Granvinsvandet.
M. silvatica HOFFM. Mange steder.
M. arvensis ROTH. Alm.
**Echinospermum deflexum* LEHM. Mange steder.

Solanaceæ BARTL.

Solanum nigrum L. Eide som ugræs i en have 1901—1903.

Scrophulariaceæ Lindl.

Verbascum nigrum L. Mange steder i den nordlige del af bygden.
V. Thapsus L. Mange steder.
Scrophularia nodosa L. Alm.
Linaria vulgaris Mill. Alm.
Digitalis purpurea L. „Røvabjødla". Flere steder.
Veronica arvensis L. Flere steder.
V. serpyllifolia L. Alm.
V. saxatilis L. Mange steder.
V. alpina L. Alm.
V. officinalis L. Alm.
V. Chamædrys L. Alm.
**V. scutellata* L. Sj.: Sellandshagen.
Euphrasia officinalis L.
— *tenuis* (Brenn.) Wettst. Alm.
— *minima* Jacqu. Alm. paa myrer tilfjelds.
Bartsia alpina L. Alm.
Alectorolophus minor W. et Gr. „Pengagras". "Engjakadl". Alm.
Pedicularis palustris L. Alm.
Melampyrum pratense L. Alm.
M. silvaticum L. Alm.

Lentibulariaceæ Lindl.

Pinguicula vulgaris L. Alm.
Utricularia minor L. Alm.; jeg har kun seet den steril.

Primulaceæ Vent.

**Primula scotica* Hook. Sj.: Smøreggen.
P. officinalis Jacq. Lillegraven i eng 1903.
Glaux maritima L. Ved Granvinsfjorden.
Lysimachia thyrsiflora L. Ved Granvinsvandet.

L. vulgaris L. Sj.: Ved Granvinsvandet og elven nedenfor.
Trientalis europæa L. Alm.

Ericaceæ Endl.

Vaccinium Myrtillus L. „Blaobær". Alm. (De sorte, ikke blaaduggede bær kaldes „ravnabær").
V. uliginosum L. „Blokkebær". Alm.
V. vitis idæa L. „Tytebær". Alm.
Oxycoccus palustris Pers. *β microcarpus* Rupr. „Myrabær". Alm.
Arctostaphylos uva ursi Spreng. Mange steder.
A. alpina Spreng. „Rjupebær". Alm.
Andromeda polifolia L. Alm.
A. hypnoides L. Mange steder.
Phyllodoce cærulea Gr. et Godr. Alm.
Azalea procumbens L. Alm.
Erica Tetralix L. Sj.: Helgasætfjeldet (J. Havaas).
Calluna vulgaris Salisb. „Beiteslyng". Alm.

Hypopityaceæ Klotsch.

Pyrola minor L. Alm [1].
P. media Sw. Sj.: Styrtningerne fra Aadnagavedln mod Granvinsfjorden; Aasene (J. Havaas).
P. chlorantha Sw. Sj.: Styrtningerne fra Aadnagavedln mod Granvinsfjorden.
Monesis uniflora Patze. Sj.: Aasene.
Ramischia secunda Gke. Alm.

Umbelliferæ Juss.

Ægopodium Podagraria L. Eide; Holven.
Carum Carvi L. „Karve". Alm.

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[1] *P. rotundifolia* L. er funden nær grænsen af Granvin paa Ravnanut i Ulvik.

Pimpinella Saxifraga L. Alm.
Haloscias scoticum Fr. Ved Granvinsfjorden.
Æthusa Cynapium L. Sj.: Urerne under Joberget.
Heracleum sibericum L. Alm.
Angelica silvestris L. „Geitaul". Alm.
Archangelica officinalis Hoffm. „Fjellkvanna". Flere steder.
**Torilis Anthriscus* Gmel. Nestaasberget; urerne under Joberget i mængde; Kløve.
Myrrhis odorata Scop. Sj.: Haugse; Kjerland. Oprindelig plantet.
Anthriscus silvestris Hoffm. „Hundasleikja". Alm.

Araliaceæ Juss.

**Adoxa moschatellina* L. Mange steder, især paa vestsiden af Granvinsvandet; gaar i Nesheimshorgen op til en høide af ca. 900 m. o. h.

Cornaceæ Lindl.

Cornus suecica L. „Hønsabær". Alm.

Crassulaceæ D. C.

Bulliarda aquatica D. C. Sj.: Nesheim.
Sedum Rhodiola D. C. „Smørbukk". Alm.
S. annuum L. „Vortegras". Alm.
S. album L. Mange steder.
S. acre L. Mange Steder.

Saxifragaceæ D. C.

Saxifraga Cotyledon L. „Lilja". Alm.
S. stellaris L. Alm.
S. nivalis L. Mange steder.

S. oppositifolia L. Alm.
S. aizoides L. Alm.
β aurantia Fl. D. Hist og her.
S. rivularis L. Alm.
S. cæspitosa L. Mange steder.
Chrysosplenium alternifolium L. Alm.
C. oppositifolium L. Sj.: Nesheim, ca. 400 m. o. h.

Ribesiaceæ Endl.

Ribes Grossularia L. „Stikkelsbær". Flere steder forvildet.
R. rubrum L. „Vinbær". Ligesaa.

Ranunculaceæ Juss.

Thalictrum alpinum L. Alm.
**T. minus* L. Alm.; ved Skaandalshorgen gaar den op til en høide af ca. 800 m. o. h.
Anemone nemorosa L. „Symra". Alm.
Ranunculus platanifolius L. Mauge steder; ved Eide gaar den næsten ned til havets overflade[1].
R. reptans L. Alm.
R. pygmæus Wahlenb. Flere steder.
R. repens L. „Traunskesoleia". Alm.
R. acer L. „Smørsoleia". Alm.
R. auricomus L. Alm.
R. Ficaria L. Alm.
Caltha palustris L. „Myrasoleia". Alm.
Aquilegia vulgaris L. Sj.: Lines ved Granvinsvandet.
Aconitum septentrionale Koll. Flere steder i den mod Ulvik grænsende del af bygden.
Actæa spicata L. Mange steder.

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[1] *Ranunculus glacialis* L. er funden paa fjeldet Oksen i Ullensvang nær grænsen med Granvin.

Fumariaceæ D. C.

**Corydalis fabacea* Pers. Mange steder.
Fumaria officinalis L. Ligesaa.

Cruciferæ Adans.

Nasturtium palustre D. C. Ved den øvre del af Granvinsvandet.
**N. silvestre* R. Br. Langs den øvre del af Granvinsvandet fra Nesheim til Granvins kirke.
Barbarea vulgaris R. Br. Flere steder i kunstig eng.
B. stricta Fr. I kunstig eng (J. Havaas).
**Turritis glabra* L. Mange steder.
Arabis hirsuta Scop. Mange steder.
A. Thaliana L. Alm.
A. petræa Lam. Sj.: Skaandalshorgen.
A. alpina L. Flere steder.
Cardamine pratensis L. Alm,
C. hirsuta L. Alm.
C. bellidifolia L. Mange steder.
**Dentaria bulbifera* L. Nyastøl, 590 m. o. h.; nær Skaalsæte, 550 m. o. h.; styrtningerne paa vestsiden af Granvinsfjorden lige ned til sjøen (J. Havaas).
**Berteroa incana* D. C. Flere steder i kunstig eng. Funden første gang 1888.
Draba hirta L. Sj.: Steinsætehorgen; Nesheimshorgen (J. Havaas); Skaandalshorgen.
D. incana L. Flere steder.
Cochlearia officinalis L. Ved Granvinsfjorden.
Thlaspi arvense L. Flere steder.
**Erysimum hieracifolium* L. Flere steder.
E. cheiranthoides L. Funden 1890 i kunstig eng.
Camelina silvestris Wallr. I kunstig eng (J. Havaas).
Capsella bursa pastoris Moench. Alm.

**Lepidium perfoliatum* L. I kunstig eng (J. Havaas).
Brassica asperifolia Lam. Funden 1890 i en ager.
Sinapis arvensis L. Flere steder.
S. alba L. Mange steder.
Raphanus Raphanistrum L. Af og til som ugræs i agre. De tre sidstnævnte kaldes „mustar".
Subularia aquatica L. Findes baade ved Granvinsvandet og fjeldvandene.

Nymphæaceæ Salisb.

Nuphar pumilum Sm. I flere fjeldvande.

Droseraceæ D. C.

Drosera rotundifolia L. Alm.
D. longifolia L. Alm. Begge arter kaldes „ringormegras".
β *obovata* Koch. Sj.: Havaas.
Parnassia palustris L. Alm.

Violaceæ Juss.

Viola palustris L. „Kjeringøyra". Alm.
V. biflora L. Mange steder.
V. Riviniana Rchb. Alm.
V. canina L. Alm.
V. tricolor L. „Dag og natt". „Taksoleia". Alm. under flere former, f. eks. *f. typica* Wittr. og *f. versicolor* Wittr. En form fra Eide nærmer sig *f. aureobadia* Wittr.
V. arvensis Murr. Eide, som ugræs i en have 1903.

Portulacaceæ Lindl.

Montia fontana L.
α *minor* Gmel. Alm.
β *rivularis* Fr. Sj.: Krossdalen paa Ystaas.

Paronychieæ St. Hil.

Scleranthus annuus L. Flere steder.

Alsinaceæ Bartl.

Spergula arvensis L. Alm.
Sagina procumbens L. Alm.
S. saxatilis Wimm. Mange steder.
Alsine biflora Wahlenb. Sj.: Kvasshovd.
**Moehringia trinervia* Clairv. Alm.
Arenaria serpyllifolia L. Flere steder.
Stellaria nemorum L. Alm.
S. media Vill. „Vassarve". Alm.
S. graminea L. Alm.; findes især under formen *Pacheri* Wohlf.
**S. Friesiana* Ser. Sj.: Nesheimshorgen; Skjervet.
S. uliginosa Murr. Alm.
Cerastium alpinum L. Alm.
C. trigynum Vill. Alm.
C. vulgatum L. Alm.

Silenaceæ Lindl.

Silene inflata Sm. „Smedlegras". Alm.
S. maritima With. Ved Granvinsfjorden og i de lavere dele af bygden.
S. rupestris L. Alm.
S. acaulis L. Mange steder.
Agrostemma Githago L. Af og til som ugræs.
Lychnis flos cuculi E. I kunstig eng.
Viscaria vulgaris Roehl. Flere steder.
V. alpina Fr. Sj.: Stavaskardnut; Hondalsnut.
Gypsophila vaccaria. Eide, i kunstig eng 1903.
Melandrium diurnum Fr. Alm.
M. vespertinum Fr. Eide, i kunstig eng 1903.

Tiliaceæ Juss.

Tilia parvifolia Ehrh. „Lind“. Alm.

Hypericaceæ Lindl.

**Hypericum montanum* L. Sj.: Aadnagavedln.
H. quadrangulum L. „Harbein“. Alm.
H. perforatum L. Sj.: Aadnagavedln; Nesheimslien.

Polygalaceæ Lindl.

Polygala vulgaris L. Alm.

Rhamnaceæ Lindl.

Rhamnus Frangula L. „Hundabærhegg“. „Trodlabærhegg“. Alm.

Empetreæ Nutt.

Empetrum nigrum L. „Krækjebær“. Alm.

Geraniaceæ D. C.

Geranium silvaticum L. Alm.
G. Robertianum L. Alm.
G. lucidum L. Sj.: Nesheimslien; urerne under Joberget.
**G. columbinum* L. Sj.: Ved veien langs Granvinsvandet under Joberget.
**Erodium cicutarium* Herit. Sj.: Spilde.

Linaceæ Lindl.

Linum catharticum L. Alm.
L. usitatissimum L. Eide, i kunstig eng 1902.

Oxalidaceæ Lindl.

Oxalis Acetosella L. „Gaukasyra". Alm.
β *lilacina* Lge. Sj.: Havaas.

Balsaminaceæ Lindl.

Impatiens noli tangere L. Alm.

Onagraceæ Lindl.

Epilobium angustifolium L. „Geitskje". Alm.
E. montanum L. Alm.
β *collinum* Koch. Eide.
E. anagallidifolium Lam. Mange steder.
E. lactiflorum Hausskn. Ligesaa.
E. Hornemanni Rchb. Ligesaa.
E. palustre L. Alm.
Circæa alpina L. Alm.

Halorageæ R. Br.

Hippurus vulgaris L. Flere steder.
Myriophyllum alterniflorum D. C. Alm.

Pomaceæ Lindl.

Pyrus Malus L. „Surapall". Hist og her.
Sorbus Aucuparia L. „Raun". Alm.
S. fennica Kalm. „Asald". Flere steder.
S. Aria Crantz. Flere steder.
Cratægus monogyna Jacq. Sj.: Urerne under Joberget; Nestaasberget (J. Havaas).
Cotoneaster vulgaris Lindl. Mange steder.

Rosaceæ Juss.

**Alchemilla vulgaris* L. „Fedlestakk". Alm. under flere former:
— *filicaulis* Bus.
— *alpestris* Schmidt.
— *obtusa* Bus.
A. alpina L. Alm.
Agrimonia Eupatoria L. Sj.: Under Joberget.
Rosa canina L. Denne og den følgende art kaldes „klungr". Alm.
R. villosa L. Alm.
Rubus idæus L. „Bringjebær". Alm.
R. suberectus Ands. „Bjødnabær". Alm.
R. cæsius L. Ved Granvinsfjorden.
R. saxatilis L. „Taogabær". Alm.
R. Chamæmorus L. „Molta". Alm.
Dryas octopetala L. Sj.: Nær Kvasshovd.
Sibbaldia procumbens L. Alm.
Geum rivale L. Alm.
G. intermedium Ehrh. Sj.: Eide.
G. urbanum L. Alm.
Comarum palustre L. Alm.
Potentilla anserina L. „Mura". Mange steder.
— *argentea* Bl. Ved Granvinsfjorden.
**P norvegica* L. Flere steder.
P. argentea L. Alm.
P. verna L. a) *major* Wahlenb. Mange steder.
P. Tormentilla Scop. „Almegras". „Grisagras". Alm.
Fragaria vesca L. „Jarbær". Alm.
Spiræa Ulmaria L. „Meurta" (udt.: Me-urta). Alm.

Drupaceæ D. C.

Prunus Padus L. „Hegg". Alm.

Papilionaceæ L.

Anthyllis vulneraria L. Mange steder.
Trifolium agrarium L. I kunstig eng (J. Havaas).
T. repens L. „Kvitklýver". Alm.
T. hybridum L. I kunstig eng.
T. pratense L. „Rau(d)klýver". „Blaohatt". Alm.
Lotus corniculatus L. Alm.
Orobus vernus L. Sj.: Aadnagavedln[1].
Lathyrus pratensis L. Flere steder.
Vicia silvatica L. Mange steder.
V. Cracca L. „Musertragras". Alm.
V. sepium L. Alm.
V. sativa L. Eide, i kunstig eng 1903.
Ervum tetraspermum L. Sj.: Under Joberget.

De s. 85 nævnte 4 *Hieracium*-arter, som tidligere er fundne i Granvin, men ikke senere gjenfundne, og som derfor ikke er opført i foregaaende fortegnelse er følgende:

H. canescens Schleich?
H. oreades Fr.
H. protractum Fr.
H. crocatum Fr.

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[1] *O. tuberosus* L. og *Astragalus alpinus* L. er fundne nær grænsen af Granvin; den førstnævnte i Ullensvang ved Utnesfjorden, den sidstnævnte paa Ravnanut i Ulvik.

Trykt den 14de April 1904.

Motion au Congrès international de Botanique Deuxième Session. Vienne 1905.

Les soussignés se permettent de présenter les dispositions suivantes au vote de l'assemblée:

I. Afin d'établir le droit de priorité sur de nouvelles espèces et variétés morphologiques parmi les végétaux thallophytes, il faudra à l'avenir publier, non seulement une description, mais une représentation figurée de l'organisme considéré, suffisamment claire pour faire comprendre la diagnose de l'espèce.

II. Afin de maintenir ce même droit de priorité sur des genres nouveaux parmi les thallophytes, il faudra, outre la description, présenter aussi (ou se referer à) la figuration, comme pour l'espèce, d'une espèce aumoins parmi celles composant le genre considéré.

III. Ces dispositions entreront en vigueur au 1er janvier 1906.

Exposé des motifs.

Quiconque s'occupe de la détermination d'organismes microscopiques reconnait bientôt qu'il est souvent fort difficile d'identifier une espèce rien que sur une description, si bonne qu'elle puisse être.

Dans certains groupes d'algues, les desmidiacées, les oedogoniacées, les cladophoracées, les diatomacées etc., il est même souvent impossible d'identifier une espèce, si l'on n'a pas l'occasion de la comparer avec des planches ou avec des exemplaires originaux.

Plus à l'avenir parmi les thallophytes, on s'occupera des espèces elémentaires, plus on trouvera de difficultés à les identifier uniquement sur des descriptions. Le nombre des attributions erronées augmentera dans une proportion inquiétante.

Sans vouloir méconnaitre la valeur des exemplaires originaux, il convient cependant de faire remarquer que chez les thallophytes, ils ne peuvent pas toujours suppléer à l'absence de bonnes planches. Par la méthode de conservation encore usitée géneralement pour les algues, c. a. d. la dessication, de nombreux groupes d'algues, p. ex. les volvocacées, les ulothricacées, les cladophoracées etc. se trouvent fréquemment si modifiées qu'il n'est désormais pas possible de les identifier: alors même qu'on les conserve dans les meilleurs liquides conservateurs, il se produit chez nombre d'espèces des changements tels, qu'il devient difficile ou impossible de les identifier. Ajoutons qu'il peut souvent être difficile d'être fixé sur ce qui constitue l'exemplaire original d'une espèce; c'est ce qui a surtout lieu, quand l'espèce en question se présente en peu d'exemplaires dans un mélange composé de beaucoup d'autres algues plus ou moins voisines, comme p. ex. desmidiacées et diatomacées.

Enfin, lorsqu'une espèce n'est représentée que par un petit nombre d'exemplaires originaux, elle sera plus exposée à la déstruction et sera plus difficile à expédier (sans compter que certains musées ne prêtent pas leurs exemplaires au dehors) que des planches qui généralement seront imprimée en nombre, et pourront d'ailleurs toujours être photographiées.

Aussi une planche soigneusement exécutée pourra-t-elle, en ce qui concerne bien des groupes de thallophytes, offrir un meilleur moyen d'identification d'une espéce que des exemplaires originaux.

Il va sans dire que tout cela suppose que l'espèce sera représentée d'une façon si exacte, qu'elle soit facile à reconnaître et qu'au moins les plus importants des caractères microscopiques sur lesquels on fonde la diagnose de l'espèce, seront bien mis en évidence par la figure, dont les proportions devront être exactes, et dont le grossissement devra être indiqué en chiffres.

Pour les lichens, les grandes phéosporées et les grandes floridées, il est clair qu'à cet égard de bonnes planches analytiques prises après examen microscopique des conditions de reproduction pourront *suffire* à établir la priorité pour une espèce, une variété, nouvelles, mais même alors même il serait désirable qu'on y jolguît aussi une représentation macroscopique exacte (de préférence une photographie).

Pour les espèces dites élémentaires qui ont été érigées en dernier lieu dans certains groupes, comme p. ex. les bactéries, les mycédinées etc., on ne peut naturellement pas faire valoir les mêmes arguments, ces espèces n'étant pas, basées sur des caractères morphologiques.

Si l'on exige désormais que les descriptions de genres, d'espèces et de variétés de thallophytes soient accompagnées de planches, il en résultera probablement les conséquences suivantes, favorables au progrès de la science:

1) Il sera bien plus aisé d'identifier les espèces à l'aide de figures qu'à l'aide de descriptions.
2) Ces figures seront à l'avenir exécutées avec plus de soin encore, afin que le nom qu'on leur impose ne perde pas son droit de priorité. On observa avec une précision d'autant plus grande les caractères de l'espèce, et l'on arrivera par là à des diagnoses plus tranchées.
3) On évitera des „descriptions provisoires“ destinées à convrir le droit de priorité: elles peuvent avoir de l'intérêt pour l'amour-propre personnel, mais dans la littérature scientifique, elles font plus de mal que de bien; attendu qu'en général

elles ne sont pas poussées bien à fond, et sont même publiées avant que les recherches soient achevées. C'est pourquoi l'on trouve souvent dans les descriptions accompagnant de pareilles communications próvisoires un certain nombre d'inexactitudes, et qu'il convient de les corriger lorsque paraît la description plus approfondie.

Christiania (Norvège) et Stockholm (Suède) Mai 1904.

Dr. N. Wille. *Dr. V. Wittrock.*

Trykt den 30te Mai 1904.

A study on trout and young salmon.

(Report on researches concerning the migrations of young salmon 1898—1902)

by

Knut Dahl

director of the biological station, Trondhjem.

(With 3 plates and 7 tables.)

Introduction.

Ever since LINNÉ in the year 1766 published his *Systema Naturae,* the treatment of the genus, to which trout and salmon belong, has thrown considerable difficulties in the way of systematical investigation, because these species or forms are very closely related as well in external and internal caracters as in their habits of life.

LINNÉ distinguished the following species:

Salmo	salar	= salmon.
„	eriox	= sea trout.
„	trutta	= river trout.
„	fario	= brook trout.
„	lacustris	= lake trout.

These LINNÉS 5 species have in the course of time encountered quite a remarkable fate.

During the past century a series of naturalists have occupied themselves in investigating their right as distinct species. Swedish scientists principally have closely studied these species, although other european savants f. ex. CUVIER, PALLAS' AGASSIZ sen., KRÖYER, SIEBOLD, GÜNTHER, DAY and YARREL

also have dealt with them. Among the swedish investigators the principal ones are Nilsson, Widegren, Liljeborg, Fries Ekström and Sundewal, besides F. A. Smitt. I will not here in detail pursue the fate of Linnés 5 species under the hands of all these men.

His first species, the salmon, *Salmo salar*, has endured all trials; contrary to this his 4 species of trout have encountered very variable conditions. The great variation among trouts, which is the fundament of Linnés species has on closer study made the distinction between species and non species very difficult. As every one knows, who has paid attention to these things, the trout of even closely connected waters, may differ considerably in certain respects, for instance in colour and the form of the body. To begin with, this circumstance caused the proposition of still more species than Linné originally did propose.

However on this fundament there would apparently be no end to the constitution of new species and very soon we notice a tendency to reduce the number of species, a closer investigation showing that the peculiarities whereon the descriptions of the species were founded mainly were peculiarities which every trout under given circumstances could acquire.

The latest swedish naturalists, f. ex. Liljeborg, nominate now only two species:

Salmon (*salmo salar*).
Trout (*Salmo trutta*).

Still more exacting in his reduction is F. A. Smitt, who only nominates one species, *salmo salar*, and as a variety thereof *s. trutta*.

Liljeborg thus asserts, that the proper salmon (*salmo salar*) in all stages of its life may be distinguished from any other salmonid form.

The Trout (*salmo trutta*), which is found in the fresh waters as well as in the sea, varies highly and he does not find

that it is possible to distinguish its many local forms as different species. They must be considered as varieties produced by varying sourroundings.

Also, he asserts that the trout in all stages of its life can be distinguished from the salmon. However he admits, that it is the oldest and the youngest stages that are most readily distinguished in the two species. As regards the half grown stages (between fry and grilse, by LILJEBORG denoted as „forell og öring-stadier") he acknowledges that they only with difficulty are to be distinguished.

F. A. SMITT, probably the man, who up to date has disposed of the largest material and who has undertaken very comprehensive examinations in order to sift the system of the *salmonidæ*, does not find himself able to uphold more than one species, *salmo salar*. According to the environs of developement the species may appear, now as salmon (*forma typica*), now os trout (*forma trutta*), and fry of one form thus have a chance of by force of circumstances to develop into the other form.

Here in Norway, the question remarkably enough newer has been subjected to a thorough serious investigation although fishermen and people interested in fisheries from time to time have subjected it to a lively discussion, and adequate knowledge of this question obviously is fundamental to any rational legislation tending to regulate the fishing for these species.

In our country there has from olden time, besides the salmon-fisheries proper, been practised a fishery, whose object was the catching of smaller salmonid fishs, so called „sjøørret" (sea trout) varying in length from 20—40—50 cm. The gear employed was usually small seines and ground nets.

As regards the species of these fish, which according to locality were named „smaalaks", „sjøørret", „sjøblege", „kludd", „høstblege" etc. the opinion of fisherman and people interested in the fisheries has been highly divided. We here encounter

the very same views, which have governed scientific research on these matters.

While some fishermen assert, that these different names denote just as many species, others again give prominence to the opinion that these small salmonids, named sea trout, are nothing but young salmon. Others have stated as their opinion, that among the sea trout, which they consider a separate species, there is to be found a large proportion of young salmon or grilse, which in these younger stages only with the utmost difficulty are to be discerned from the sea trout.

This latter theory, which is also to a certain extent supported by science, has been essential to the deliberations, on which regulations of law concerning the salmon and sea trout-fisheries of this country are founded.

When our administration (lastest in the salmon law of 1891) by the aid of different regulations, among these a regulation inforcing a certain minimum-size of mesh in nets and seines, sought to benefit the interests of these fisheries, it was, on account of the difficulty in distinguishing between sea trout and young salmon, considered impossible *separately to regulate the salmon and sea-trout fisheries. Accordingly both were in common subjected to the regulations of the same law.*

By this law the use of a smaller mesh than 6,5 cm. between the knots. (13 cm. mesh) was prohibited, as well in fishing for salmon as for sea trout. The regulation size of the mesh is by later laws and amendments altered to 5,8 cm. between the knots. The law also orders that sea-trout of a smaller length than 40 cm. cought in gear with a smaller mesh. (such as herring seines etc.) are to be set free. The smallest allowed size for sale of salmon and seatrout is 21 cm.

Under those regulations our sea trout fisheries have not profited, as the size of the fish of wich previously the bulk of the catch consisted, is to small too be retained by the regulation mesh, in other words, it is a fact that a profitable fishing

for sea trout under our present regulations only can be carried out with unlawful gear.

The only way in wich our fishermen during the latter years have been able to procure sea trout in quantities worth mentioning, has been to use ordinary small meshed seines (20—30 fathoms long). The use of these seines for herrings and other sea fish is in most parts of our country unlimited by law. The trout cought during the use of these seines is then sold under protection of the regulation concering the minimum size of 21 cm. for sale of salmon and sea trout.

In case the fishermen are not cought in the very act of killing trout smaller than 40 cm.s long taken in seines or nets conviction is not easy. Hovever there has been no lack of collisions between the fishermen and the guardians of the law on this point, and it will be quite well understood, that a fishery, working under such conditions, has no chance of being carried on rationally.

The conditions, here briefly scetched, have occasioned very pointed differences of opinion as to whether the sea trout ought to be cought or not.

Foreign sportsmen especially have publicly in sporting yournals and other press organs asserted, that the salmon fry upon leaving the rivers are „swept out“ by nets and sold under the name of sea trout, and have also pointed out, that this fact, would imply the certain ruin of our salmonfisheries.

The opinion of the „lawless“ trout fishermen is just the opposite. They strongly assert the innocense of their industry as to harming the salmonfisheries. On the contrary they often give prominence to the fact, that they consider it a deed of merit to kill the trout who is „a rapacious fish and the foe of the salmon“.

In recognition of these facts Mr. A. Landmark, inspector of fisheries in 1897 consulted Dr. Johan Hjort and the author of this paper, and finally proposed to governement the commen-

cement of rational researches as to the relation between young salmon and sea trout in our waters. The storthing voted the necessary means, wich also during the whole progress of the research have been liberally granted.

During the 4 years from 1898 to 1902 I have undertaken quite a comprehensive series of investigations concerning the distribution of different stages of salmon and seatrout in our waters in connection with studies on their specific characters and biological differences.

In the following chapters I propose to give an account of these investigations and their results, which, according to my opinion, not only throw new light on the questions mentioned above, but also have importance to other features in legislation relating to salmon and trout-fisheries.

Chapter I.
The methods and implements of the investigations.

Any investigator wishfull of forming an independent opinion based on observation. will to my thinking, on reading the large mass of literature relating to the problems shortly mentioned in the introduction, find a lack of systematically continued researches founded on direct observations in nature concerning the species in question, their wanderings or habitats in different stages of life.

From the abovementioned literature it transpires, as far as I have been able to see, that those naturalists, who have treated salmon and trout, have got the essential proportion of their material from museums. Certainly they have also made independent collections in nature, but these seem in most cases to have had a casual caracter and been merely supplementary, Among those investigators, who have gained the best knowledge on these species, there is hardly one, who has had the opportunity of undertaking numerous independent fishing experiments over

great areas of water, through a series of years, and by these means endeavouring to pursue the species during their developement through different stages of life, not only by study and observations on single scattered individuals, but by the investigation of large numbers of fish.

Thanks to the generosity of our storthing, the present author has had the opportunity of planning researches differently to previous investigators.

As a base of investigation was chosen the Throndhjem fiord with its rivers and the adjacent coast outside the fiord. This district is by far the richest of all our salmon districts, yielding an annual catch of salmon amounting to about the fourth or fifth part of the total yield of the whole country.

In this district I have, by systematically continued investigations, endeavoured to solve the problems in question and at the same time or later, by more cursory researches in other localities through all parts of the country, effected a control of my results, as to their general value. During the researches in the fiord and the adjacent strech of coast, I have employed a small sailing cutter with a crew of 2—3 skilful fishermen, besides myself. I was thus enabled, at any time to move between the different localities, according to the demands of my investigation. In my fishing experiments, which chiefly embraced smaller sizes of fish, than those cought in implements of a mesh in acordance with the regulations of law, Danish eelhandseines of large dimensions (30 $\times$ 3 fath.) were mainly employed. By floating the headrope more and weighting the groundrope less than usual for fishing with the same gear in Denmark, these seines are made very efficient implements for the catching of smaller salmonids. By numerous direct comparisons, I have found them more efficent, than the ordinary type of seine (without a pocket), as used by our fishmen in „illegal“ troutfishing. Their size of mesh (28—32 knots pr. foot — norvegian —) of course make them a little heavier than the ordinary abovemen-

tioned troutseines, who have a little larger mesh, varying in different localities.

As supplementary implement, and in order to control my experiments with the eelhandseines, I have also employed seines of different sizes and mesh (from 15—8 knots pr. norvegian foot).

These seines have in some cases had the dimensions generally used by the fishermen (30 $\times$ 3 fath.), sometimes they have been much larger (45 $\times$ 4½ fath.).

Of other fishing gear I have occasionally employed ground nets of varying mesh, according to the object in wiew.

Salmon bag nets of the usual dimensions and of the construction, commonly used on the coast, have also been employed. In stead of the regulation mesh hovewer I employed a mesh varying from 8 to 11 knots pr. norvegian foot.

At such places in the rivers, where net implements could not be employed with advantage, I have used the rod with fly or worm as a bait.

With moveable fishing gear principally seines, I have since the spring 1898, mainly in the Trondhjem-fiord and its sourroundings, and also in many other localities all round our country, made several thousand hauls and cought thousands of salmon and trout.

The predominating proportion of these fishing experiments I personally supervised, and I personally examined the catch. When my presense was prevented, the fishes, regarding the species of wich my assistants intertained a shodow of doubt, were preserved, and later personally examined by me.

A small proportion of the fishing experiments have been conducted in other countries than Norway.

Besides these my own experiments, I have been present at innumerable houls conducted by active fishermen, and had the opportunitly of examining their yield. My researches have also receiver considerable aid throug fishmongers in Norway, England and Denmark liberally allowing me to examine their stores of salmon and trout..

As regards certain important systematical questions, I have in an essential mesure had to fall back on the rearing of young fishes. These rearing experiment were effected in the aquaria of the Trondhjem biological station.

The main collections of salmon and trout, belonging to Scandinavian museums, have been examined by me.

It is needless to mention, that in all my yournys I have constantly communicated with fishermen and gained knowledge from their experience. Also from other people interested i these fisheries valuable information and assistance has been obtained.

Chapter II.

The Investigations.

a. *Seines.*

The investigations commenced, in the beginning of May 1898, in the lower course of the Orkla and in the mouth of this river.

Fishing with the eelhandseine, in the river mouth, during the first days of the month, only yielded a few trout.

In using a rod with worms as a bait, I succeded in ascertaining, that the young of two different species of salmonids were to be found higher up the river. One could with certainty be determined as young trout, the other was just as certainly young salmon. Specimens are represented in Pl. I, and I will not here enter into a detailed description of their different characters, as I later will return to this matter.

By fishing with the eelhandseine in the same localities I could catch larger numbers of them.

By way of example I quote the yournal:

Evjen (Evjenskilen) Orkla May 10, 1898.

Two houls with the eelhandseine yielded: 13 youg salmon 9,5—12 cm. long.

Many young trout same size.

Numbers of flounders (very small) and 1 agonus.

A couple of days later these small salmon, as well as the trout, commenced appearing in our houls down in the mouth of the river.

We also here got great numbers of larger „trout", some very much spotted others less spotted and some very shiny.

Until the 25th of May, these investigations were continued, in and around the mouth of the Orkla

Young salmon occurred only in the hauls effected in the river, or in the very mouth of the river. As soon as we left the river mouth and continued our fishing outward along both shores of the fiord, young salmon were never cought, only larger or smaller numbers of trout, more or less spotted.

From May 26 until June 12 we fished in the Gula, the mouth of the Gula and the fiord Gulosen, where a large number of houls were done with the eelhandseine.

In the Gula itsself and in the rivermouth, nearly every houl brought the young of as well salmon as trout, besides large quantities of larger more or less spotted trout, varying in length from 15—20—40 cm.

As an example may be quoted:

Mouth of the Gula, May 27, 13 houls with 2 seines from both sides of the middle channel, yield:

6 young salmon, ca. 10 cm. long,

28 trout of different sizes.

Numbers of young flounders and gobies.

1 *mallotus villosus.*

Mouth of the Gula, May 31.

A couple of houls with eelhandseine in the middle channel yielded.

8 young salmon 10—12 cm.

17 trout 12—42 cm.

A number of flounders.

Much time and labour was there upon spent in investigating the shores of the fiord Gulosen in order to ascertain, if the young emigrating salmon (smolts) also were to be found along the shores of this fiord.

All attempts at fishing the small salmon in these localities however gave a negative result. From Mule on the east side to Lundenaes on the westeren shore I fished in nearly all places where a seine could possibly be employed, without being able to find one single young salmon among tbe hundreds of trout of all sizes wich were cought.

These fishing experiments to me clearly established two facts.

None of the young salmon (smolts) wich I cought in the rivers Gula and Orkla exceeded 16 cm. in length, and this latter size did only occur as an exception. Generally their size did not exceed 13 cm.

Young salmon (smolts) larger than these I was unable to procure. In Tab. no. IV will be found a graphical representation of their size.

They were all shiny and evidently in their migratory attire, such as it is well known and described by previous investigators. These young were consequently on the point of emigrating.

My failures in catching them outside the river might have two reasons. Perhaps they had not yet emigrated from the river mouths or estuaries, or perhaps in emigrating they did not tuch the places wich I could control with my fishing gear.

The occurence of the more or less spotted trout was entirely different. They could be obtained in alle sizes in the river. Along the shores of the fiord all sizes from the migration stage and upwards were obtained in every houl.

In Tab. no. V column 1, 2, 3 the sizes cought during this fishing period will be found represented.

Next I sailed back to Orkedalsøren where a few days were spent in controlling the correctness of my previous researches.

I found nothing to contradict my above mentioned experiences, after this the whole fiord was examined from June 18 to August 11. I first examined the outer part of the fiord right out to Storfosen and the Biugn fiord. Thence I returned examining the whole of the Trondhjem fiord right to the bottom of the Beitstad fiord.

Fishing experiments were thus carried out in the following localities: Lensviken, Rissen, Selven, Ørlandet, Storfosen, Biugn, Tautra, Aasenfiord, Frosten, Holsanden, Levanger, Sundnæs, Borgenfiord, Vennæs, Kirknæs and Krogsvaag.

Several hundred houls with the seines were effected in these localities.

Not one single young salmon (smolt) or grilse was cought, while trout in all stages, excepting those which only belong to the rivers, were abundant. From August 13 to August 17 the Gula, the mouth of the Gula and the Gulosen were again investigated.

We here recorded the same phenomena as were found earlier in the summer.

By way of example I quote the journal:

„The mouth of the Gula. August 16.

6 Hauls with the eelhandseines yielded:

More than 500 flounders.

Some Herring fry.

19 Trout 10—40 cm.

37 Young salmon 9—13 cm.“

„Gula August 17.

11 Hauls with the eelhandseines from the Uddevold bridge to the river mouth yielded:

84 trout 10—38 cm.

11 young salmon 10—13 cm.“

It was thus evident, that the smolts had not grown and that they consequently emigrated at the above mentioned size.

Later on, during autumn, a series of fishing experiments were carried out, thus at Vik in Nordland, in Lekø and at Brønø, later on also on in the neighhourhood of Fredriksværn and in Eidanger on the south coast. The results were perfectly analogous to those obtained in the Trondhjemsfjord i. e.: I did not succeed in catching one single smolt in the sea.

During the month of July I had the opportunity of for some time accompanying Dr. Hjort on a cruise along Jæderen. In this locality some hauls with the eelhandseine were effected, the results in no respect differing from those above.

In the month of October fishing experiments were carried out along the fiord between Trondhjem and Orkedalsøren with similar results.

In the mouth of the Orkla large numbers of trout were present. They had the same appearrance a those cought during spring i. e., there were more or less spotted. A small proportion had recently spawned.

On October 23, 1898, 3 hauls with the eelhandseine in the mouth of the Orkla thus yielded: 187 trout 17—34 cm.

Kalstad, Meldal (ca. 40 km. up the Orkla) October, 25, 1898:

Many hauls with the eelhandseine through differens pools and rapids yielded:

11 trout 27—43 cm.

2 young salmon (parr) 6—8 cm.

During late autumn of the same year fishing experiments were from time to time carried out in the vicinity of Trondhjem and at Sundnæs, Inderøen.

Results: trout were the only salmonid fishes cought.

During the whole of this summer opportunities were availeable for constantly examining the large qauntities of salmon and trout passing through the stores of several Trondhjem fish-

mongers f. ex. M. Thams & Co. During these investigations, when I had the opportunity of examining thousands of fishes, I could not find one single salmon smaller than 50 cm. long. All the smaller fishes were throut.

By courtesy of the managers of this large buissiness I was permitted to store a large vessel with preserving liquid in the establishment. The clerks then undertook for me to preserve the smallest specimen of salmon, which could be found during the season. The result was a salmon 49 cm. long.

The results of my researches during the first season was shortly this:

I could ascertain the presence of trout in all stages in the waters examined. *Salmon however could not be found of sizes between 13 cm. (as an exception 16 cm.) and 45—50 cm. in length.*

The correctness of this result I have during the latter years tried to centrol by all means available to me.

The year 1899 was spent in repeating the investigations of 1898 with perfectly similar results. During the same year I visited the main fishmarkets of England, Scotland and Denmark endeaevouring in these countries to find salmon of small size. The results of the examination of large stores of fish was perfectly like those obtained in this country.

A few fishing experiments, undertaken from the Danish Biol. Station in the sourroundings of Fyen, only yielded trout of the same appearance as those obtained here in Norway.

In 1900 large fishing experiments with eelhandseines and other seines were effected in the Trondhjemfiord. As regards the fiord, the hauls yielded large quantities of trout, no salmon. In the rivers I obtained the same result as in previous years.

Different localities in the Battenfiord were also this year examined with the same result as all my previous investigations.

As examples from the hauls of this year my be quoted a nights catch in the Beitstadfiord, illustrating the abundance of trout.

May 28, 1900. Kirknæsvaag.

12 hauls with the eelhandseine from 9 pm. to 1 am. on the strech Kirknæsvaag—Galgsøen, yielded:

97 trout 19—58 cm. (total weight 45 kgr.).

9 wrasse (labrus rupestris) 9—14 cm.

1 cod, 21 cm.

1 Pl. limanda, 17 cm.

10 Sprats, 12—15 cm.

Ca. 1/4 barrel of herrings, 20 cm.

In 1901 a few hauls with the seine were effected in Finmarken and Nordland. A few hauls were also made in the Trondhjemsfjord.

None of these experiments exhibited any differenee from the results of previous years, excepting a few of the hauls made in Finmarken yielding specimes of sea-char.

In October 1901 investigations were undertaken in the Mandal river. In this river, besides other southern rivers, the population has asserted that large numbers of quite young salmon during autumn ascended the river.

The local name of these fishes is „blege“ Mr. A. Landmark, inspector of fisheries, desired me to investigate this matter.

Upon a closer examination of the lower parts of the Mandal river however it immediately transpired, that the conditions in this river were perfectly like those I had observed during autumn in northern rivers.

Thus 10 hauls with the seine at Lerkjær, Mandal river, October 25, 1901, yielded:

178 trout, 10—45 cm.

5 young salmon (parr), 10—11 cm. long.

The smallest trouts were brownish, those above 20 cm. shiny, quite like the trout I used to get during autumn in the Gula and Orkla. These latter were by the people considered as young salmon.

b. *Finemeshed bag nets.*

Fishing experiments with bag nets were effected in 1899, 1900 and 1901.

In 1899 a bagnet was constructed of 9/12 cotton twine, 5½ fathoms deep, 11 knots pr. foot (Norw.). The net was fixed in a good bag-net locality at the island Garten, Ørlandet, in one of our best bagnet districts. The net was fixed July 10 and remanied in position (with larger or smaller intervals) until August 9.

The yield was:

6 salmon, 58—64—69—65—70—52 cm.

11 trout, 34—40—43—44—42—22—34—32—27—32—26 cm.

19 cod, 30—80 em.

11 seithe 30—40 cm.

9 lythe 30—50 cm.

1 ling 56 cm.

2 lumpsucker 15—48 cm.

During the winter 1899—1900 the same bagnet was employed at Inderøen through several mouths. Only one single trout was cought, no salmon.

In 1900 and 1901 a bagnet of hemptwine was used. The mesh was 8 knots pr. foot (Norw.). It was fixed at the biological station, Hegdalen, Trondhjem and during the year 1900 it was fixed from July 1—September 28, with a few intervals.

The yield was;

4 salmon, 63—85—59—49,5 cm.

5 trout, 42—40—32—36 cm.

392 lythe, 35—74 cm.

13 seithe, 37—48 cm.

6 cod, 35—51 cm.
10 haddock, 32—40 cm.
6 lumpsucker.
1 whiting, 40 cm.
1 gurnard (*trigla gurnardus*).
3 plaice, 30—60 cm.
1 large angler (*lophius piscatorius*).

In 1901 the net was fixed in the same locality and remained, with a few interwals occasioned by accidents and repairs, from April 12—July 10.

The yield was:

5 salmon, 101—90—51—50—48 cm.

16 trout, 35—30—32—35—33—33—55—39—32—36—31—32—32—38—34—38 cm.

21 lythe, 34—65 cm.

49 cod, 33—65 cm.

3 seithe, 34—38 cm.

8 flounders, 10—27 cm.

1 herring, 34 cm.

5 lumpsucker.

The main proportion of the catch was captured in April and May.

Not even during these experiments with fixed fishing engines I succeeded in procuring young salmon of the missing sizes, no salmon smaller than 48 cm. in length being cought in my bagnets.

c. *Fishermens catches.*

During the past years innumerable opportunities have been offered of examining the catches made by those fishermen, who employ seines and during their work catch sea trout, sometimes in considerable quantities. These catches have been examined by me, sometimes in the possession of the fishermen them-

selves, sometimes in the hands of those fishmongers, who buy their catch.

Among the many thousands of fish thus examined I have found nothing to contradiet the results of my own experiments. The catch of the seiners consists besides other seafish of trout only. An occasional grilse or salmon of the larger sizes may occur.

On numerous occasions I have endeavoured, by the aid of the bagnet-fishermen, to ascertain, if salmon smaller then 45—50 cm. in length or less weight then 1,2—2 kgr. accidentally are caught in their nets, which as a rule only are capable of retaining grilse down to 49 cm. in length when the fish is of ordinary thickness.

The only result of my efforts in this respect are 2 salmon of 45 cm. length, which kindly were sent me by Mr. Krane, Brevig, Sørøen. They were retained in the meshes of his bagnets, wich are fixed on the outer side of the Sørøe by the open ocean. Mr. Krane will also according to his statement have seen smaller salmon, who have passed through the nets, sometimes in considerable numbers.

d. Rearing-experiments and investigations on the systematism of the salmon.

The results arrived at during the first season of my researches, has thus been confirmed by experiments and experience during several years. During these years *I have thus not been able to catch or to procure through the aid of other fishermen salmon of sizes between 13—16 and 45—50 cm. in length in those waters where in our country fishing gear is used for the purpose of catching salmon.*

In the face of this negative result I have considered myself obliged to test its correctness as far as my means have reached.

Two courses of reflection have in this connection strongly asserted themselves.

One has forced me to effect the strongest possible control as to the correctness of my specific determinations.

The other has urged me to endeavour by positive results to illustrate the real habitat of the young salmon in the missing stages.

When I have not been able to find those stages of the salmon, which a number of other scientists have described, this fact would clearly seem to contain a contradiction fatal to the correctness of my investigations, and this chain of thaught caused me to begin with no small amount of trouble.

When I laid before me a collection of salmonids, it was by no means difficult, the works of systematical authors (f. ex. Liljebofg) in my hand, closely to distinguish the young of salmon and trout up to 16 cm. in length. No more did the distinguishing between salmon and trout above 45—50 cm. in length occasion the least difficulty. However, if I laid before me fishes between 24—40 cm. in length, I found to my great astonishment that they ad libitum might be determined as salmon or trout and that on the strength of the printed descriptions by the different authors. In other words mere judgement apparently had to decide. It also seemed to me as if mere judgement must have formed the base of the diagnostic description.

I laid before me seperate series of these two species in their different stages avaibable to me In one species i. e.: the trout, I could follow it through its developement through all sizes from 10—40 cm. and more. In the salmon, quite contrary to the trout, the series was broken at 16 cm,, and could not be continued before a length of 45 cm. was reached.

Those very pregnant characters, distinguishing the young of the salmon (parr and smolts) from those of the trout, were found suddenly at 16 cm. length to cease.

Just as suddenly the characters sharply and concisely distinguishing grownup salmon from trout asserted themselves from 45 cms. length and upwards.

Surely, the systematical works, especially the swedish ones, ewerywhere contained remarks upon the difficulty in distinguishing between salmon and trout in just these middle stages; but this circumstance did by no means satisfy me.

How could the young of one species, so different from those of another species, that even children easily may learn to distinguish them, how could the young, upon reaching a certain length suddenly become like those of another species and then again after some lapse of time and upon reaching a more advanced stage of growth become like itself.

The contradictions contained in this chain of reasoning seemed to me to point to the possibility that previous authors on this subject might have confounded trout, especially shiny slender and rounded trout with young salmon, and that other investigators no more than myself had been able to procure for examination salmon between 16 and 45 cm. in length or salmon between the smolt stage and the grilse stage.

In other words I was compelled to adopt for preliminary use the working hypothesis, that salmon of the above mentioned sizes were unknovn or at least undescribed.

To solve this problem two things have been necessary.

First I have had to catch and further rear in seawater the young salmon (smolts) when emigrating from the rivers, and further during their developement compare their characters with those of trout of corresponding size.

Secondly I have had to examine those collections of young salmon on which the systematical descriptions of salmon in the abovementioned stages (16—45 cms.) are founded. Most of these are as far as I know to be found in the "Riksmuseum" in Stockholm, and the late direktor of this museum, professor F. A.

Smitt, has with great liberality and kindness forwarded to me for examination the specimens needed.

Besides, the collections of salmon in the museeums of our university, Bergen, Trondhjem and Tromsø, have been examined.

The result of these investigations proves my working theory to be correct, as I will endesavour to show.

In the middle of june 1900 I cought in the mouth of the river Gula some 150 emigrating young salmon (smolts). In saved--off barrels or tubs they were kept about 1 week on board of my sailingvessel. About 25 were kept in each tub (new ones) the water being changed 4—5 times in the 24 hours.

The vessel was towed to Trondhjem, and June 17, 150 smolts and about 20 trout of different stages were placed in separate freshwatertanks. As the tanks, tubings and aquarea for salt water were not yet in order, I had to keep my fishes for nearly a fourthnight in freshwater.

By transferring a few to seawater and letting them stay there about a day, I satisfied myself that no trouble was likely to arise from their passing from fresh to salt water.

In the mean time a considerable mortality occurred among my young salmon. They would greedely eat ordinary rainworms besides gammarids, which latter in large numbers were to be had under de stones at lowtide. By and by however they were attacked by the common freshwater fungus (saprolegnia) which affected their gills, fins or those places of the body where scales were lost.

The fish once infected, this saprolegnia woud spread with incredible rapidity. Thus I noted that the fungus in some cases in about half a day would spread from a small point, just distinguisheable, to an area of about 2 square centimeters. Many fishes succumbed during this period.

On July 1 the aquaria for saltwater were ready for use. I had then no more than 70 smolts left. These were in some

cases still suffering from the saprolegnia some were reconvalescent and some were healthy.

During the first days after the transfer to saltwater (about 10 ‰, gradually increasing to 33 ‰ salinity) ca. 30 died. However the 40 fishes, which were left, got on very well.

They were fed partly on worms, partly on gammarids. Later on during summer their main food was the young of *Gobius Ruthensparri* of which quarts of living specimens might be taken in every haul with a small seine of mosquitonetting. A supply of living food was thus constantly kept in the aquarium with the fishes, who might eat as often as they liked.

Through autumn, when this source of supply ceased, chopped fresh herring or herring roe was used.

Their appetite however stagnated during winter with the sinking temperature. Only a few casualties occurred during summer and autumn, but the months after christmas 1900 demanded about 55 victims. In spring 1901 when their appetite again began to assert itself only 15 were left.

As will be understood it has not been possible directly to measure their growth during this period but it was evident, that they did not grow anything worth mentioning during the winter months.

During the first summer however they grew very rapidly. None of them measured more than 13 cm. when they were transferred to the saltwater aquarium. In autumn the largest were nearly 20 cm. long.

During the second summer their growth was very rapid and they increased enormously in bulk.

The fishes were killed off on October 18, 1901 and were measured ofter having been kept a few days in a preserving fluid consisting of water, spirits of wine and formalin.

The measurements ran as fellows:

♂	♀
23 cm.	21,5 cm.
23,5 „	23 „
23 „	25,5 „
25 „	31,5 „
22 „	30 „
27 „	28.5 „
29 “	

The largest one weighed kgr. 0,60.

During their growht in the aquarium a large proportion of these fishes have suffered larger or smaller læsions to the fins of the hindpart of the body. In some the ventrals and the anal fin are a little worn as a consequence of the ravages of the saprolegnia previous to their transfer to salt water. In some the caudal fin is more or less hurt. Not a few have regenerated the fins affeced.

During the whole of their developement these young salmon have been higly differing from any trout I have ever cought. They distinguish themselves not only by peculiarities in the structure and relations of several important parts of the body, besides also in the colouring from all those fishes which I have cought during my experiments and named trout.

Their whole deportment and their habit in the aquaria also shows a specially marked difference from those of the trout which I have captured and kept in confinement for comparison.

All the trout, which I have kept in captivety, will keep very still in the aquarium, suspended in midwater without hardly any motion all day through, occasionally when gorged with food resting motionless at the bottom. Off and on they will suddenly dart forward catching their food when they are hungry.

The salmon on the contrary are constantly in motion, nearly unseasingly swimming round and round in the aquarium night

and day. In this respect it has been very instructive to let a trout of corresponding size down to the salmon.

All day through I could then see the trout remain nearly in the same place suspended in midwater, while the shool of young salmon lively svimming constantly circulated round the aquarium. Specially striking has also been the different way in which their appetite asserts itself.

The appetite of the trout is not strong every day. Often it will assert itself only within intervals of several days. Given the opportunity to eat as much as they like the trout will then gorge themselves until the food hangs out of their mouth, yes even to such a degree that they will drop to the bottom and motionless digest for several days.

The salmon eats as a rule several times every day. They do not gorge themselves to the same degree as the trout, and they digest very rapidly. Thus after the lapse of a few hours they are very often prepared for a new meal.

Respecting the colours a considerable difference has been noticeable in the two species.

Excepting the gradual disappearance of the parr marks and the red lateral spats, the colour of the salmon has not changed. During the whole time I have kept them they have been of a strong shining sivercolour with a blueish green undercoating on the head and back, a few large black spots scattered mainly on the dorsal side of the body.

When exposed to strong light, their colours have paled a little resuming their ordinary hue as soon as the light was subdued.

The trout have been quite different. Even the most shining and silvery trout, taken directly from the sea, have very soon assumed quite other colours varying in blue, blueish green brown and yellow. Also they have always grown very much spotted. These changes have also taken place when trout of the same

sizes as the young salmon have been kept in the aquarium where the latter were reared.

The fænomenon however is in good harmony with the well known propensities of the trouts for variation.

Before entering into a closer description of the younger stages of salmon, compared with trout of the same sizes, I will shortly relate the result of my search in those of Scandinavian museums whose collections of salmon I have had the opportunity of examining.

In Norwegian museums I have only succeded in finding *4 salmon* between 16 and 45 cm.'s length. *None of these have ever been described.*

In the Bergen museum I found 2 young salmon resp. 20,5 cm. and 21,5 cm. long. They were reared in a freshwater dam in Jæderen and by Mr. Grude presented to the Bergen museum.

They both closely resemble the fishes reared by me in salt water.

In the university museum in Christiania I also found 2 salmon resp. 23,5 cm. and 28 cm. long. They had not been subjected to any closer examination or been described. According to professor Collett they were found among mackerel in the Christiania fish market.

Also these closely correspond with the fishes reared by me and differ, as also do the fishes from the Bergen museum, most decidedly from any salmonid fish of similar size wich I have ever cought in the sea.

In plates I, II and III will be found drawings representing as well these young salmon as trout of corresponding sizes. In my opinion a superficial glance is quite sufficent in order to discover the considerable difference between then. Later on a closer description will be given.

Before doing this however we need to review the collections, forming the base of the diagnostical descriptions issued

by the swedish systematists and critically revise the material at hand in the descriptions of different authors.

The main body of the collections, upon which most of the independent investigations in Sweden bave been based, are presumably to be found in the „Riksmuseum“ in Stockholm. At all events the collections on which F. A. Smitt and Hjalmar Widegren have founded their descriptions are kept in this museum. Excepting Nilsson, whose collections I presume mainly are to be found at the University of Lund, only the two authors mentioned above may be said to have in any marked degree based their diagnostic descriptions on independent rescarches and examinations of specimens. Most of the other authors have chiefly compiled faunistic works, the diagnostic descriptions of which, as regards the species in question, mainly seem composed from the diagnosis of original authors and only in a small degree based on independent examination of specimens. At all events no distinct specification of the the specimens forming the base of description is to be found.

By good will of prof. F. A. Smitt, the not inconsiderable material of young salmon stored in the collections of the „Riksmuseum“ has been forwarded to me.

Upon examination of this material I found to my great astonishment, that even this collection did not contain specimens of sizes, by means of which it would be possible to fill the gap in the description of young salmon, the exsistance of which my own investigation indicated.

It transspired, upon examination, that these collections did not contain salmon between 17,3 cm. and ca. 38 cm.s lenght — with a couple of exceptions — exceptions of quite a remarkeable character and exceptions which, in my opinion, throw a certain light on some of the difficulties which the swedish authors have experienced in distinguishing young salmon and trout in the intermediate stages.

The sizes mentioned above, differ quite inconsiderably from the size limits of the salmon found by me in our waters.

However it is just the intermediate stage, between smolt and grilse, or the so-called „Forell"-stage, which has occosioned the difficulties in discerning salmon and trout.

In his great work on the salmonids „Kritisk förteckning öfver de i Riksmuseum befindtliga salmonider", Professor Smitt has compiled a table on this stage. As his method of examination demanded as large numbers as possible, of course he must have mustered all the specimens availeable.

On revising this table however one will be astonished at finding only the following salmon;

Pg. 50 we thus find:

Tab. No.	173	172	166	171	167	161
Length in cm.	20.4	17,3	15,9	17,2	16,0	14,5

By looking up his metrical tables (the Tab. No.s above refering to these) I observe, that the specimens all are from the „Motala ström" by Norrköping with exception of No. 161 which is from the lake Venern (Kannikenäset).

Upon closer examination I find that these salmon in no mean degree differ from those kvown from other places.

The 3 smallest differ considerably from the smolts of our rivers and also from smolts from other swedish rivers of which the collection of the Riksmusmuseum contain many of a little smaller size.

The 2 largest ones No. 173 and No. 172 are higly different as well from the salmon I found in the Bergen museum as from those I have reared myself.

They possess many characters reminding of those of the trout. Thus the form of the body is clumsier, the tail shorter, the fins larger and the scales smaller than in salmon. The

only salmon-characters of a safer nature, which they possess, is the relatively short upper jav and partly the size of the breastfins.

The specimen No. 173 is not yet sexually mature and differs as may be seen above (ca. 4 cm.) so little in length from the largest known smolts from norwegian rivers, that this solitary specimen hardly can be considered as material for a description of the stage in question.

Specimen No. 172 is in a state of sexual maturity and in this state possesses several characters, f. ex. prolongation and thickening of pectorals ventral and anal fin, which renders it considerably different to immature fishes. Consequently it is very little fit to form a base of description of such fishes.

In determining the importance to be attributed to these prof. Smitt 6 specimens as material for a description of salmon between the emigration and the grilse stage, two facts must, according to my opinion, be held in view.

First it must be remembered that the last one of them is taken in Venern, and that all the other fishes are taken in the Motala, a water course, which according to the explicit reports of an investigator as f. ex. Widegren is supplied with fish from the lake Vettern and is connected with nearly the whole of the lake complex of middle Sweden, a locality wich, as is well known, possesses a „landlocked“ variety of salmon, whose main characteristic is the union of several, salmon and trout characters.

As for myself, not having had the opportunity of systematically investigating the fishes of these waters, I will not express anything definite regarding these young fishes. I will only give prominence to the opinion that in all probability they belong to the middle Swedish relict variety the Vener- or Vetter-salmon.

At all events they are not oceanic salmon (salmo salar).

Secondly I draw attention to the fact that one of these fishes No. 172 is in a state of maturety, a circumstance, wich

of course renders is unfit for a description encompassing immature fishes, especially when this description, as in the case of prof. Smitt, is founded on *metrical characters.*

The facts here mentioned, besides the small number of the specimens, are in my opinion well adapted to throw some light on the difficulties which prof. Smitt has experienced in distinguishing the „forell“ stages of salmon and trout. By comparing certain metrical characters and demanding the continuity of these characters through all stages as professor Smitt has done, the difficulty is obsiously extended to the two species during the whole of their developement.

It is to me perfectly clear, that the introduction of only one or two specimens in the mature stage, wil be sufficient to disturb the final mean of metrical characters when the work is carried out according to the system which prof. Smitt employes.

It will be remembered that the proportions of as well salmon as trout are considerably altered when in a state of sexual maturity.

It is just as evident, that a collection of a few individuals of young Vener-salmon, cannot possibly form the base of a diagnostic description of the young of the salmon of the ocean. Also the trout-characters of these specimens would be higly efficient in confusing a description, where even real salmon were used as material.

From the facts above mentioned, it must, as far as I can see, follow that this material, and the descriptions based thereon, hardly may be considered as rendering any satisfactory contribution towards filling the gap, which, according to my experience, exists in the description of salmon between the emigration stage and the grilse stage.

The investigations of Hjalmar Widegren will be found described in „Öfversigt af Kgl. Vetsk. Ak. Handlingar“ 1862 and 1864 „Bidrag till kännedomen om Sveriges salmonider“ and „Nya bidrag til etc.“

In the first of these works the author describes the young salmon during transition from the „stirr“ stage to the „forell„ stage.

Also he describes their appearance during the „forell“ stage. He also admits the difficulty in distinguishing salmon and trout in these stages. He is of the opinion that the young salmon at about 20 cm. length pass into the „forell“ stage and he explicitly states that the young of the salmon only after reaching 40 cm. in length acquires the typical characters of the species.

He notes that young salmon in transition between „stirr“ and „forell“ often are to be found as well in the Motala by Norrköping as in the rivers of Norrland, (äfwen i Norrlands elfvor), and that their length is 20—22 cm.

As far as can be seen however his descriptions are founded only on specimens from Motala. He thus mentions only 3 specimens from Motala stream by Norrköping 21,5—23,2—26,7 cm. long, even the very locality, the dangers of which for the present purpose i have mentioned above.

In support of his description of the young salmon in this stage he refers to one of the plates, accompanying the paper representing a fish, which in the explanation of the plates expressly is stated to be a female of „Venerns blanklaks“ [1] (the relict Vener or londlocked salmon).

Whether this specimen is identical with one of the 3 specimens measured and mentioned above, is not stated.

This drawing is, as any one may satisfy himself higly differing from the representations of salmon in the same stage given by me, (Vide pl. II and III.)

In this latter paper he also gives a drawing representing a salmon in the „forell“ stage, even from Motala. (Vide Wgr. „Nya bidrag etc.“ pl. XIV fig. 1.) This fish which I have had the opportunity of personally examining, and which exists in the

[1] Vide pl. in Widegrens work tab. V fig. 2 („Bidrag till kännedomen etc.“).

collection sent to me from the Riksmuseum, differs however highly as well from the young salmon reared by me as also from those found ind our museums, exhibiting the same mixture of trout and salmon characters as all the specimens I have seen from middle swedish localities.

From other localities than the middle svedish lake and river complex, where Vener and Vetter-Salmon is to be found Wiedegren evidently has not had youg salmon for examination. The conclusion thus would seem justifiable, that all his descriptions on *Salmo salar* in this stage have been prepared with the relict lake form of Middle Sweden as material.

Turning to the classical descriptions by Nilsson i his „Scandinavisk fauna“ Lund 1855, we find, that the smallest „laksbørling“ or grisle, described by him, is a little more than 20 inches long (Norw.). accordingly more than 50 cm. long. The next size is „a youg salmon 11½ inches long,“ a little more than 30 cm. However this latter size has not been examined by Nilsson, but the description is prepared on the streugth of a drawing in Sir Jardines work on british fishes. Sir Jardine had procured the specimen „on the sea-coast“ presumably the coast of England.

Quite briefly he mentions a specimen of 9½ inches (24 cm.) collected by adj. Lilljeborg on the norwegian coast. It is kept at the Lund museum and I have not seen the specimen.

Respecting these two specimens I am thus not able to speak from personal experience. However the very imperfect descriptions of Nilsson seem to indicate, that Sir Jardine's specimen possibly has been a real salmon. Regarding the other specimen, from Norway, it is not possible to express any defiente opinion. However, Nilssons remark that „it is much fatter and plumper than trout of the same size“, seemes to make it doubtfull whether it is a salmon, these on the contrary being much more slender and elegant in shape than trout of corresponding size. Locally the specimen was named „Blankøre“, a name

wich in many localities in this country is applied to the sea trout. This circumstance also throws some doubt on the case.

In the works of Fries, Ekström and Sundewall, Liljeborg, Krøyer and other scandinavian faunists as well as in those of british authors such as Couch and Yarrel. one will in vain search for specifications regarding the material, on wich their descriptions are based.

As mentioned before, their works are mainly faunas with diagnostic descriptions and biological notes chiefly founded on the works of other investigators or on revision of the collections, wich in the course of time, throgh the efforts of these investigators, have been desposited in the museums. Only in one work I have found reliable accounts of salmon of a little larger size than in the young salmon emigrating from our rivers. Vide „Neuere Lachs und Maifisch-Studien" by P. P. C. Hoek. 1899.

The author has examined the young salmon wich during the month of may emigrate from the Rhine and graphically described their size. From his graphical table it will be seen that these young on the average are a little larger than the smolts of norwegian rivers. The more southerly location of the Rhine probably accounts for a more rapid growth. The ampiltude of his curve mainly reaches from 10 to 18 cm. with a couple of exceptions of a little larger size, while my curves (cfr. tab. IV col. 1, 2, 3) average a little lower with one exception of 16 cm.

His drawing Pl. I fig. 4 in all essential respects resembles the largest smolts cought by me and has still got the parrmarks and the red spots along the lateral line.

According to my oppinion the abovementioned facts are sufficient to show, that earlier descriptions of young salmon between the emigration stage and the grilse stage are not founded upon sufficient material. In examining the large material, collected through about half a century or more, wich the swe-

dish authors have disposed, we have not been able to find more than about 1/2 dozen specimens of young salmon, above the emigration stage. Most of them belong even to the lowest of the sizes desireable, and they are all taken from a watercourse inhabited by the Vener-Salmon. Direct examination has shown them to possess the peculiarities ot this form. In the works of all the swedish authors we have further not been able to find one single drawing of one single young salmon of the missing sizes not beeing taken from the obove mentioned water-complex or expressly stated to be „Vener or Vetter-Salmon". In my oppinion we are therefor justified in drawing the conclusion, *that the descriptions of swedish authors of youg salmon between the emigration and the grilse stage are founded on the relict or landlocked form of middle Sweden and consequently are of no value for the distinction of oceanic salmon.*

Even supposing that some authors like f. ex. Nilsson or Jardine have had a real young salmon of the abovementined sizes for examination, a possibility wich I will not deny, the walue of such a single and imperfect diagnosis must obviously disappear when, during the preparation of later descriptions, it is confused with descriptions of a material possessing quite other characters.

My working hypothesis has thus proved to be correct.

Salmon between the emigration stage and the grisle stage are not properly described and consequently must be considered as unknown.

At this juncture I must allow myself the pleasure of expressing my acnowledgement of the works of msrs. Smitt and Widegren, wich undoubtedly are executed with great care and conscientiousness and in a manner, wich even now, after the lapse of more than 30 years, enables present investigation largely to control their results by examination of the original specimens. The excellent manner in wich they have effected

the reduction of the innumerable „Species“ of salmonids, flooding the systematical literature of former days, deserves every aknowledgement.

As I have shown, the lack of material of the „forell“ stage of the real salmon has prevented a perfect distinction between *salmo salar* and *salmo trutta*, a gap wich according to my experience has been very difficult to fill.

This deficenecy and supplementing it with specimens belonging to the relict salmon form of middle Sweden in my opinion suffices to explain, how professor Smitt, undoubtedly the scientist, who on this subject has excercised the greatest care and drawn the utmost consequences from his rcsearches, has not been able to separate the two species.

In the following pages I will describe the youger stages of the salmon compared with trout of corresponding sizes. I will commence with the stages in wich the fishes leave the rivers and further describe them during their developement. The larger stages from ca. 45 cm. and upwards are not worth describing, as they easily my be distinguished by people not wholly ignorant on the subject.

Certainly previous investigators have given quite accurate descriptions of fry and emigrants belonging to thise species; but for sake of completeness and in order that this work my be useful to those who might wish to use it for the specific determination of such fishes, I also incclude the fry.

To begin with however I wish from a general point of wiew to discuss some principles, wich according to my opinion are fundamental to the specific description.

Describing a species, the scientist is hardly able to do more than as accurately as possible to detail the image wich the peculiarities of the species in question, presents to his senses, and by means of wich he may recognise the species in single individuals.

In description of the general image of the species, the means, by wich the description is to be effected, will consequently be dependant on the nature of the peculiarities and give due consideration to these.

If we place before us an adult salmon and an adult trout, place them side by side and ask. by wich means we distinguish them, I should decidedly answer: by means of „habitus", the image, presented by the total of their exterior characters. The main difference by means of wich I am able, even at first sight, to distinguish between them is shortly this:

The body of the salmon is considerably more slender and spool-shaped than that of the trout, wich is more plump and clumsy. The tail of the salmon is considerably longer more coniccylindrical and lower than that of the trout, wich is shorter higher and more compressed from the sides.

The caudal fin of the salmon is more cut out than that of the trout. The anal fin of the salmon is smaller and the scales of the body are larger than those of the trout.

The trout is not so shiny and silver coloured and has more dorsal and lateral spots than the salmon. Behind the dorsal fin the salmon is spotted only above the lateral line. The trout is spotted also below the lateral line. The upper jaw of the salmon is shorter than that of the trout.

All these factors and their mutual relations form the main features of the image, wich at all times enable us to distinguish the two species. Even in the fry (parr) stage and when in a state of maturety, stages in wich the fishes considerably differ from the species as grown up, but not yet mature, a number of the abovmentioned factors, such as the lenght of the upper jaw, the form of the body, the ralations of fins and tail besides the size of the scales, form a valueable clue for distinction, a clue wich is also strengthened by other factors peculiar to these stages.

In two species, so closely allied as trout and salmon, one must however obviously expect the different relations of the body to vary, especially so, when at least one of the species is known to be disposed to variation.

When man, apes, birds etc. show individual variation vithen the limits of the species, we must also in the present case be prepared to meet it, and in the examination of large numbers of individuals the variation vill sone be observed.

Every form, every relation in an organism may be metrically described and expressed by figures. A series of investigators have largely employed and still employ the metrical method. In this however I think they very often are wrong. The main object of a diagnostic description is to be practical, and now there is nothing, wich in a more unpractical way denotes the form, at least in fishes, than the figure. As professor Hervig once said, there is nothing to prevent us from correctly describing the face of a man metrically, but undoubtedly we should find it difficult and unpractical to recognise our friends by means of such a table of figures or formula.

I openly confess that great difficulties are in the way of finding aedquate expressions for a difference in specific form wich mainly is brought to our brain through the eye; but an adequate carefull repræsentation in words aided by exact drawings is undoubtedly in most cases preferable to figures.

When I in the fallowing have availed myself of measurements, it is not with the intention of preparing a table of figures by means of wich salmon and trout may be distinguished.

I only wish to produce a graphic, through the eye easily perceptible, representation of the progress of a few of the abormentioned characters in salmon and trout, the individual variation considered.

Among the peculiarities and different relations wich destinguish salmon and trout may be mentioned 1) the different size of the scales, 2) the different size of the anal fin or if we like

to express it that way, its relation to the length of the tail, 3) the more or less prominent slenderness of the tail.

The size of the scales may be determined as other investigators have done, by counting their number in a row over a certain measured portion of the body and referring this length to the length of the fish. However as I find this method too impracticable, I have deemed it better to count the number between two definite points on the body *e. g.* in the oblique row of scales running from the hindpart of the base of the adipose fin down to the lateral line. I have included the perforated scale of the lateral line.

The relation of the anal fin to the length of the tail may be brought out by dividing the latter by the length of the anal fin. The result will be a coefficient which I call "Tail coefficient I."

The more or less pronounced slenderness of the tail may also be expressed as a relationship between the length and minimum altitude or depth of the tail — "Tail-coefficient II." In the subjoined illustration (fig. 1) these different lines of measurement are indicated and explained.

The method employed in examining the specimens is illustrated by the following example.

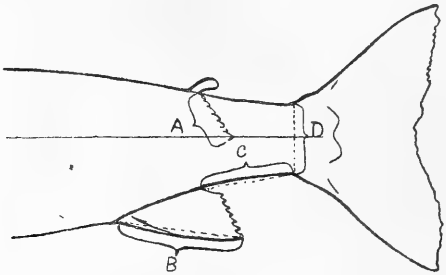
Total length of the fish.	A	B	C	D
25 cm.	15	2,5 cm.	2 cm.	1,5 cm.

$$\text{Tail coefficient} \quad I = \frac{C}{B} = \frac{2}{2,5} = 0,80.$$

$$\text{"} \quad \text{"} \quad II = \frac{C}{D} = \frac{2}{1,5} = 1,33.$$

In this way large numbers of salmon and trout have been measured. Of course they have all been immature fish. To see if the relationship of these different characteristics altered

throughout development the fish have been classified in 3 stages: 1) fishes of a smaller length than 16 cm. (including the largest emigrating smolts, 2) fishes between 16 and 50 centimetres long comprising in the case of the salmon, mainly the "missing stages", 3) fishes above 50 cm. (the sizes of salmon common by caught).



A = The number of scales in the oblique row of scales from the posterior base of the adipose fin up to and including the scale on the lateral line.

B = The altitude of the anal fin ɔ: the distance from the base of the first ray of the anal fin to the point of the longest ray of the same fin.

C = The length of the tail, measured from the posterior base of the anal fin to the sharp heel formed by the first auxiliary rays of the caudal fin.

D = The minimum altitude of the tail.

This classification has been adopted mainly on account of the salmon. In order to produce the correctest possible comparative representation of the alterations during development, corresponding annual classes of both species ought to have been compared. However this has been impossible.

From the figures thus obtained I have represented graphically the course of the abovementioned 3 characters in the two species compared. (Vide Tab. I—III). Every 0 in these tables denotes an individual examined. The Ordinates respectively represent the number of scales, figures for Tail-coefficient I, figures for Tail-coefficient II. From these tables it is evident:

1) That the scales of the salmon are larger than those of the trout.

2) That the anal fin of the salmon is smaller than that of the trout compared with the tail.
3) That the tail of the salmon is more slender than that of the trout.

However, it is also obvious that these relations vary, and to such an extent, that the amplitudes of variation in the two species vaguely meet or even overlap each other. However on this latter point it ought to be noted, that some of these overlappings are caused by the introduction of specimens, which, in size, differ only inconsiderably from the previous class or group; the character in question alters in fact, during development.

If we scan the table giving the scale-number, we find that this character remains practically constant through all groups.

Upon examining table II (on Tail-coefficient I) however, we remark that this coefficient in the salmon slowly rises during early growth; in other words that the anal fin of the young salmon gets smaller and smaller as the fish grows, while that of the trout remains nearly unaltered.

Excepting the youngest group the curves representing this character in the two species run nearly separated, with one single exception, a salmon of the group 16—50 cm. This fish measuring only 17,5 cm. was captured in the ocean outside Christianssand, as will be mentioned later, and only the size destinguished it from ordinary emigrating smolts. The coefficient of the youngest group beeing low, the introduction of this specimen will in some degree alter the real course of the curve of the second group.

The same phenomenon also occurs in the table on Tail-coefficient II (the slenderness of the tail), which in both species rises a little with the age, especially between 16 and 50 cm. (cfr. Tab. III a and b).

A classification in sizes separated by sufficiently large intervals would possibly have yielded a more strikingly typical result.

The material measured by me however, has not been large enough to allow of this method.

The abovementioned facts seem to me to show clearly, that any characteristic body relation in these two species might have been treated in the same manner and would have yielded similar curves of variation. By way of example we have now seen how some specific characters apply to the species in general.

I have previously given prominence to the fact that the abovementioned investigations are not intended to establish characters which might be expressed by figures or formulæ and separately employed in determining the species of a given individual. In itself, this would be unnecessary, because *the accurate specific distinction of all the individuals on which these tables are prepared, must needs have been known previous to my investigations on the variation of the different characters in the two species.*

Thus none of the characters investigated, has separately been fundamental to my distinction; but the sum total of these, in addition to many other characters I have before called „habitus" has in all cases enabled me to distinguish the two species.

Supposing that we tried to determine the species of an individual solely by means of one of the 3 characters whose variation has been investigated, *e. g.* the scale fugure. By examining table I we find, that an absolutely certain determination is in a large number of cases possible. Just as large a proportion however, leaves room for doubt.

If we examine table II (Tail-coefficient I) we find that a fish belonging to the youngest group is only in about half the cases with certainty determined by the value of Tail-coefficient I.

As regards the two older groups it will be seen that the curves run almost quite separated. Consequently the species of a fish may in the great majority of cases be determined solely by the value of this character, when the fish is not smaller than 16 cm. in fact neither a parr nor a smolt.

Examination of the 3rd relation as represented in tab. III (Tail-coefficient II) will yield a similar result.

None of these relations detached from the others whose course has just been described, or from the other, „habitus"-characters of the fish suffice as a fundamentally safe diagnosis embracing *all cases.*

If however the course of these 3 relations of form or character is examined in the *isolated individual*, they will be found, if compared with other characteristics, to present a valuable support to specific determination.

The youngest group (below 16 cm.), belongs to the stage, where these 3 relations are most similar in the two species. However, other body relations yield destinctions so pregnant and so easily observed, that there never is any doubt as to which species the individual in question belongs.

An examination of the large number of individuals by means of which the tables (I—III) on the two older stages, have been constructed, has shown that the same individuals never cause the curves to meet or overlap each other in regard to all three characters. As I have mentioned above, the tables show, that the salmon has large scales (small scale-figure) small anal fin in relation to the tail (tail longer than anal fin) and a very slender tail, while these characters in the trout are just the opposite.

When the tables now show that the amplitudes of the variation of these characters in the two species overlap each other, we are not justified in inferring, that there needs must exist individuals of the salmon species which in themselves unite all the lowest values of the salmon curves or trouts possessing all the highest values of the trout. The curves thus do not shew that salmon exist which *e. g.* possess 15 scales, Tail-coefficient I 0,90 (anal fin longer than tail) and Tail-coefficient II 1,30, or a short and thick tail. No more do they show that trout exist which *e. g.* possess 14 scales, Tail-coefficient I 1,0 or an equally

long anal fin and tail, and a Tail-coefficient II 1,60 or a very slender tail.

In examining the course of these relations in the single individuals of the above-mentioned tables, I have found quite the opposite to be the case. As a rule only one of the three characteristic relations, if any, is situated within those values of the curves which are common to both species.

When a salmon possesses a very high scale-figure, one or both tail-coefficients have been situated outside the values of the curves, common to both species or vice versa.

When a trout *e. g.* has possessed a tail-coefficient ranging among the highest values of the species, the scale-figure has not been among the values, common to both species.

The most interesting examples I have been able to find among my material on trout, are 3 specimens of which Nr. 1 was caught in the Orkla, Nr. 2 in the Battenfiord, Nr. 3 in the ocean a few miles south of Christianssand (S.). They are respectively 34,5, 36 and 45 cm. long, all very shiny and slender.

The course of the 3 relations was:

	Length.	Scale-figure.	Tail-coefficient I.	Tail-coefficient II.
Nr. 1	34,5 cm.	17	0,99	1,56
„ 2	36 „	17	0,99	1,60
„ 3	45 „	16	1,00	1,53

Nrs. 1 and 2 are undoubtedly the most shiny, slender and salmon-like trout I have ever come across among the fishes examined by me.

In the case of the salmon I may refer to some of the most striking cases that have occurred to me.

	Length.	Scale-figure.	Tail-coefficient I.	Tail-coefficient II.
Nr. 1	17 cm.	13	0,85	1,91
„ 2	39 „	14	1,57	2,32
„ 3	49 „	15	1,33	—
„ 4	88 „	13	1,00	—
„ 5	108 „	13	0,92	—

In the face of my experiences I will however not deny the possibility that an examination of still larger numbers of individuals might produce salmon or trout which in all 3 relations possess values corresponding to those values of the curves, which are common to both species.

As I have not in the sifting of my relatively large amount of material met with such specimens, the conclusion however seems justifiable, that such specimens are extreemely rare.

In all the cases examined, the total of the values of these 3 different relations combined, always points clearly in the direction of one or the other of the two species.

Thus the examination of these 3 characters, yields a good means of specific distinction. In most cases it is quite sufficient, and when other characters are also taken into consideration, there is no room for error.

e. *Description of young salmon and trout.*

The distinction between the young of salmon and trout at that stage of developement, when they leave the rivers, is effected by means of the differences observable in the form and relations of the body — those of the head, the size and form of the scales, the colour, and, when the fish is living, its habits.

In specific determination however, I would not advise anybody to attach importance to any one of these characters isolated, but only to a careful examination of them all.

Pl. I represents two fishes in natural size. The upper one is a trout, the lower a salmon, both caught in the river Gula (the mouth). If we compare them the great difference in form of the body is obvious.

While the trout is more plump and has a shorter and clumsier tail, the salmon is more finely pointed and spoolshaped in form, and has a very slender and relatively long tail. The salmon is not so much laterally compressed as the trout, which however cannot be shown in the drawing.

The shape of the head is utterly different in the two species. The head of the young salmon is low and slender, while that of the trout is higher and clumsier. The head of the trout is relatively larger than that of the salmon. At first sight the head of the salmon seems specially long. In comparing the fishes it will however be seen, that the head of the salmon seems long, because its facial region (the nose and the mouth-region) is considerably shorter than that of the trout, the gillcovers being longer.

The eye of the salmon, proportionally larger than that of the trout, is pushed very much forward. The nose is specially short and the mouth small. This latter character is expressed in the upper jaw of the salmon being exceedingly short. If a perpendicular line is drawn downwards from the posterior part of the pupil of the eye, the posterior edge of the upper jaw will as a rule, not reach far enough back to touch this line. Often it will only reach as far back as to touch a perpendicular line drawn downwards from the centre of the pupil. In the trout however the frontal part of the head is considerably longer, the nose being proportionally longer and the mouth region heavier. The mouth is larger, and the upper jaw consequently longer.

Although the nose region of the trout is longer, and the eye pushed further back, the upper jaw as a rule reaches a good deal further back than tot he posterior edge of the pupil, in many cases even further back than the posterior edge of the eye itself. Thus a perpendicular line drawn from the posterior margin of the pupil downwards will in nearly all cases cut the posterior part of the upper jaw.

The form of the upper jaw is also somewhat different in the two species, that of the salmon being considerably broader in proportion to its length and generally more finely rounded at the posterior margin than is that of the trout. If the heads of the two fishes are seen from above, it is at once obvious that the forehead of the trout is broader than that of the salmon, the forehead of the latter being shorter and more pointed.

All fins, excepting the adipose fin, are at this stage larger in the salmon than in the trout.

The size of the caudal fin and the pectorals is specially conspicuous, the caudal fin of the salmon possessing considerably longer and more finely pointed flukes than that of the trout.

The pectoral fins of the salmon exceed by far those of the trout in size, being longer as well as broader. If the pectoral fin is folded along the side of the fish, its posterior point will in the salmon be as a rule situated a little in front of or right below the anterior edge of the dorsal fin, and it will often reach even further back. Thus if a perpendicular line is drawn downwards from the anterior base of the dorsal fin, this line will as a rule touch or cut the pectoral fin. In the trout this fin is strikingly shorter.

This difference causes the two species to act quite differently on dry land.

If a bucket of water containing living specimens of the two species is poured out on a sloping deck, the fishes when left dry will act quite differently. The salmon will all turn on

their bellies and prop themselves up on their broad pectorals, while the trout as a rule remain helplessly sprawling on their sides.

Respecting the size of the scales in salmon and trout belonging to this stage vide tab. 1 and my previous remarks upon this subject.

The colours and their destribution and patterns in my opinion, afford considerable support in distinguishing between salmon and trout in the emigration stage.

When leaving the river in this stage of developement both species possess a shiny silvery coating over the underlying fry or parr-colours. This coating may be more or less pronounced, the colours of the parr being more or less plainly seen through or being only distinguishable at certain angles of light. As a rule however, the colour patterns show very plainly.

Generally the young salmon is more intensely silver coloured than the trout and the silvery hue is mixed with a remarkably beautiful mother-of-pearl tinge.

The silvery hue of the young trout is mixed with a more yellowish- sometimes copper-coloured tinge.

The main undercolouring consists in the salmon, of a blueish-green pigment. In the trout this pigment is more brownish or brownish-green, with a hardly perceptible blue touch. When the fishes are kept in a weak solution of formaline, the pigment of the salmon turns blueblack, that of the trout more greyish brown with a weak blueish touch.

The distribution of the pigment is very different in the two species.

In the salmon the back is greenish blue with a few black spots. This pigment reaches down the sides and the tail of the fish, arranged in several (8—12) scallops or flukes contrasting strongly with the pure white of the ventral parts of the body.

Sometimes these flukes are quite lightly parted from the pigment of the back, by small intervals of a little lighter colour. Small marks or spots of a light bluegrey colour may sometimes occur between the lower points of the flukes. Between every one of these flukes, which faintly resemble marks from fingers soiled with blue lead paint, is a bright red spot, the colour of red sealing wax. This spot is as a rule situated right in or by the lateral line. Sometimes red spots may occur higher up or lower down on the body; but, in this case, they are not arranged in any regular order and their number is never great, the highest number within my experience being 2 or 3.

The dorsal fin has the colour of the back with a couple of irregular rows of dark spots.

The caudal fin is greyish blue, semitransparent with blackish flukes.

The adipose fin has the colour of the back.

The anal and ventral fins are white.

On the side turning towards the body the pectoral fins are bluish-black. On the outer side they are whitish towards the base, but gradually become more bluish-black towards the points of the finrays.

In the trout the back is more brownish-green-grey.

This pigment of the back is not as in the case of the salmon, continued scallop- or fluke-wise down the sides of the fish; it is always interrupted. In the trout large oval spots thus correspond to the flukelike markings in the salmon. These spots are always separated by relatively large intervals from the pigment of the back. Between these spots are found smaller spots dorsally as well as ventrally. None of these large side spots are as distinct and sharply limited as in the salmon. Along the lateral line runs a row of small red spots. As well above as below this line, runs a similar line of small red spots arranged just above and below the intervals between the spots along the

lateral line. Small black spots are scattered over the back and the sides of the body.

The dorsal fin has the colour of the back.

The adipose fin as a rule is orange-coloured.

The caudal fin is as a rule yellowish-brown, semi-transparent.

The anal fin is mostly yellowish-brown with blackish fore-part and a creamy streak along the first ray.

The ventral fins are whitish-yellow-brownish and the pectoral fins have the same yellowish-brown, semi-transparent colour as the caudal fin.

The different colours however, may vary a good deal according to the locality.

Even the size will afford some aid in distinguishing the two species in the emigration-stage, the salmon according to my experience in northern rivers only exceeds 13 cm. in length in one case in a hundred, while the trout in this stage not rarely reaches 18—20 cm. in length. (Vide Tab. IV and V).

f. *Description of young salmon in the oceanic stage, compared with trout of the same size.*

After the young salmon have left the rivers the characters gradually undergo considerable changes.

This is also the case with the trout, although the changes in this species are not quite as great as in the salmon.

Judging from my aquarium experiments these changes cannot be said not to occur when the fish reaches any certain or fixed length. They are evidently dependent on the time of emigration, no matter whether the fish belongs to the largest or to smallest of the sizes peculiar to the emigration stage.

Only gradually and during a long lapse of time do the fishes lose their juvenile characters. Thus one may very well meet salmon individuals of the same size, some presenting many juvenile characters, while others of the same size may present

characters mainly belonging to salmon of more advanced development.

This phenomenon is explained by the above-mentioned facts. I only mention it here to prevent the presumption that the salmon, once emigrated, must needs present the following characters.

This will specially relate to the sizes between 10 and 20 cms.

As an illustration of the appearance of salmon and trout, after the juvenile characters have been discarded, the drawings on Pl. II and III may serve. Salmon and trout are here represented, in pairs for closer comparison.

The upper figure in Pl. II is a trout 21 cms. long, the lower one a salmon 21,5 cms. long. The trout was caught in a seine in the Trondhjem fiord; the salmon is one of two, I found in the Bergen museum, reared by Mr. Grude in a freshwater-pond at Jæderen.

The upper figure on Pl. III is a trout 25,5 cms. long, caught in the Trondhjem fiord, and the lower one a salmon 28 cms. long reared in my aquarium at the Trondhjem Biol. Station.

The drawings in these as well as in Pl. I are executed by Mr. A. Dircks taxidermist to the Academy of Sciences in Trondhjem. All relations are carefully measured by compasses, reduced and entered on the drawings; they have been also twice tested and corrected in the same manner by me.

The caudal fin in the salmon drawn on Pl. II was worn, somewhat, during life in the aquarium and the flukes were smaller than represented in the figure. The points of the flukes are constructed with the aid of one of the specimens (28 cms. long) I found at the University of Christiania and which had been kept so long in spirits as to render it in other respects less fit as material, for a representative drawing.

The principal characteristics of distinction between salmon and trout at this stage will be found under the following features.

1) The shape, relations and relative size of the head.
2) The lenght and slenderness of the tail.
3) The relation of the anal fin to the length of the tail.
4) The shape of the caudal fin.
5) The size of the scales.
6) The colour.

Most of these characters will be quite plainly observed on inspection of Pls. II and III.

As will be easily seen the head of the salmon is smaller, more shapely and narrower than that of the trout.

The eye of the salmon is situated closer to the forepart of the head than that of the trout; the nasal region is shorter and the mouth smaller than in the case of the tront.

The upper jaw is also at this stage (as in the previous stage) considerably shorter in the salmon than in the trout. Thus the posterior margin of the upper jaw only seldom reaches as far back as to a perpendicular line drawn downwards from the posterior margin of the pupil of the eye. The upper jaw of the trout on the contrary, reaches mostly as far back as to the posterior edge of the eye itself and even further back; only in a few cases will its posterior edge touch the limit peculiar to the upper jaw of the salmon.

The upper jaw of the salmon is also as a rule, a little more drooping than that of the trout. The head of the salmon is also of a more conical, rounded form than the more laterally compressed head of the trout. Thus the cheeks of the salmon as also often the gillcovers are more bulging than in the trout.

When the salmon has stayed some time in the sea and has grown somewhat, one will find that the frontal part of the head still retains the arch also observed in the smolts, and that this arch will even become more pronounced. Thus salmon of a length of between 20 and 30 cms. actually possess a depression in the occipital region of the head, while the arch of the forehead

curves smoothly over the eyes and precipitates itself towards the nose.

Seemngly this peculiarity is produced by the quick growth of the body, the region behind the occipital part of the head putting on flesh quicker than the latter.

In the salmon on pl. II this peculiarity is only indicated. In the other specimen sent me from the Bergen museum it was however, more pronounced.

In the salmon represented in Pl. III as well as in the other specimens reared in my aquarium, this feature was constantly present. Also the two specimens from the University museum plainly presented traces of the same peculiarity notwithstanding that they were considerably shrivelled up from being kept for years and years in spirits.

This rounded forehead, the small short nose, the drooping upper jaw and the small mouth gives a much more „beaky" appearance to the face of the salmon than that of the trout.

The arch of the forehead seems to get less pronounced, as the salmon approaches the grilse stage. In a specimen 39 cms. long caught in the Skagerrack off Christianssand only faint traces of the arch are present. It seems to disappear as the nose gets more developed. This seems to take place from about 30 cm. length and upwards.

The difference in the length and slenderness of the tail is at once obvious upon closer examination of Pls. II and III, and as regards the variation of the slenderness in the two species I refer to tab III and my previous comments.

From the figures of the above-mentioned plates it will also be seen that the relation between length of anal fin and length of tail is utterly different in the two species. The anal fin of the salmon is also proportionally smaller than is that of the trout. Tab II and my comments on this table will sufficiently illustrate the relation between the length of anal fin and length of tail.

Needless to say, only fishes whose anal fin was quite uninjured have been employed in the construction of this table. The main difference in shape consists in the caudal fin of the salmon having long and more pointed flukes than that of the trout. Also the basal part of this fin is less broad in the salmon than in that the trout.

Respecting the size of the scales vide tab. I.

The colour at this stage, at least in more advanced development, differs considerably from that of the emigration stage. The metallic lustre in both species gradually gets more prominent as the juvenile markings more and more disappear. The undercolouring in the salmon is still blueish-green, while that of the trout is more brownish-green.

In the case of the trout however, great variations occur according to surroundings. The salmon however, seems to be constant in this respect.

The trout possesses a large number of black spots, densely distributed. These spots extend far below the lateral line as well in front, as behind a perpendicular line drawn downwards from the posterior base of the dorsal fin.

The black spots of the salmon on the contrary, are very few and large, and only a few are found below the lateral line. Very rarely do black spots occur below the lateral line behind a vertical line drawn downwards from the posterior base of the dorsal fin. The black spots below the lateral line are mostly limited to the triangle produced by a line drawn from the upper base of the pectoral fin to that point in the lateral line, where a perpendicular line drawn from the posterior base of the dorsal fin would cut the lateral line.

g. *Capture of young salmon in the ocean.*

The positive material I have succeeded in procuring to illustrate the habitat of the young salmon between the emigration stage and the grilse stage is not very large.

During the first summer of my investigations I discovered in the collections of our university museum 2 young salmon in the emigration stage, which professor G. O. Sars had taken in the Trondhjem-fiord from the stomach of a large saithe (*gadus virens*) during the summer 1891.

Being aware of this fact I have continually examined the stomachs of large numbers of saithe without being able to find any young salmon. On one occasion however I have found trout.

On reading a report prepared by Mr. Simonnaes, assistant to the inspector of fresh-water-fisheries I was aware of his mentioning the fact, that the mackerel-fishermen from Flekkerøe, Christianssand professed to get in their driftnets small salmon the size of a large herring. He further mentions, that he himself had the opportunity of once seeing the remains of an individual 40 cm.s long caught in the Skagerrack by the mackerel-fishermen from Flekkerøe.

During a visit to Flekkerøe in 1901 I arranged with Mr. Thomas Thomassen, Skaalvik, a man possessing influence among the fishermen, that the young salmon caught during the summer 1901 should be forwarded to me. I offered a reward of 50 kroners for each salmon between 15 and 45 cm. length forwarded to me.

At the end of the fishing season I received from this source 6 specimens caught in the driftnets in the open ocean up to 30 miles off any shore. 3 proved to be trout, 3 salmon.

The following table shows their species and size also the date of capture and distance from land where they were caught.

Nr.	Species	Length in cm.	Locality	Date 1901
1	Salmon	39	18 miles S. off. Oksø	1/5
2	„	17,5	8 „ —»—	25/5
3	„	43	30 „ —»—	5/6
4	Trout	38	8 „ —»—	6/6
5	„	42	26 „ —»—	6/6
6	„	44	8 „ —»—	27/6

German herring-fishers inform me, that young quite small salmon during antumn often are caught in their driftnets in the North Sea.

h. *Summary of the results of the investigations.*

The investigations described in the present chapter have shortly yielded the following results:

1) That young salmon may be caught in the rivers and river mouths up to a size of 13—16 cm.[1]
2) That young salmon of sizes between (13—16) cm. and (45—50) cm. have been caught by me neither in the rivers nor in the fiords, nor those parts of our seas where gear is employed for the purpose of catching salmon. Neither have they been found by me in the catches made by the fishermen, nor in the fishmarkets of Norway, Great Britain and Denmark.
3) That young salmon between the emigration stage and the grilse stage (some 40 cms. length) are not at all previously known nor accurately described; that examination of the collections of the majority of Scandinavian museums, only yielded 4 — four — individuals between these sizes, all undescribed.
4) That young salmon of sizes between the emigration stage and the grilse stage have been caught in small numbers many miles at sea and above large oceanic depths.

Young salmon of the abovementioned sizes must evidently be considered as very rare specimens of natural history. I therefore consider myself justified in drawing the conclusion that the young salmon after emigrating from the rivers, disappears from the fiords, the belt of islands and the immediate neighbour-

[1] My investigations in certain southern rivers have later proved that the smolts in these rivers may occasionally reach ca. 20 cm, in length.

hood of the coast, and enters upon a pelagic life in the open ocean.

I must consider this as a peculiar lawbound passage of its lifehistory.

This fact I now consider so well founded by the investigations described above, that I desist from all further comment.

On the strength of this fact I will not claim, that young salmon of the abovementioned sizes *cannot be found* in our waters, but it is evident, that such finds would only be exceptional.

For all practical purposes my result may thus be expressed in the sentence, *that salmon between ca. 16 and ca. 45 cms. length or salmon between the smolt stage and the grilse stage do not occur in those of our waters where salmonfishing is carried on.*

In this connection I wish to propose a single reservation which, however, does not impair the correctness of the abovementioned results.

My investigations have not, in any considerable degree, been extended to Finmarken, and I do not feel certain that my results correctly express the conditions peculiar to the fiords of this vast portion of our country. Some of these fiords have indeed more the character of open bays of the ocean than of fiords, and may possibly, on account of their more oceanic character, be the habitat of young salmon.

Also I do not feel certain that young salmon, somewhat smaller than the smallest grilse generally caught by the fishermen may not be caught in a few places on our coast near the open ocean.

I mean however, that this latter phenomenon, if occurring, must be regarded as a casual and sporadic visit paid by these sizes of salmon, which undoubtedly belong to the open ocean and lead a pelagic existence there.

The abovementioned results are obviously in no small degree important to the solution of practical problems relating to our

salmon and trout fisheries. In some respects they offer a wholely new base far deliberations fundamental to measures calculated to promote the interests of these fisheries.

Before proceeding to a closer description and a critical revision of my results in relation to the principles of law tending to promote these fisheries, I propose in separate chapters to describe some investigations of a more special nature regarding the growth and other biological features in salmon and trout, which also have some importance in legislation relating to the species in question.

Chapter III.

On emigration and growth of young salmon.

As is well known the maturing salmon during spring and summer ascend our rivers. During autumn the large ova (ca. 6 mm. in diameter) are deposited among gravel and sand in the spawning beds.

Spawning in the northern parts of our country, as a rule, takes place in September and October. In southern rivers it may be extended to November and even to the first half of December.

Reposing among the gravel and sand of the bottom partly also buried in it, these eggs develop during winter and hatch from the latter end of February to the last days of April, the larva, about 2 cm. long bursting the egg-capsule and emerging. To begin with this larva lying practically helpless on the bottom, is nourished by the large yolksack. After the lapse of about 6 weeks the young fish commences taking nourishment from the outer world, consisting of smaller insects, insect larvæ and crustaceans. It also acquires the form and locomotory faculties of the fry.

These fry abide in the river until reaching a certain size, when, acquiring the silvery coat of the emigration stage, it leaves the river.

My investigations showed that, as a rule, the size of the emigrating young salmon of our rivers varies from 9—13 cm. (Vide Tab. IV). In the following pages I will endeavour to throw some light on the question of the age of these fishes, counting their age from the time of hatching, viz. ca. April 1. Most authors, who have treated the system as well as the biology of the salmon, agree quite unanimously that the young salmon (smolts) emigrate from the rivers during spring (April, May) in schools. This is described as a phenomenon limited to a relatively short space of time.

The general idea seems to be, that the young salmon at a certain time of the year is suddenly smitten with the migratory instinct, resulting in an emigration in masses analogous to the migration of our migratory birds.

When, during the first summer of my investigations I found in the latter half of August emigrating young salmon in the mouth and lower parts of the Gula, I was consequently not a little surprised. These young fish were not in the least different from the emigrants of spring (Vide Tab. IV col. 3).

This experience has been confirmed by all later investigations. At any time during summer I have been able to prove the occurrence of young emigrating salmon in the mouth and the lower parts of the Gula as well as the Orkla.

In order to gather experience on the occurrence of young salmon in the different stages of development right from the spawning places down to the sea I effected a series of fishing experiments in the river Orkla, from the river mouth up to the spawning beds in Meldal. On the 16th, 17th and 18th of July 1901 I fished with the rod at the following localities: Kalstad (Meldal ca. 40 km. from the river mouth), Aarlivold (20 km. lower down), Bak, Forve, and the mouth of the Orkla.

I employed the smallest trout flies obtainable or minute Japanese flies without a barb.

In all these localities the young of the salmon abounded. High up the river they appeared to be most numerous. Shoals of them could here be *seen* everywhere swarming in all pools and rapids, especially the large quiet and relatively shallow pools. Throwing my small flies along the shore and dragging them towards me, shoals of young salmon as well as trout were enticed to come so close that the two species, even in the water, were clearly distinguished. The young salmon however by far outnumbered the young trout. Each cast made dozens of fishes rise to the flies, which however only the largest ones were able to swallow.

The fishes denoted in the last column of Tab. No. IV represent the sizes caught on my flies at Kalstad. As it will be observed, they are a good deal smaller than the young, emigrating in spring from the Orkla (vide first column of same table). However, there were in the river considerably smaller fishes which I could not catch with the fly.

Not one single young salmon in the silvery coat of emigration was here observed, a fact also stated by the British sportsmen fishing the river. They said that „The parr did not become smolts". All the young observed by me in this locality had the coating and colours peculiar to the salmon before acquiring the emigration coat, viz: a greenish-yellow a little copper-hued and faintly iridescent colouring, forming as it were a coating over the other characteristic pigment markings and spots.

At Aarlivold (20 km. lower down), the same phenomenon as above mentioned was observed. However a few young of a slightly larger size and in emigration colouring, were observed.

At Bak midway between Aarlivold and the mouth of the river, *young salmon in the emigration garb were the only ones found.* These young, the size of which may be seen in

the second last column of the table (Table No. IV), correspond in all respects to the emigrants of spring (vide 1st column of the same table). The same facts were also observed at Forve, in the lower reaches of the river and at the river mouth which is subject to the tides and alternately possesses fresh and brackish water.

From these experiments it transpires, that the young salmon during growth migrate down the river, and during migration gradually acquire the coat of colours peculiar to them when finally leaving the river.

During all summer there is a constant migration of young salmon down the rivers and into the ocean.

This migration commences in the rivers Gula and Orkla in May and ceases in autumn because the young in the river then practically cease growing. Thus, as my fishing experiments show, I have during late autumn (October) found the mouths of both these rivers devoid of young salmon.

When May or spring time has been considered as the annual time of migration, this view is probably derived from the fact that the spring floods quite mechanically convey large numbers of young salmon down the rivers.

It is of course very difficult to judge at which time of the emigration period, the number of emigrants is largest. However I have the impression that May and June in our rivers, are the months when most young salmon may be caught in the river mouths. During these two months the large floods of the Gula and Orkla generally occur, and this fact would afford sufficient explanation.

I mention with regret that the material collected by me for illustrating the age of these young salmon is not as large as I should have wished it to be. In order correctly to determine their age, very large numbers of individuals are wanted, and catching the smallest stages in the stony reaches of the rivers

is so slow work, that I have not found time enough to enter into this work.

However one may with certainty start from the fact that the young leaving the river during spring are at least 1¼ years old, because their hatching cannot have taken place later than February—April of the previous year.

Whether the young, which during summer continually emigrate are the smallest of the young hatched in the previous year or the largest of the fry of the year, I am not in a position to determine with sufficient accuracy. In my opinion it is not improbable that both annual classes are to be found among them.

This latter supposition does not seem to be confirmed by the experience gained at the rearing establishments of our government, where the fry from March to October only grow from 2 to 8 cms (maximum) (Vide report of the inspector of freshwater fisheries 1895—1896, pg. 14).

However it would seem probable that the growth of the fry in nature would be a good deal quicker than in hatching-boxes, where thousands are penned together. Researches made by P. P. C. Hoek (comparing the size of limited numbers of artificially reared young salmon with those caught in the river Prüm.) confirm this presumption.

Also during the excursion to the Meldal, July 1901, I did not succeed in observing (in the water) numbers of very small young salmon, whereas the larger size of fry (parr) occurred in countless numbers and could easily be caught and also observed everywhere in the shallows and pools. The sizes are denoted in the last column of Tab. IV. I regret to say that this column does not correctly represent the lower size limit of the fry, because I could with certainty discern young salmon down to 5—6 cm. length rising in numbers to my flies, unable to swallow them. It is quite certain, that the group in the last column of the table would have included at least the 6 cm.

sizes if I had been able to secure these smaller fishes. Then it is very improbable that a smaller group exists between 2 cm. and 6 cm. as late in the summer as in the middle of July.

Consequently it becomes most reasonable to consider the group in the last column as 0-group or the fry of the year, viz: fry hatched ca. April 1, 1900. For the same reason it is not impossible that the emigrants represented on the second last column, may belong to this group which gradually, during growth, migrates down the river.

If however the results from our state rearing establishment at Ullern should be a correct gauge of the normal growth of the salmon fry, a group smaller than the smallest I have found must exist in our rivers in summer. This fact, if existing, would clearly retard emigration for one year. The emigrating smolts, which leave the rivers in spring would thus be 2¼ years old because they could not possibly grow from maximum 8 cm. (which the reared fry reach in October) to maximum 13 cms. which is peculiar to the emigrants of spring.

Without expressing any definite opinion as to the final decision on this question, I admit, that at present I feel most satisfied and think the groups represented in tab. No. IV are best explained, if the matter is considered from the point of view, that the emigrants of spring are ca. 1¼ years old („I-group"). Those emigrating during summer are partly the young belonging to the I-group, the fry of the previous year which have not developed so quickly as those previously emigrated. These emigrants of the summer also belong partly to the fry of the year, or the „0-group", which in July and August have grown large enough for emigration. The rest of the 0-group remain during winter in the river and emigrate next spring and early summer as „I-group".

It seems to me that this view is feaseable considering that hatching and consequently also development, have an amplitude of several months.

This fact in connection with the varying conditions of nutrition, which undoubtedly occur in the rivers, will inevitably cause the fry of each year to represent a series of different stages of development. Thus a phenomenon like the emigration, which evidently is dependant on a certain stage of development, can only be realised during a longer space of time.

Evidently no large error is committed if the age of the emigrating young salmon is valued at $1^1/_4$ years.

Undoubtedly it would be important to know how long time is required before these young, as grilse, return to our fiords or rivers. A final solution of this question I am unable to present. Conclusions as to the progress of growth of the young salmon, cannot directly be based on my rearing-experiments. Only when we are able to fish large numbers of small salmon after emigration will a final knowledge as to the growth of young salmon be obtained. However I feel obliged to communicate my experiences as to the growth of the fish in my aquaria, and by means of a comparison with known facts, endeavour to prepare a representation of the rate of growth of the fish, which at the present time may be considered most probable. In the adjoined graphical representation (Fig. 2) I have drawn curves reduced to forms representing the size of the fish, and with figures denoted their probable age.

The upper one of these curves or groups represents the size of the young salmon when introduced into my aquaria. In consequence their age, estimated at $1^1/_4$ years, cannot possibly be lower. The lowest group represents the lowest values of the grilse group as found in our waters during summer. Only the lowest part of this curve is drawn, and it is compiled according to Mr. Landmarks report for 1891—1896 in which paper sufficient evidence is given as to the fact that the grilse constitutes a separate annual class or group of growth.

The middle group denoted by an unbroken line, represents the size of the young salmon reared in my aquaria and killed

October 18, 1901. These are thus at least 2½ years old. The upper one of the two groups denoted by broken lines, represents the estimated size of these same salmon during the first autumn in the aquaria, when their size could not of course be measured.

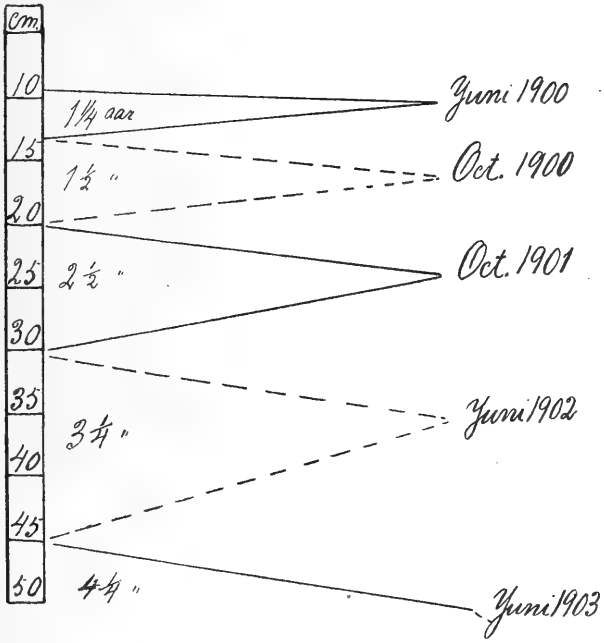


Fig. 2.

Further, as a gap then exists between 30 and 40 cms., a gap of such a size that a group evidently must exist between these sizes, I have drawn a curve in broken lines representing such a group about the sizes found in the young salmon caught by the mackerel fishermen in the Scagerrack and forwarded to me during May and June.

For clearness I have provided the different groups with current dates.

According to this, the grilse caught in our waters during summer would be ca. 4¼ years old, and the emigrating smolts would thus, during 3 years in the ocean, develop into grilse.

As I have mentioned above, our knowledge as to the growth of young salmon must necessarily be to a large extent theoretical as long as we do not possess a sufficient number of young specimens caught in the ocean.

At present there is nothing to guarantee that the growth in my aquaria has been quite normal.

In order to judge, if other fish grow normally in the aquaria, a sufficient supply of food granted, I have kept numbers of young saithe (gadus virens) in a special tank.

Their growth very well corresponded to the growth of the same group of saithe in the sea, which from time to time I easily caught for comparison.

I do not however think, that these experiments with the saithe justify any definite or final conclusion as to salmon. Although I believe it to be probable, that really no large disproportion exists between the growth of salmon in my aquaria and in the sea.

Chapter IV.

On the growth and migrations of the trout.

Like the salmon the trout of the sea ascend our rivers to spawn. The trout run as a rule during late summer and autumn. The ova are deposited in sandy places in the rivers. Spawning occurs in most places in September—October.

During winter the embryos develop. From the end of February and towards the beginning of May the eggs hatch, the ca. 1½ cms. long larvae emerging. Like the salmon they are provided with a yolk-sack. Reposing among the gravel of the bottom these larvæ during development use up the

contents of the yolk-sack, become fry and during summer rapidly grow.

How quickly this fry of the year grows in our rivers I am unable to state, my researches only encompassing the trout from the stage when leaving the river and migrating into the salt water. As shown in table V the size of the young trout, when leaving our rivers for the first time, varies between 10 and 20 cms., average about 15 cms.

The age of these emigrating young trout I do not precisely know; but counting the age of the fish from the moment of hatching, they must be at least 1¼ years old, and consequently have spent one spring, one summer and one winter in the river. However, I am inclined to believe that they may be one year older.

This is only conjecture, and I must expressly state, that I have not acquired material for an independant and definite opinion on the matter. As will be noticed my tables only comprise fish down to 10 cm. length.

In the tables V, VI and VII the size of trout caught during my investigations is graphically represented.

These tables comprise a great number of the fishes caught. However they are founded mainly on *larger catches,* made in single localities during a short space of time. Poorer catches made during a longer space of time, over a large area, I have not used as material for these tables.

If we look at the groups in Tab. V, we observe that two groups of sizes may be distinguished in the 2 first columns of the table, one group between 10 and 20 cm., the other between 20 and some 30 cm. The fishes constituting the groups are the fishes taken in nearly all the hauls made in the lower parts and mainly in the mouths of the Orkla and the Gula, during May and the first days of June 1898.

Both these groups represent fish *emigrating* from the rivers during these months. As I propose to show, later on, the groups

represent the fry of two different years or two annual classes of growth, and the presence of the older one is dependant on a biological peculiarity, distinguishing the trout from the salmon. The young trout, indeed, after the lapse of the first summer in the sea return to the river in autumn, spend the winter there and again emigrate in spring. This phenomenon however, seems mainly to apply to the larger rivers and streams.

Thus if we examine the next two columns of tab. V which are based chiefly on fishes caught in the mouth of the Børselven in Gulosen and the „Skougdalselven“ in Rissen, we find only the smallest group of emigrants represented. The first of these streams is hardly more then a brook, and it is perfectly clear, that numbers of larger fishes cannot spend the winter there. Neither is the second stream an important watercourse.

As an example I propose to describe my results from one river, the Orkla, which at all times of the year has been examined by me.

If the first column of table V be compared with table VI it will be observed that the smallest group, which in May 1898 was 10—20 cm. long, in October of the same year had grown to a size varying between 18 and 30 cm. and at this latter time of the year occurred in large masses in the mouth of the Orkla.

All the fishes (between one and two hundred) by means of which the first column of table VI is constructed, were taken in 3 hauls with the eelhandseine and it was evident, that the trout were „thick as herrings“ in the lower course of the river. As will be seen in the table, only an insignificant minority of these fish were sexually mature, and consequently their object was not propagation.

On this same occasion also a stretch of the river at Forve, 7 kms. up the river, was examined. Not a fish was caught. At Kalstad in the Meldal about 40 km. up the river, a number of hauls were effected in a larger stretch of the river. In these hauls I obtained the fishes denoted in the next column of table

VI (Kalstad October 24, 1898). Nearly all these were grown-up fishes, belonging to older stages and in a state of sexual maturity.

Thus the upper reaches of the river were evidently devoid of the younger group filling the mouth of the river:

That this group afterwards must have ascended the river in shoals, I was able to prove in May 1899.

I then made a haul at Forve, where no fish had been obtained in October. This haul yielded 175 trout represented in the last column of table VI (Forve bridge, May 3 1899). These fishes clearly belong to the same group which, during late autumn 1898, ascended the river, and clearly they also constitute the larger of the two groups which would emigrate from the river during the same spring (compare table V, 1st column).

By way of example, this fact is also clearly illustrated by looking up the size of trout which in May occurs in the fiord. The size of this trout is very well shown in table VII, column 1, representing fishes caught in the Beitstadfiord, May 1900.

I have also satisfied myself that this group does not occur „en masse“ in the Orkla during summer. Thus in July 1901 fishing right from Kalstad down to the mouth of the Orkla brought nothing but quite young trout, and as mentioned, a few quite young salmon. Only very rarely a larger trout would be seen rising to the flies, and evidently the river was to all practical purposes devoid of larger trout. This fact was also corroborated by British sportsmen, who for 10 years had fished the beats at Kalstad. They acknowledged it as a characteristic peculiarity of the river, that sea-trout, excepting fry, during summer was extremely scarce.

These facts are also characteristic of the Gula. This is partly shown when the second and last columns of table V are compared. In August 1898 we find the smallest emigrants of spring grown up to 20—30 cm. length, and prepared to re-enter the river. Also in August a group is found between 10 and

18 cm. Its occurrence in the table is caused by the fishing also being carried on a little up the river. Consequently the smaller fishes, which next spring would represent the youngest group of emigrants, were also caught.

Also in October the fishes which constitute the smallest emigrating group of spring, invade the Gula. This is shown in table VII, second last column.

In my opinion, similar facts will be found in most rivers, although I am inclined to believe that larger or smaller exceptions and variations may occur especially respecting the dates of emigration and return. It seems very probable that the climatic variations in this respect would assert themselves, and that some difference would be noticeable as to southern and northern latitudes in our vast country.

That such difference, however, cannot be great, is clearly shown by table VII, last column, which represents trout caught in the Mandal river, October 25, 1901.

There is no doubt, that this autumnal immigration of trout as regards most large rivers, is a general phenomenon. Reports to this effect, are present from many different parts of the country, especially the surroundings of the lower parts of the larger rivers,

These reports are also interesting on account of the fact, that these masses of trout which appear in the river mouths in autumn, have very often been considered as young salmon. At this time of the year, having spent the summer in the sea among the herring fry, they are really very fat, shiny and silver-coloured; however, as described in Chapter II, they are easily distinguished from salmon. These immigrating trout are in most places in this country named „blankøre“, „høstblege“, „blege“, „lakseyngel“ a. s. f. When leaving the river in spring, the people around the Orkla and the Gula, and also many other rivers, call them „is-fisk“ (icefish) evidently because they are caught when the ice is breaking up. As I have mentioned they

are by many people considered young salmon. From several localities such trout have been kindly forwarded to me for examination, by men, who either took an interest in getting the species of these fishes determined, or acted in the belief that they were sending me those sizes of young salmon, which I had not been able to catch.

I must admit, that the real cause of the trout returning to the rivers during autumn, to me seems a mystery, and I can offer no contribution towards a solution.

Considering the numerous reports as to the trout being injurious to ova and fry of salmon, I was led to suppose that the trout in question perhaps ascended the rivers in order to devour ova and fry.

In order to test this supposition I have examined the contents of large numbers of stomachs. In the trout, which has spawned during autumn, the stomachs as a rule contained ova and fry of salmon and trout, sometimes in not inconsiderable quantities. The stomachs of the fat and shiny fishes, belonging to the immigration group of autumn, did, during autumn 1898, not contain ova or fry. On one accasion I examined ca. 100 stomachs, taken from the fishes which on May 5, 1899 were caught at Forve bridge (vide table VI). Among these, only one contained a small salmon fry; the rest were empty. Thus these fishes would not seem to remain in the river on feeding purposes. On the contrary it is highly probable that they eat next to nothing. As I propose to show later on, they hardly grow at all during winter. While ascending the river in autumn they are fat and in splendid condition, they are in May, when emigrating again, much more slender; they are in fact very lean; the flesh is not so red; they do not fetch the same price, and are also not so good eating as prime fish.

As mentioned before, not all fishes belonging to this group, ascend the rivers in autumn. Some remain in the sea

during winter. Although I am not in a position to determine definitely their places of resort in the sea during the winter months, I believe their habitat to be nearly the same as during summer. The only time of the year, when I have not been able to catch them along the shores, where they live in summer, is the space of time between the latter end of November and the end of February; but during this time I have not made many hauls. As early as in the first days of March, I have nearly every year been able to procure, trout, as well singly, as on some occasions in large quantities, in single hauls. These fish have been of the same size as the emigrating „isfisk" of spring, but have been fat.

As I have mentioned above, these trout scarcely grow at all during winter. Also the trout kept in aquaria at my station have refused food during winter, reposing quietly on the bottom or among stones. These facts have conveyed to me the notion, that the trout of these sizes (between 20 and 30 cm.) only eat very little during winter, keep quiet in a sort of half-torpor, the reduced processes of life being maintained on the fat accumulated during summer.

The tables V—VII very plainly show the growth of the fish from the moment it leaves the river for the first time 10—20 cm. long, until it returns to the river in autumn, hibernates, and re-emigrates. If we observe the progress of growth as regards the fish of the Orkla and compare the first column of tables V and VI, it transpires, that the youngest emigrants of spring, during summer have grown from 10—20 cm. to a length varying from 10 or 20 to some 30 cm. When these fishes during the following spring re-emigrate, their size is nearly unaltered, as will easily be observed by comparing table VI, first and last column.

As regards the Gula, comparison of column 2 and 5 table V will show the same progress of growth.

If we examine the groups in table VII last column, representing fishes from the Mandal river, it is obvious how well this table agrees with those of the two northern rivers, the upper group representing fishes, which are going to emigrate next spring, the lower one, fishes who left the river for the first time during spring 1901, returning during autumn.

As regards the growth of the trout after it has left the river a second time as „isfisk", these tables do not give exhaustive information. The only fact which, upon this point is clearly established by the tables, is that a definite grouping of the growth after the second emigration ceases to be perceptible. Thus the further growth of the fish must undoubtedly be very irregular and highly varying in different individuals.

This fact is obvious if we look at column 1 table VII, Beitstadfiord May 1900, a table representing the sizes of a large number of fishes caught during a short space of time in one locality. The fact also is in good accordance with the experience gained by Mr. A. Landmark, inspector of fisheries, in experiments with the labelling of trout of similar sizes.

This irregularity of growth, which is however observed in most fishes as they grow older, may to some extent be connected with the fact, that the trout in these stages becomes more wandering and thus encounters considerably differing conditions of nutrition.

Also the fact, that the larger proportion of the trout attain sexual maturity only after the second emigration, may to some extent account for the subsequent irregularity of growth.

As will be observed in the tables, where fishes, sexually mature, are denoted by a 9, the group immigrating in autumn very rarely contains mature fishes. Thus, a careful examination of more than 150 trout caught in the mouth of the Orkla, October 23, 1898 (vide table VI) yielded only one mature fish below 30 cm. length, while not a few above 30 cm. had not yet attained maturity.

Among the fishes caught in the upper part of the river during the same excursion (vide table VI, col. 2), and all of which with a single exception, were sexually mature, only one was below 30 cm. in length.

The same fact will also be observed if the 3 last columns in table VII are examined. They represent fishes caught, during the breeding season, in the Battenfiord, the Gula and the Mandal river. We also here notice the fact that there is no absolute size limit at which sexual maturity is attained. At the same time however it transpires, that the majority of trout spawn when they have reached a length of 30—35 cm.

If we examine those columns in the tables which are constructed upon the results of fishing experiments conducted during the spawning time, it is obvious how exceedingly scarce the mature fishes are, compared to the number of immature fishes in the rivers during autumn.

This fact however must not be considered as containing a correct representation of the real relation between the numbers of mature and immature individuals in this species. The fact, that sexually mature fishes rarely occur in the catches, is to a large extent due to the hauls being effected in the main courses of the rivers. These do not to any large extent seem to afford spawning beds for the trout, the mature fishes preferring to enter side-rivulets and brooks of even quite inconsiderable size and water-volume, localities where the use of seines is excluded. Not only does this refer to the brooks and rivulets joining the large watercourses, but nearly every small watercourse or even gutter, which directly joins our fiords or the open sea, forms spawning places where trout breed in autumn. In the immediate neighbourhood of the mouth of such small watercourses one may during autumn always be sure to find large trout, who only ascend the brook, when in the last stages of maturity.

In these small watercourses the spent fish of course never remain long. However I have considered it too slow work in such localities, to catch so large numbers of individuals, that their introduction in the tables would be in any marked degree illustrative of the relative abundance of mature and immature fishes.

On the whole it seems to be a peculiarity of the trout, at least in the rivers examined by me, that the mature fishes do not remain long in the river either before or after spawning. They run quickly up the river or watercourse, spawn and return to the sea. In my opinion this fact is rendered evident if on one hand we remember, what I have remarked above on the scarcity of large trout during summer in the Orkla and the Gula, and on the other hand note, that during late autumn, October and November, I have often in my seines in the sea caught recently-spent trout.

Thus it will easily be understood that the tables from the rivers are fallacious as regards the numeric relation between mature and immature trout.

If any of the materials collected by me might be supposed to illustrate this relation, it would be table VII col. I Beitstadfiord, May 1900.

This table may be considered as illustrative of the usual catches of trout in the sea at this season. Later on, during summer, the upper group will move down, as the fish grow. Even here however, as is usual in the tables, the larger fish (above 30 cm.) are few, compared to the younger group.

A careful examination of the measurements of about 500 trout, which some years ago were effected by Mr. Simonnæs in western Norway (vide report of the Inspector of Fresh-water fisheries 1895—96) shows the same result as my tables.

This relation between the numbers of larger and smaller trout must evidently thus be of general value, and clearly the

size of the great proportion of the trout, which can be caught in our waters, is smaller than the size at which the majority of the individuals of the species attain sexual maturity.

Whether this fact is a correct expression of the really existing relations in the natural economy of the species, I am of course unable in any satisfactory way to illustrate.

However I wish to draw attention to the fact, that the trout, having reached the sizes peculiar to the mature stages, becomes much more roving and wandering, partly resorting to localities where our ordinary fishing implements are insufficient. The labelling experiments effected by Mr. Landmark in one of our western fiords seem indeed to show that the trout do not wander much. However if we consider, that I have procured large trout from the mackerel driftnets as far as 26 miles off Oksö in the Scagerrack, and further, that nearly all mackerel fishermen from the Scagerrack and Kattegat state that trout are caught in their driftnets miles at sea, it is at all events evident, that some trout must wander considerable distances away from the rivers or brooks where they were reared. Thus knowing that larger trout may occur as pelagic fishes many miles from land in the open ocean, we cannot possibly expect them to be plentifull in the fiords at the same time of the year.

Further conclusions as to the progress of reproduction and the economy of the fish I do not consider justified by the material at hand. I can only state, that the trout in all the waters investigated by me is exceedingly numerous. In this connection I also wish to draw attention to the fact, that the economy of the trout of the sea cannot be considered to be dependant solely on the reproduction of this form.

In my opinion the freshwater forms of the trout also contribute to the abundance of trout in the sea. Thus, trout continually descend from the fresh waters to the sea, trout which are not direct descendants of the trout form of the sea, but belong

to the various trout forms of the fresh waters. Having reached the sea these fish become sea trout.

First of all I was made aware of this fact by obtaining in my nets in the sea, especially in or around river mouths, trout which differed considerably from the sea trout. These trout differed in colour considerably from the general colouring of the sea trout and possessed more of the gay and bright colours peculiar to the trout forms of the fresh waters. For comparison I have several times in mountain lakes caught trout and satisfied my self as to their similarity to the sea trout. Whether fry or young of the fresh water forms are to be found among the young trout emigrating in spring, I have been unable accurately to decide, as no marked difference is noticeable between the young of the sea trout and the young of other trout forms. On this occasion I have compared the young of mountain or lake trout as well as the young of trout from brooks where sea trout cannot ascend, with the young sea trout emigrating from our rivers in spring. I have been unable to find any marked difference between them, and the colours especially are in the main features strikingly alike. Even such a detail as the anal fin being olivegreen or brownish yellow with blackish forepart and a creamy streak along the front edge is constantly noticeable in all such young which I have examined. Only after having reached the sea and for some time lived there do the young of the sea trout acquire the strong silver colour and in other respects become distinguished from the other trout forms.

Thus a recently emigrated freshwater trout may clearly be recognised as such in the sea, only when it belongs to older stages.

However I deem it highly probable that such an emigration of freshwater trout to the sea also includes younger stages, and further that this emigration may take place to an extent not unimportant to the economy of the sea trout.

It is indeed a phenomenon known in any river, that strong floods in spring and autumn generally convey not inconsiderable quantities of fish from the upper to the lower portions of the river. Especially obvious is this fact in rivers, the lower parts of which are poor in fish, while the upper parts are exceedingly rich in fish, or head from lakes where fish abound. From my own experience I very well remember a river in Southern Norway, where the downward migration of fish during the floods was obvious. Thus the common lake char, which only lived in a single remote lake at the head of one of the tributaries of the river, might, after heavy floods, be caught in the river.

It is then perfectly clear, that these fish, as they gradually get transported by floods down the river, must finally reach the sea. Whether these, the trout forms of the fresh waters, can live in the salt water is a question which I have endeavoured to solve by experiment.

In order to secure as unfavourable conditions as possible for my experiments, I chose for experimental purposes the trout form, which undoubtedly is most different in habits of life from the trout of the sea, viz. the brook-trout. My material was procured from a small mountain brook which runs into the sea at the Trolla iron works just outside the biological station at Trondhjem.

Sea-trout cannot on account of insurmountable obstacles reach the upper parts of the brook, and it is here inhabited solely by „fingerling“ trout, which even at a length of 14—16 cm. attain sexual maturity. They do not grow larger in the brook, and are thus typical brook-trout. Of these I caught by angling a small number, 14 specimens.

Arrived at my station I put the smallest and the largest one into an aquarium containing water of a salinity of ca. 33 ‰. The smallest one died after 12 hours, the largest one after 24 hours. The others were kept for some time in a small fresh-

water tank, into which was allowed to run a small stream of seawater of 33 ‰ salinity. In the course of a couple of days the supply of saltwater was increased, until the aquarium contained almost only seawater. The fishes then commenced to die. On this account the supply of saltwater was reduced to a very small volume and by and by in the course af 3—4 weeks, again gradually increased. It was then evident that a salinity of 10 ‰ even 15 ‰ did not in the least affect the fishes. Only when the salinity was suddenly increased to 20 ‰ did a few die.

The 2 remaining fishes were again subjected to a reduced salinity and 2 recently caught brook trout added to them. The salinity was again gradually increased during about 1 week. All passed 15 ‰ without inconvenience. When 20 ‰ was passed the 2 recently added died, while the 2 veterans lived and even spawned in the aquarium. As the seawater-supply of the station at this time was stopped, the experiment was broken off.

By these experiments I consider the fact established that even brook trout, which undoubtedly must be considered as the freshwater form, whose properties are most highly specialised, can live without difficulty in water of a salinity of 15 ‰ and may even endure a salinity of 20 ‰. In most of our rivermouths, at any rate the larger ones, the salinity however is considerably lower during spring and summer, at least in the upper water-layers, and the distribution of this low salinity is very often wide. Thus the emigrating freshwater-trout here evidently encounter more favourable conditions than in my aquaria, especially if we consider, that, in nature, the changes from fresh to saltwater are much more gradual and afford the fish more choice than the relatively rough experiments in my aquaria.

It is also my opinion, that this emigration must not necessarily be effected by one single individual; but that it may be performed in one or more generations.

As far as I can see the main thing, which is important to the economy of trout in the sea, is the fact, that trout from

remote fresh waterstreams and lakes continually and gradually migrate into the sea. In other words a very little noticeable, and very little noticed development from the freshwater forms to the sea form of the trout takes place in our waters.

I need hardly add, that this phenomenon though common applies only to a proportionally small number of individuals of the freshwater forms. On the other hand however it is perfectly clear, that the economy of the sea-trout is influenced thereby. It is also not improbable that the phenomenon may influence locally the economy of the trout forms of the fresh waters.

Chapter V.

Practical conclusions.

a. Protection of young fish in general.

From my investigations, more fully described in chapt. II, it appears, that it must be considered an established fact, that young salmon between 13—16 and 45—50 cm. in length are practically speaking not to be found in those of our waters where people fish for salmon and trout.

Evidently then regulations tending to protect these stages are unimportant to the economy of the salmon and the salmon fisheries. With the practical problems, mentioned in the introduction in view, it is however just as obvious, that these regulations must be altered in favour of the trout-fishery, which certainly may be predicted to yield considerable profit as soon as a rational working of this fishing is facilitated.

The only question is, by what means and in what degree this may be effected by legislation. In the following pages I will endeavour to develop the views which in my opinion are justified by the scientific material at hand.

If we examine the regulations by means of which our legislation has intended to provide for the protection of small salmon

and trout, we find, that these provisions may mainly be classified under the following heads.

1) Prohibition of the employment of net gear with a smaller mesh than 5,8 cm. between the knots (when wet).
2) Prohibition of the catching and sale of salmon and sea-trout under 21 cm. in length.
3) Order to set free salmon under 55 and sea-trout under 40 cm. length, provided they are caught in gear with a smaller mesh than 5,8 cm. between the knots or are accidentally caught in the annual close time.
4) Protection of river mouths and their immediate surroundings, by prohibition of any sort of net fishing gear of a smaller mesh than 5,8 cm. between the knots. (Some exceptions for large herring-seines).

The 3 first of these prohibitions are fixed by law; the last one is effected by „Royal Resolution“ upon petition from district and county councils.

The first prohibition is mainly intended to regulate the large industry. The other is mainly directed against sport-fishing or fishing with hook gear generally. The third chiefly aims at limiting the accidental or occasional catching of salmon or trout occurring in the fishing for other seafish with other gear than that permitted for catching salmon or trout, and finally the fourth prohibition aims at protecting the young salmon in such localities where they are supposed to be easily caught in numbers during fishing with net gear for other fish.

These regulations are, excepting the difference in the size limit at which salmon and trout are to be set free, mentioned under 3), uniform for salmon as well as trout and apply to salmon as well as to trout rivers.

b. Protection of young salmon.

In the introduction I have mentioned that these regulations almost totally prevent a lawful fishing for sea-trout.

Now in what degree may these regulations be altered or repealed, so as to forward the fishing for sea-trout without injuring the interest of the salmon fisheries?

If I now, with the results of my investigations in mind, consider the practical value of the provisions generally sketched under heads 2) 3) and 4), I find that as regards *the salmon* their value must be said to be very small.

My investigations clearly enough show that only a fraction of a percent of the young salmon emigrating in spring from our rivers, at any rate the northern ones, exceeds 13 cm. in length (vide tab. IV in which only a minor part of the young salmon caught are represented). Excepting herring seines, and in some localities, eel traps, there does not in our country exist any kind of net gear, which possesses the power of retaining or entangling in its meshes these emigrating young salmon. It is perfectly evident, that the latter easily pass through all the different forms of ground nets employed in this country.

The value of the regulations sketched under head 4) is thus limited to refer only to the use of seines and traps.

The seines which in our country are employed, or may be thought to be employed at or in the neighbourhood of river mouths, are however as regards the majority of them, very little adapted to retain the emigrating young salmon. In the mouths of southern rivers, f. eks. the Glommen, a seine fishing is carried out for gwyniad, roach, and other freshwaterfishes; but the seines used are of a mesh much too large to retain young salmon (smolts). As regards the mouths of most northern rivers, fishing (excepting for salmon and trout) with net gear can only have the object of catching cod, haddock and saithe, which during summer are occasionally plentiful in the river mouths. Fishing for herrings is carried on during autumn in river mouths, f. ex. the Gulosen. This kind of fishing however requires only net gear, which as I have explained above, is perfectly innocent of the destruction of young salmon. Ground seines of the

ordinary kind are also employed. These seines, the dimension and mesh of which are very varying in different parts of the country, very rarely possess a mesh as small as the ordinary mesh of herring seines, 15—20 knots pr. foot (Norw.). When a small mesh is used, the points of the seine as a rule are of a large mesh, the small mesh only occupying a short stretch in the middle of the seine.

A description of the groundseines commonly used in the Trondhjem fiord will be found in my paper on the fishing with groudseines in the Beitstadfiord in „Aarsberetning vedk. Norges Fiskerier". 3. 1900. These seines must be regarded as types of the seine gear, commonly used in this part of the country, and which may come into use in fishing for saltwater fish in a river mouth.

More cursory examination of the seine gear of other districts has convinced me that the majority of such gear, which might be used for such fishing as above mentioned, does not, as regards the mesh, differ to any important extent from the above mentioned seines.

Finally, respecting the employment of finemeshed eeltraps, I may remark that the use of such gear in river mouths is in most parts of our country, unknown. As such fishing gear may be employed with advantage only during autumn, when our river mouths are devoid of emigrating young salmon, a prohibition against their use will only put obstacles in the way of the fishing industry without furthering the object in view viz: the protection of young salmon.

That fishermen with the intention of fishing for young salmon, would procure gear of such a fine mesh as those seines which I have specially provided and employed for my fishing experiments, is out of the question. And even with gear of such small mesh and such fishing power, only a relatively small number of young salmon are caught.

According to pt. 3) salmon not exceeding 55 and trout smaller than 40 cm. are to be set free when caught during the annual close time or in gear of a smaller mesh than that permitted by law. A closer consideration of this provision will show, that the advantage gained for the salmon fisheries by this regulation is exceedingly small.

The difficulty in distinguishing between salmon and trout in the younger stages has been the main cause of this regulation. Working under the presumption, that numbers of young salmon occurred among the „sea-trout", the authorities have not dared to fix the size limit for sea-trout lower than 40 cm.

However in fixing the size limit, at which salmon should be set free, one has also laboured under a delusion. The object of this provision of course was to prevent the fishermen from retaining salmon of a smaller size than the smallest caught in gear possessing the minimum mesh allowed by law.

However, if we examine the tables on the individual size and weight of the salmon caught in our waters, prepared by Mr. Landmark, we observe that not inconsiderable quantities of salmon smaller than 55 cm., are caught in lawful gear and are sold in accordance with the regulations.

In the comparative table on the relation between length and weight in salmon, which is published by Mr. Landmark in his report for 1895—96 doc. nr. 6, the minimum length of the salmon proves to be 50 cm.

I myself have not rarely measured salmon of 49 and 48 cm. in the fish stores of Mr. Thams in Trondhjem. Upon rare occasions I have found fishes as small as 45 cm. All these fishes are caught in gear of the lawful mesh.

If we now keep in mind, that I have not during my researches in our waters succeeded in procuring salmon of a smaller size than the above-mentioned (excepting fry, emigrating young and young salmon in the open ocean), clearly the pro-

tection offered to the salmon by the regulation in question is quite illusory. First of all, the cases in which salmon of a smaller size than 55 cm. should be set free, occur so rarely, that even this fact renders it indifferent whether these few fish are set free or not. Secondly, the fish thus set free, may in the next instant be caught in a fishing engine with a lawful mesh and be sold in accordance with the law.

That fish accidentally caught during the annual close time should be liberated or at any rate not be killed, is presumably a consequence of the regulation inforcing an annual close time. Presumably these kinds of cases are, on account of their rareness, of small consequence,

Further as regards the regulations scetched under head 2) the prohibition against the sale of salmon under 21 cm. in length is of no importance when we remember that the length of emigrating young salmon practically speaking does not exceed 13 cm. Sale of such fish certainly touches the borders of impossibility.

The prohibition against the capturing of salmon smaller than 21 cm. in length is in our salmon low expressed as „prohibition against the employment of fishing methods or fishing gear, by means of which salmon of a smaller length then 21 cm. may be caught".

As regards the sea, this prohibition is entirely valueless. This is clearly enough shown by my experiments. In all the hundreds and thousands of hauls with seines effected by me in the sea, not one single emigrating young salmon (smolt) has been caught, except in the immediate vicinity of river mouths.

As regards the rivers, such prohibition would seem justified, if it is considered necessary to stop sportsmen from killing the salmon fry accidentally caught in fishing for larger fish, or to prevent boys from wantonly destroying fry, parr and smolts. If these sources of destruction to salmon should

be considered important enough to demand special regulations, a minimum size of 13—16 cm. however would include all the sizes demanding protection.

As we now have seen, it transpires, that all the regulations, by means of which the authorities have intended to protect the young of the salmon, such as protection or closing of river mouths enforced liberation of salmon and trout caught under certain circumstances, prohibition aganst the sale of undersized salmon, prohibition against the capturing of the young etc. may without the slightest injury to the interests of the salmon fisheries *be reduced to a prohibition against the killing of salmon fry, parr and smolts.* This prohibition covers all the sizes of salmon which in our waters, may justly demand the protection of law. As the size of these young salmon, only in exceedingly rare cases exceeds a length of 13 cm. any collision with the interests of the trout fisheries is excluded.

Even if we proceed to relax in a considerable degree the present exacting regulation for trout-fishing, these relaxations cannot in the interests of trout fishing be extended beyond endeavouring to afford some protection to trout fry. As all stages of trout occur in our waters the term „fry“ or „young“ will however, as regards this species, be insufficient.

Evidently in respect to this species there must be fixed a size limit at which the protection of the young must commence. Later on, I will return in detail to this question; but even at the present moment it is clear, that this limit in the interest of trout fishing must in reason be fixed at a figure protecting the maximum length of salmon fry or emigrating young salmon. Then clearly a prohibition against the killing of salmon fry (parr and smolts) does not offer any chance of evasion and thus sufficiently protects the interests of salmon.

Thus as no chances of collision are present between the interests of salmon and trout fisheries in this respect, separate

regulations relating to the different fisheries may without much difficulty be formed.

c. *The protection of young trout.*

As shown above, it is the interests of the trout and not those of the salmon, which must be the object of regulations aiming at the protection of young fish under the forms mentioned on page 299. In the framing of such regulations a special value is attached to the fixing of a size limit at which the protection of the young fish is to commence.

I admit that a correct estimate of this size limit with due regard to the demands of the fishing industry and the economy of the fish in question, presents a problem not easily solved. Especially difficult is the solution when, as in the present case, the question refers to a species of fish, which practically speaking is only caught "on the sly", and to a fishery, the value of which is an unknown figure, and the development of which belongs to the future.

As starting points I here recommend an endeavour to realize what sizes in the present species, represent the fry or young fish. At the same time we must endeavour to sift the distinction fry = non edible, non-marketable fish.

In connection with these investigations, we must next attempt to make clear how high the size limit may be fixed without injury to future fishing industry and local fishing-interests.

For illustration of these points I have gathered some material.

If we e. g. look up table V and observe the groups of fishes contained in the different columns, it is clear that the members of the upper groups from 10—20 cm. must be regarded as the „fry", representing the individuals emigrating for the first time into the sea.

If we now consider the size (about 20 cm.) at which trout become marketable we find, that the non-edible, non-marketable fish, are represented by the fry.

Thus if we further examine my tables we will in table VI last column, find a group of trout caught in one haul in the Orkla. These fishes were, after the „fingerlings“ were thrown out, by my fishermen, sold for Kr. 0,70 pr. Kilo. If now we we look up table VII, first column, Beitstad-fiord, May 1900, we observe that scarcely any of the fishes are smaller than 20 cm. According to the above-mentioned experience it is also clear that these fishes are marketable in the practical sense of the word. They quite agree in size with the fishes in the catches made by the seine fishermen during this time, catches which were sold at high prices, and which in numbers were examined by me. It is to me evident that practical reasons also, are in the way of fixing the size limit higher than 20 cm., because the fishermen thereby would be deprived of a large and remunerative portion of their catch and constantly be tempted to disobey the regulation by getting this portion in their gear.

Even if we would endeavour to regulate this matter by means of enforcing a regulation minimum mesh, we would only remain in the same difficulties as at the present time, when trout is caught in gear also or mainly intended for the capture of other seafish. Due regard to sport-fishing also speaks in favour of not fixing the size limit of „young fish“ higher than at 20 cm.

This limit corresponds fairly well to the minimum size of marketable fish, which for a long space of time has been fixed by law in our country (21 cm.) and thus to some degree must have established itself in the public feeling.

Eventually this limit would protect the young non-marketable fish and not injure the practical industry as regards the catching of sea trout.

Such size limit must of course also apply to freshwater trout in such parts of rivers or waters, in which sea trout run.

The fixing of the size limit at 20 cm. will however in my opinion be dependant on the form of regulation by means of which, protection of the young trout is to be effected.

If we are going to protect sea trout under 20 cm., by a prohibition against killing such fish, no inconvenience worth mentioning will be incurred in the case of the larger rivers, because the capture of small fish is here of small importance. If however we consider the large number of small rivers or brooks, which in our country fall into the sea, such a prohibition would be unjust. A very large proportion indeed of these rivers is inhabited not only by sea trout but by large numbers of freshwater trout, mainly brook trout and this latter form, in numerous rivers, rarely exceeds 20 cm. in length.

As an example of such a rivulet may be mentioned the little Øre-elv in the Sheidsdal in the Batten-fiord, which river has been specially investigated. It heads from a small tarn about 7 kilometers from the sea. The whole of its length is inhabited by a freshwater trout-form which only in rare exceptions exceeds 20 cm. in length. Of this fact I was convinced after I had measured specimens caught in all parts of the river. They attained sexual maturity at a length of 15 cm. Graphically represented, their measurements run thus:

Each dot represents a fish.

```
cm.
10 o o
11 o o o o o
12 o o o o o o o o o
13 o o o o o o o o o o o o o
14 o o o o o o o o o o o o o o o o o o o
15 o o o o o o   }
16 o o o o o o o o }
17 o o o o o       }
18 o o o            } sexually mature
19                  }
20 o                }
```

About 500 metres from the mouth of the river was a little waterfall which prevented the further ascent of sea-trout. Of this latter form fullgrown individuals in no small number occurred in this lower stretch of the river mingled with trout of the above-mentioned sizes, right down to the river mouth. Undoubtedly some of the fishes in the above representation, which are not sexually mature, are the brood of the sea-trout, which in time would emigrate and develop in the sea. As will be observed these facts are very complicated. However, a prohibition against killing trout under 20 cm. in the lower part of this river, where sea-trout run, will deprive the people living on the surrounding farms of the whole catch of freshwater-trout.

Certainly this catching of smaller trout cannot be termed specially important, except as offering chances for sport fishing or fishing for food; but it will be easily understood that a prohibition against killing fish under 20 cm. will be difficult to obey.

Such rivers are plentiful in our country, even to such a degree, that most rivulets or brooks running into the sea may probably be said to possess similar conditions.

Provided it should be deemed necessary to secure the protection of young trout by means of a *prohibition against killing such fish,* consideration of the conditions peculiar to these rivers would prompt us to fix the size limit as *low as 15 cm.* Smaller fish would be of no value for food or sporting purposes.

If the authorities however would be satisfied with protecting these young fish by means of a regulation prohibiting the sale of *sea-trout* under 20 cm. in length., the interests of these rivers presumably would be served. However in forming such a regulation it must be strongly kept in mind, *that such a provision, to be effective, must also refer to freshwater-trout.* As I have before mentioned, it is generally quite easy to distinguish sea-trout and freshwater-trout, excepting the young and the sexually mature fishes. Now the sizes below 20 cm. are just

„*the young*“ and there are, in the great majority of cases, no means of distinguishing the two forms at these sizes. Thus it is clear, that the young of sea-trout may easily be caught and offered for sale as freshwater-trout. To prevent the sale of freshwater-trout under 20 cm. would be unjust, as countless smaller lakes, tarns, rivers and brooks in our country possess trout, the majority of which do not exceed a length of 20 cm.

The fish of these waters would thus be rendered entirely valueless. If however the limit is lowered to *15 cm.*, presumably all inconvenience would be avoided. I should recommend that this be done, as I am strongly of the opinion that a future law ought to contain a regulation tending to prevent the sale of *trout* under a certain length.

It is to me evident, that this lowering of the present size limit, 21 cm. to 15 cm., would not produce any effect on the economy of the sea-trout. As I will show later on, trout under 20 cm. are of no importance in the catches made in the sea, and in the sea the real fishing for sea-trout will have to be carried out. And even if smaller fishes than 20 cm. were caught to the same extent as larger stages, clearly a lowering of the size limit by only 5 or 6 cm., will only make the fishes liable to be fished 2 or 1½ months sooner than would have been the case if the limit was fixed at 20 cm. This fact may be directly realised from my tables on trout. It will be seen that a fish which in May is 15 cm. long, in August is about 25. Thus about 1½ summer months will suffice for a trout of 15 cm. to pass by growth the size limit if this is fixed at 20 cm.

The insignificant loss in weight which the catch of trout in the sea would thus be liable to, may in my opinion be considered as counter-balanced by the above-mentioned advantages to the freshwater fisheries and by the benefit of a regulation, the observance of which may be controlled.

If a regulation was issued, prohibiting the sale etc. of sea-trout and freshwater trout under 15 cm. and at the same time there existed a prohibition against the sale of salmon fry, clearly the sale of salmon fry would be impossible on the pretext of their being young trout.

However if it should be desirable to prevent the killing of salmon fry (parr and smolts) when accidentally caught on hooks or in other ways, a prohibition against wilfully killing salmon fry would not be sufficient. Although anybody, even children, may easily learn to distinguish the young of the salmon from the young of the trout, such knowledge is by no means common. According to my experience very few people, even including fishermen, know the difference between the young of the two species.

It is thus evident that a prohibition against wilfully killing salmon fry (parr and smolts) would have very little effect unless accompanied by a corresponding prohibition relating to trout, when both species occurred in the same river. As already mentioned, no objection would be raised by the trout-fishers against the eventual regulations containing a prohibition against wilfully killing in salmon rivers young salmon and trout under 15 cm. in length. By these means a sufficient protection would presumably be offered to the young of both species.

The only points relating to the protection of young trout, which have not yet been discussed, are the closing of river-mouths, and the provision which previously has been considered most important, viz: the enforcing of a regulation minimum mesh in net gear. In my opinion these 2 points may most conveniently be discussed simultaneously.

Under the heading „Protection of young salmon“ I have not discussed the effect of the regulation as to the protection of the infantile salmon; this I have omitted because it will be perfectly clear from other arguments under that heading, that no effect exists.

d. The mesh.

The main object of our investigations must now be to determine the degree in which our present regulations as to a minimum size of mesh may be modified in the interests of trout fishing. It is here of importance sharply to distinguish on the one hand, what the interests of salmon fisheries demand in order not to be injured, and on the other hand, what may be offered the trout fisheries without inconveniencing the salmon fisheries.

I have previously shewn that salmon of sizes between (13—16) and (45—50) cm. practically speaking do not occur in our waters. Further I have also mentioned that 45—50 cm. forms the lower limit of the sizes of salmon caught at the present time in gear with a mesh in accordance with the law. When we further remember that I previously have advised the lowering of the size limit, for protection of the young trout and salmon, to 15 cm., the sum of these facts would seem to admit of the conclusion, that any regulation of the mesh would be in general unnecessary as well for salmon as for trout.

Provided the authorities were able to organise the administration of our salmon and trout fisheries in a wholly rational and ideal way, — a question to which I shall later on return, — I should principally impress on them the correctness of the above conclusion.

However I am quite convinced that *at the present time* regulations relating to the mesh of net gear cannot wholly be discarded by legislation relating to these fisheries, considering the development of the latter during the last 2 or 3 decades.

If the authorities are not prepared to foster the development of these fisheries on new lines, this question need not, at the present time, be discussed in general, but the importance of mesh regulations must be conscientiously considered for each of the present fishing methods. Thus our deliberations must

relate separately to moveable and fixed fishing engines as well as to the fishing in the rivers and in the sea.

Of moveable fishing gear for the purpose of catching salmon and sea trout in our country, only *driftnets, groundnets* and *seines* are used.

The driftnets are only employed for the purposes of catching salmon, and accordingly the r mesh must be very large, even larger than the minimum size at present allowed by law. Reduction of the mesh is thus, in regard to these nets, quite immaterial.

As regards groundnets a reduction of the mesh is for the same reason immaterial, provided the purpose of the nets is the catching of salmon. A reduction of the mesh, however, would render them adapted to the catching of trout, and reduce their efficiency for salmon. They would not be able to catch salmon of a smaller size than those caught in the present mesh, as such salmon practically do not exist in our waters. As the nets are intended for "meshing" the fish, their mesh could never with any advantage be made so small as to imperil the size of trout, which demand the protection of the law.

If finally we consider the seines, we find that in the sea they are employed almost exclusively for the purpose of catching trout. In the rivers or in the neighbourhood of river-mouths their present object is the catching af salmon.

In the seines used in the sea salmon are rarely found. In the thousands of hauls which I have made or seen other fishermen make in the sea, with seines of a smaller mesh than the legal one, not a single salmon has been caught. Nor do any of the fishermen who for a part of the year get their living by this half illegitimate fishing for sea-trout, profess to catch salmon, but as rare exceptions. They state unanimously that a few grilse of 2—3 kilo weight may occur as rareties in a summers catch. The occasions upon which large salmon

have happened to be caught in the seines of the fishermen, are considered as remarkable incidents in their lives.

Thus without doubt the question of a reduction of the mesh in favour of these seines, which are employed in fishing for trout, does not, as regards the sea, imply any collision with the interests of the salmon-fisheries. We have only to consider the benefit to the trout-fisheries. The question in regard to these implements then, is: Ought a certain minimum size of mesh to be established by law, or is it advisable to leave it to the fishermen themselves in perfect freedom and according to the varying conditions of the fishing industry, to arrange their fishing gear in the way, which experience in every case teaches them to be profitable?

I am of the opinion that the latter solution is to be preferred, and will undoubtedly prove to be rational and economical as regards the whole fishery in the sea with this kind of gear. It those seines were only employed for the purpose of catching seatrout, no inconvenience consequently would be occasioned, if it should be decided to fix a regulation mesh possessing the power of retaining only fishes down to the size limit for seatrout permitted to be sold.

A large number of the present seines used for seatrout, thus have a mesh which totally excludes the capture of trout as small as any of the minimum regulation sizes suggested by me above. The mesh of these nets varies as a rule from 8 to 11 knots pr. foot (Norw.). Many fishermen see an advantage in using these relatively large meshed seines, as they are considerably easier to handle than finer meshed seines.

Other fishermen, however, are inclined to renounce this latter quality in preference to a smaller mesh, by means of which herrings and other small seafish may be captured with the trout, in cases or at times when no trout are to be had.

Others take the middle course and employ in the middle part of their large meshed seine (8—11 knots pr. Norw. foot) a

piece of netting of finer mesh and adapted to retain herrings. This latter case is e. g. in the Trondhjem fiord very common. In this respect I may refer the reader to my paper: "Om Fiskeriet med Strandnot i Beitstadfjorden", Aarsberetning vedk. Norges Fiskerier (3) 1900.

It is to me evident, that such phenomena are not due to chance. They are in accordance with natural laws created by the conditions of the fishing industry itself and the measures which each fisherman in each locality has had to adopt in order to bring his gear into accordance with the demands and needs of his trade. A regulation enforcing any sort of minimum mesh would then clearly render the majority of the gear employed at the present time unfit for the catching of trout. The fishermen would have to procure special trout-seines, and in using these seines they would, in large numbers of cases, have to renounce the capture of the shoals of herring or other seafish which at the present time adds largely to their catch.

Unless obstacles of a quite compulsory character are present, it is thus irrational to charge this industry with the burden of a regulation mesh. I cannot find that such obstacles are present. My fishing experiments and the tables representing the fish caught, clearly show that the rivers, river-mouths and their immediate sourroundings must preminently be regarded as the habitat of the young fish, while the young fish in the sea are much more scattered. Certainly the young emigrate into the sea and thus to some extent may be caught, but it must be remembered that they live more scattered in the sea, and that the majority in the course of a short time, during summer, all grow to sizes which must be considered as fit for food.

Thus there is no scientific reason for establishing any minimum mesh for this sort of gear on account of the trout.

In this connection I also wish to point out the fact, that a regulation, enforcing a minimum mesh for trout-fishing with

seines, will only result in the present half-lawful, half-lawless state of the fishery.

The fishermen cannot be forbidden the use of fine meshed seines in fishing for herrings and other fish, and in employing these seines they will take what trout they get, law or no law, as long as they can sell or eat it. These are the present conditions, and a law, which is not kept, has no chance of being kept and clashes with the demands of the very industry, for whose benefit it is instituted, is worse than no law.

As regards the rivers, river-mouths and their immediate surroundings the question of a reduction or abolition of the mesh regulations will be essentially different. A total abolition of the mesh regulation would in the above-mentioned localities imply drawbacks, not to be disregarded.

Clearly rivers, river-mouths and their immediate surroundings offer a far better opportunity than the sea, of capturing with smallmeshed seines large numbers of young trout, about the regulation size, which I have deemed it advisable to adopt as a limit for trout to be sold. It will be remembered that my suggestion as to the size limit of 15 cm. was given more from considerations the interests of freshwatertrout than to those of seatrout, and mainly in order to secure uniform regulations, which could not be evaded. My intention is that capture of the smaller sizes in the rivers should mainly be carried out with hook gear as used by sportsmen or by people fishing to obtain food. Thus it would never attain dimensions worth considering. However, there is no doubt, that an unlimited license to employ seine gear of any mesh in rivers and river-mouths would lead to abuse, because the opportunity of capturing very small fish is here so ample. There is consequently no doubt, that such a relaxation of earlier regulations is totally wrong and inadvisable.

A mesh, which would prevent abuse and retain marketable trout might of course easily be determined if, in the rivers, the

interests of trout and salmon-fisheries were quite separable. This is, however, not the case in salmon-rivers, and the introduction of full liberty as to mesh would inconvenience the fishing of both species.

As regards those salmon-rivers which wholly or nearly wholly are let for sporting-purposes, and as regards the smaller trout-rivers, where net gear can not easily be employed, the question of mesh is of very small importance.

Respecting those rivers, the lower parts of which are fished by numerous seines, while the upper reaches are hired by sportsmen, e. g. most northern rivers, a reduction of the mesh will to some extent cause fewer grilse than usual to reach the upper reaches.

The present mesh certainly retains grilse, down to the smallest sizes occurring in our enclosed waters. Nevertheless a few grilse break through, either bursting the mesh or being so slender that they are able to wriggle through the mesh, even though being of the same length or weight as many of the smallest caught.

This fact is shown by a few of the grilse, caught in the upper parts of the rivers, being marked by the meshes.

Attention is very often drawn to this fact by sportsmen, and I have also myself observed it in the rivers. Thus in the upper parts of the Orkla I once examined the catch made in a day by British anglers. About 25 % of the grilse were marked.

Clearly this marking of fishes will to some extent occur, no matter what size our mesh is; but I deem it also probable that this phenomenon at the present time must be mainly attributed to the use of seines in the lower parts of the rivers. In these limited stretches of water, where the fishes are hunted with net after net, as they ascend the river, obviously the chances of a majority of the ascending fishes coming in contact with net gear are greater than in the sea, where the fish move in a considerably wider area and the room for escape is far greater.

A reduction of the mesh would thus in some salmon-rivers clearly result in less grilse reaching the upper reaches and falling a prey to sportsmen, or increasing the number of spawning fish. However the provision of our law concerning a minimum mesh was never intended to regulate this side of the industry.

The object of mesh regulation has been the protection of young salmon, nonmarketable and unripe fish.

Equalising of the catch and protection of the spawning, heads to which the above mentioned features must be referred, has always indeed been aimed at, by regulations enforcing weekly and annual close-times. Thus the drawbacks, eventually caused by a reduction of the mesh in the rivers, would have to be amended by regulations concerning weekly and annual close-times and would also have to be discussed and considered under this head. Consequently the motives fundamental to mesh regulations in general should not now prevent *a reduction* of the mesh in the rivers. But perfect liberty as to the choice of mesh would not as I have said before be advisable on account of the young trout.

If therefore the interests, which would profit by a mesh reduction in the rivers, were found worthy of consideration, there are no objections in the case of young-fish protections, as long as the reduction is kept within limits protecting the non-saleable trout. Presumably the reduced size of the mesh ought not to be fixed by law in any general form. According to my opinion a lowering of the mesh ought only to be effected by the administration, upon petition, and it ought only to be lowered to a degree which special investigation in each locality, proved justified.

Also it should be left to administration to define the term river or river-mouth. This is on account of special or singular fisheries which occur in a few places in the neighbourhood of river-mouths. In a juridical sense they would be sea-fisheries while really having the character of river-fisheries.

The very same considerations as above, must in consequence also apply to all fixed fishing gear and engines, in rivers and river-mouths, and not only to gear and engines made of twine or thread but also to those made of rigid material.

Finally we have to discuss the conditions relating to reduction of the mesh in *fixed fishing engines in the sea.*

The main types of such gear, as used in this country, are "kilegarn" (net ending in an open corner), "bundgarn" (stake nets), "kilenot" (bag net) besides "laksevarp" (fixed seines with bottom).

All these fishing engines are almost exclusively intended for the capture of salmon. The only exception is in the case of stake nets, the yield of which also consists of trout and other sea-fish besides salmon. These latter fishing engines may also, under certain conditions, be exempt from some of the regulations relating to mesh and weekly close-times, provided it is sufficiently proved that their main catch consists of fish other than salmon and sea trout.

Respecting that kind of gear which is intended to "mesh" the fish, viz. the kilegarn or corner nets, the question of a reduction of the regulation minimum mesh or even total liberty as to the choice of mesh, is perfectly indifferent (vide my previous remarks upon the mesh question relating to moveable net gear especially driftnets intended to entangle the fish). All the other fixed fishing engines are so uniform as to their effect that they may all, with regard to the mesh question, be treated as bag nets. The bag net undoubtedly must be considered as *the engine* typical to our salmon-fisheries in the sea.

When considering if we may venture a reduction of the mesh or even permit free choice as to the mesh in this kind of gear, two points must in my opinion be kept in view.

On the one hand we will have to acknowledge, that the mesh question regarding bag nets or other fixed engines in the sea, *does not only refer to the salmon. On the contrary it is*

only subject to a clear understanding when viewed in connection with the interests of all other sea-fisheries.

On the other hand we must consider the effect of mesh regulations as to the protection of young i. e. non-saleable salmon and sea trout.

To any man who has studied our bag net-fishery, it will be obvious that the ever increasing employment of this fishing apparatus in our country is most closely connected with the fact that this fishing engine is admirably adapted to the conditions of our waters. What the pots and stake nets are to Denmark, the bag nets evidently are to our country.

It is also obvious that this apparatus is not only adapted to the catching of salmon, but also others of those kinds of fish which, along our coasts, and also in our fiords, lead a pelagic wandering life. Of such species may be mentioned: Trout, herring, mackerel, saithe, pollack, whiting also haddock and cod.

This fact is also to some extent shown by the experiments which have been effected by me with fine meshed bag-nets, and which are described in detail in chapter 2. As will be remembered I could get as many as 100 other seafish and even more to each salmon caught.

This fact is also shown by the catches of ordinary bag nets. Even with the present enormous mesh, large numbers of cod and saithe are caught in places, and it is evident that a reduction would mean an increase in the capture of other seafish.

Bag-net fishermen in the southern parts of our country have often reported to me that the bags of their nets, possessing the large regulation mesh, are filled with mackerel, which do not pass the meshes as long as the net is not touched, but all go through, when the net is tended.

It is to me evident that free choice as to the mesh in bag nets and similar engines would be a great benefit. Undoubtedly the fishermen in many places would see the advantage of

reducing their mesh, *according to the demands of the locality*, and in this way they would essentially increase their own incomes, and also the national income, by catching trout and other sea-fish along with the salmon.

Thus I do not for one moment doubt that free choice of mesh would be a great blessing.

The question, however, as before mentioned, also refers to the amount of power, which mesh regulations possess of protecting non-saleable salmon and trout.

The original motive of mesh regulations in our salmon legislation, was the protection of the young, non-saleable fish. The mesh was then 1¼ inches (Norw.) between the knots.

The law of May 23rd, 1863, which fixed the minimum size of the mesh at 5·8 cm. between the knots, also aimed however, at protecting the grilse, also including the seatrout, the specific distinction between grilse and seatrout being a question of doubt. Experience, however, showed that the grilse in large numbers were caught by this mesh, and in the law of 1891 the mesh was enlarged to 6·5 cm. between the knots.

This regulation, however, met with such opposition on the part of the fishermen that the legislating powers were forced to suspend the operation of this regulation and suffer the old mesh regulation to remain in force.

The idea of enlarging the mesh and sparing the grilse is rejected by the fishermen as well as by the special law-commission appointed in 1896.

Even the original mover in this matter, our inspector of fisheries, has, in his criticism of the regulations proposed by the latter commission (Christiania 1901) renounced the idea, at least temporarily, of enlarging the mesh.

When we now consider that even fine meshed bag nets cannot, as my experiments show, catch grilse of smaller size than those caught in the present regulation mesh, clearly our reasons for mesh regulations must remain the *same as before*

the law of 1863, viz.: the protection of the young or non-marketable fish.

As mentioned before, some of the grilse caught in the upper reaches of rivers are marked by passing through the meshes of net gear. I expressed as my own opinion that this must be caused principally, by seine fishing in the narrow rivers. But even supposing, that part of these marked grilse are fish which have passed through bag nets in the sea, the importance of this fact would, in my opinion, be small compared to the prospects offered to our other sea-fisheries by the employment of fine meshed bag nets.

It will be remembered as my investigations have shown that salmon of sizes between 16 and 45 cm. cannot be caught in our waters. If this result is compared with the tables published by Mr. Landmark in his report for 1891—1894, showing the size of grilse caught by the present mesh, it is evident that at all events only a very small portion of the grilse group would have any chance of penetrating the present mesh of the bag nets and would consequently be retained by a smaller mesh.

Consequently it is evident that mesh regulations, as a means of protecting young non-marketable salmon, are a failure.

If, however, upon introduction of adlibitive mesh in the sea, any inconvenience to sportsmen should arise from the fact, that a few of the smallest grilse would be withdrawn from the rivers, I think that a remedy could easily be found. As I have mentioned before, this kind of inconvenience comes under the head of regulations tending to equalize the catch and protect the spawning.

In deliberations as to weekly and annual close-times the above mentioned inconveniences may at any time be considered according to their value.

I will therefore recommend that the mesh regulation should, as regards all fishing gear in the sea, be abolished.

In chapter II I have given prominence to the fact that I did not feel wholly convinced that certain points of our outer coast might at times be visited by young salmon in the oceanic stage. I also mentioned that I did not feel satisfied, that some of the open fiords of Finmarken might not harbour such salmon. In order to take precautions against *the possibility* of such chances of local destruction, I should think it would be sufficient if the future law left the remedies against such possible cases in the hands of administration, charging it with the power of e. g. enforcing the use of a certain mesh, locally.

In case the abolition of mesh regulations, as regards bag nets, should raise the question of extending the weekly close-times also to the seine-fishing for trout in the sea, I wish to point out that the very nature of this latter industry does not offer any parallel to the bag-net fishery for salmon.

The seine-fishery for trout is indeed not in a position to suffer the economic pressure of a weekly close-time. Nor does it present the same scientific and national economic grounds, which have urged the weekly close-time for salmon.

In the seine fishing for trout there cannot possibly be any chance, by a weekly close-time, of destributing the yield of the fishery, nor promoting the access of the fish to the rivers, as the wanderings of the seatrout are not analogous to those of the salmon. Neither will it be possible to have a weekly close-time for fishing with this kind of gear, as the seines will then certainly be used "for the purpose of catching other sea-fish" and will catch trout, which is very difficult, if not impossible to prevent. This is shown by the present conditions.

e. Annual and weekly close-times.

Protection of the spawning fish and the equal distribution of the yield of the fisheries have been aimed at by regulations enforcing annual and weekly close-times.

In my opinion the first of these provisions (the annual close-time) is only justifiable as regards the rivers. In the sea the present annual close-time (August 25—April 15) is immaterial, provided the intention is to protect salmon. Practically speaking there is no chance of capturing salmon in the sea during the present close-time. The bagnets are indeed mostly taken ashore as early as the end of July.

If however we intend to allow free choice of mesh and thereby create possibilities of employing the bagnets for other fish, evidently the present annual close-time in the sea is not only unnecessary but even objectionable.

The second of these provisions, (the weekly close-time) undoubtedly *is the regulation,* which most heavily hampers the industry and has created the greatest discontent. Looked at from the fisherman's point of view, it is evident, that a weekly close-time of 72 hours or even more, must be a great burden to any fishing industry.

This method of protection is however closely connected with the development of our salmon fisheries, and is a logical consequence of the principles of our previous legislation. As long as these principles are followed, I do not venture to propose any alteration in the present method of protection by weekly close-time.

f. Change of System.

I think however, that our knowledge of our salmon fisheries, and of the lifehistory of the salmon during the last 10 years, has developed to such an extent, that the question comes more and more to the front: Is it not now the time to reconsider the very principles upon which legislation in our country hitherto has been founded?

My previous views and propositions have in general been founded on the current principles, and this is on account of the fact, that any radical change of system can only be subjected to

general deliberation, as its consequences may only be judged with accuracy, when the manysided preliminary work and investigations have been performed by government.

Until this has taken place, clearly the present system must be fundamental to law regulations, and this I have assumed in my above review of some of our leading regulations.

Those who have attempted to study the development of our salmon fisheries during the last 3 or 4 decades, will have observed that a total revolution has taken place. In earlier days our salmon-fisheries were principally *river-fisheries.* Now however they are mainly *sea-fisheries.* This developement has proved to be the canse of an ever increasing struggele between opposing interests.

To begin with, the main object of our legislation was the promotion of our salmon-fisheries through maintainance of the supply of young fish, However during the process of the above development of the fisheries, legislation has been forced in an ever increasing and predominating degree to attend to the separate interests of the different owners, fishermen, or bodies of fishermen.

The main and ideal object of the state, relating to salmon legislation, must, in my opinion, consist in providing that no disproportion arises between the fisheries and the natural propagation and maintenance of the species, and if possible to increase the number of the species.

Now, the struggling fishery-interests have gradually forced the state to endeavour more and more to produce an equal distribution of the yield and if possible allow enough fish to reach the spawning beds. During the increasing fishery and the increasing struggle of interests, the state has gradually had to enforce regulations of great severity which considerably hamper the fishing industry, as well in the rivers, as in the sea.

There is nothing to indicate, that the evolution of the later decades will not continue, and the contest between the

interests of river and sea fisheries will in consequence increase in fierceness.

As this most certainly will take place the state will, a logical consequence, be driven forward on the same course of legislation, unless there is some possibility of changing the system.

I believe as before mentioned, that such a possibility exists, and in the following pages I will endeavour to hold forth the opinion I have gradually formed on the matter.

To any man, who has thought on this matter it must be evident, that it would be a great advantage to the work of improving the salmon fisheries, if the present numerous contesting interests might as much as possible be combined. If e. g. all our salmon fisheries could be amalgamated into a general syndicate, clearly, the work of improving these fisheries would be infinitely more simple and would have a much better chance of being effective.

This idea is not new, and our present inspector of fisheries has on several occasions, advised an amalgamation of interests, especially in the rivers. Such amalgamation has really to a large extent taken place in the case of the rivers, these being more and more let for sporting purposes and fishing rights becoming more and more the property of single owners. Thus it is not impossible, that our river fisheries for salmon may gradually assume the character of one or more syndicates each with the same purpose.

However it is obvious, that a voluntary amalgamation of the two main contesting interests, the river and the sea fisheries for salmon, never will take place.

The only way in which this may be imagined to take place, is through the medium of the state.

If e. g. the state secured grater influence over one of these interests in order to secure the highest possible development

of the other, this would be equivalent to having only one interest existing.

This object, the state has long ago attempted to attain in other European countries where salmon fisheries are important. As an example may be mentioned Great Britain and specially Ireland, where the main object of the state has been to concentrate the salmon fisheries as river and estuary-fisheries, while the opposite interest, the fishing with fixed engines in the sea has been put down, or allowed only when the rights were of a very early date.

I believe, that in regard to our country it is also right, that the state should endeavour to simplify the conditions relating to salmon fisheries and if possible attempt to create only one interest.

For this purpose it will be in vain to seek a model in the system of other European countries, as the evolution of our salmon fisheries has been essentially different from that of all other countries I know.

The question of which interest is to be supported and which interest must be subjected to the increased control of state may only be answered by a closer examination of the development of our own fisheries. It must be exactly calculated, which fishery, that of the river or that of the sea offers the greatest prospects of improvement.

For this purpose I believe that we possess good material in the statistics collected by our inspector of salmon and fresh-water fisheries, and I also believe that the results got from my investigations will be able to afford some support for a decision.

In order to obtain a clear general view of the progress of our salmon fisheries during the period in which reliable statistics are available, I have constructed graphical tables which are based on Mr. Landmarks statistical tables and which represent the total yield of all our salmon rivers, the total yield of the salmon fisheries in the sea, the total yield of the salmon

fisheries of the country and finally the number of bagnets. All these results are from, and including the year 1882, and to, and including the year 1898.

This is represented in Figs. 3 and 4.

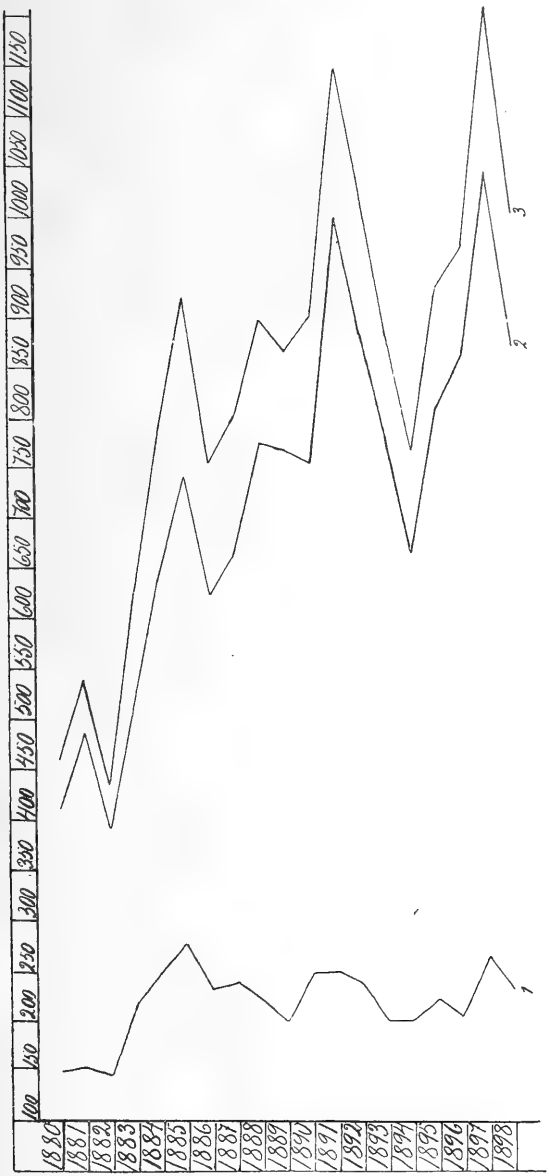


Fig. 3.

1) Curve representing the yield of salmon rivers (in tons [1]) for the years 1880–1898.
2) Curve representing the yield from salmon fisheries in the sea (in tons) for the years 1880—1898.
3) Curve representing the total yield from the salmon fisheries of Norway (in tons) for the years 1880—1898.

[1] 1 ton = 1000 kilogrammes.

At the same time I have, based on the same statistics, attempted to obtain a general view of the progress in the most important salmon district of our country viz: the Trondhjem district. With this object in view I have summed the annual returns of the statistics for 1880—1898 for all salmon rivers, which run into the sea in the shrievalties (fogderi) Fosen, Strinden and Selbu, Stjør- and Værdalen, besides Inderöen.

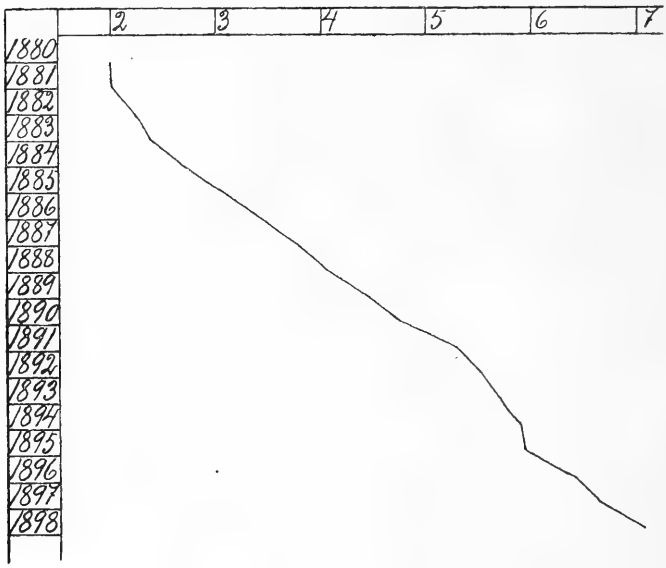


Fig. 4.
Curve representing the number of bagnets in the years 1880—1898 (in thousands).

Also I have summed the annual returns for the yield from the salmon fisheries in the sea in the above-mentioned shrivalties. Also I have summed the annual numbers of bagnets in these shrievalties.

The graphical tables constructed from this material are re-represented in Figs. 5, 6 and 7.

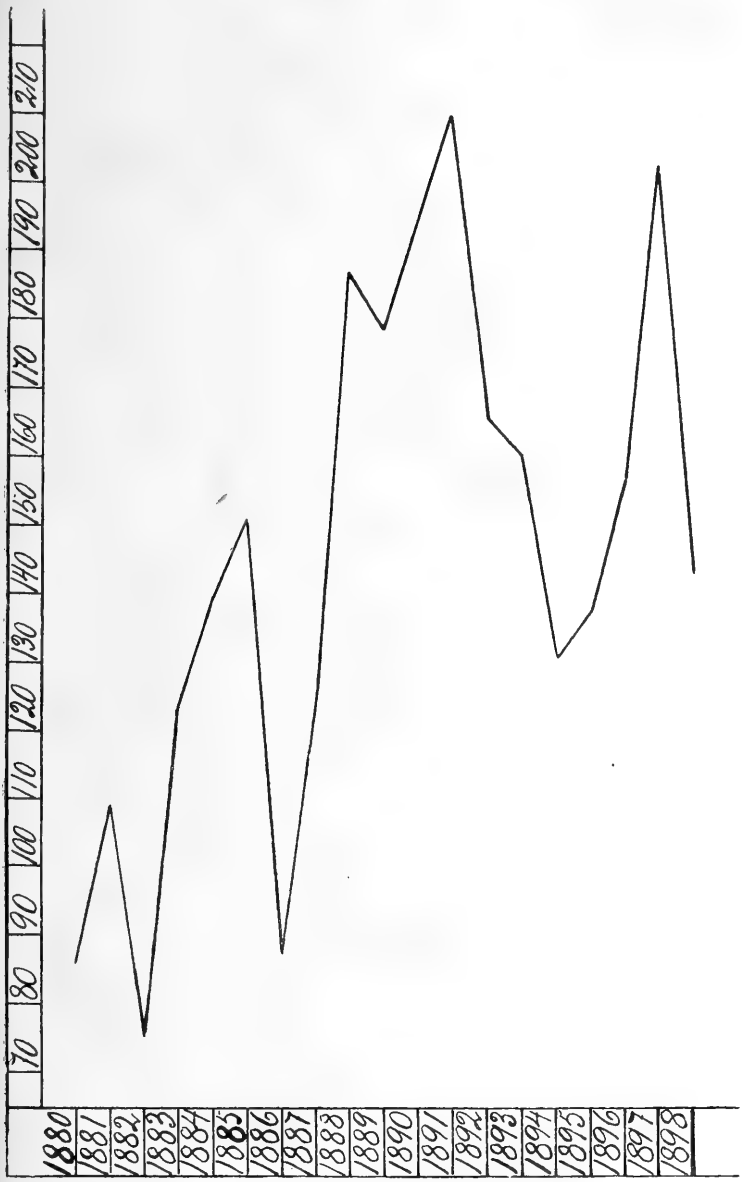


Fig. 5.

Curve representing the yield from salmon fisheries in the sea in shrievalties Fosen, Strinden and Selbu, Stjør- and Værdalen, besides Inderøen for the years 1880—1898 (in tons).

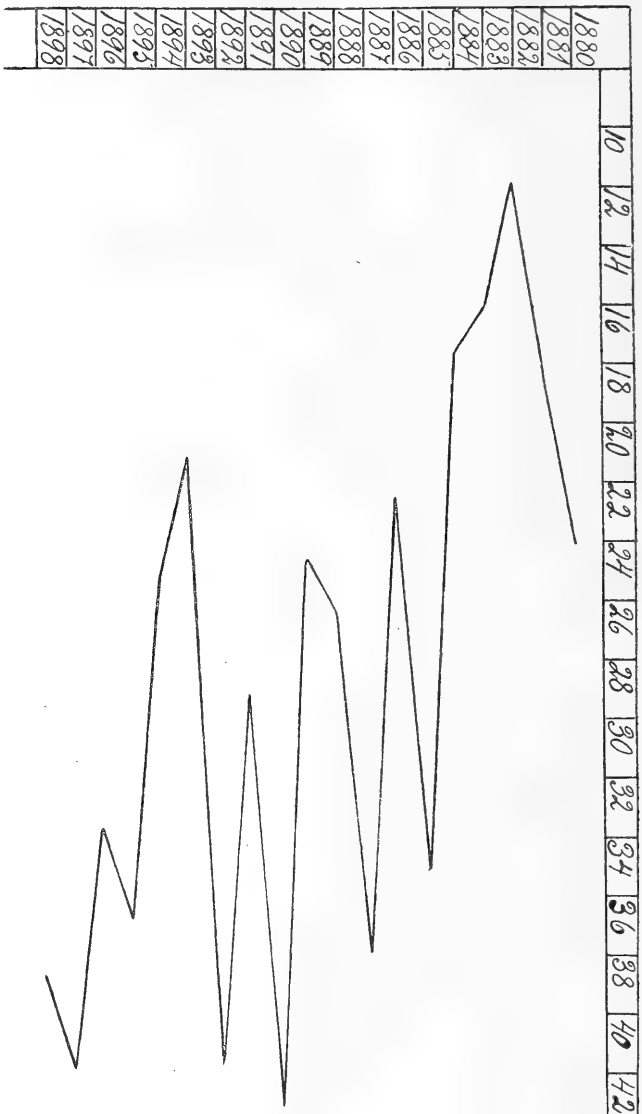


Fig. 6.
Curve representing the yield from salmon fisheries in the rivers Orkla, Gula, Nidelven, Stjørdalselven, Værdalselven, Figga and Stenkjærelven in the years 1880—1898 (in tons).

These figures and their curves are in many respects instructive.

If we look at fig. 3 we will immediately observe that the yield from our salmon-fisheries during the whole of the period has been constantly increasing, yea, that their yield has even more than doubled itsself since 1880. The curve representing the catch from the rivers presents after a rise in the first of the eighties a nearly even course, oscillating about the same figure, while the curve representing the sea presents the same course as the curve of the total catches.

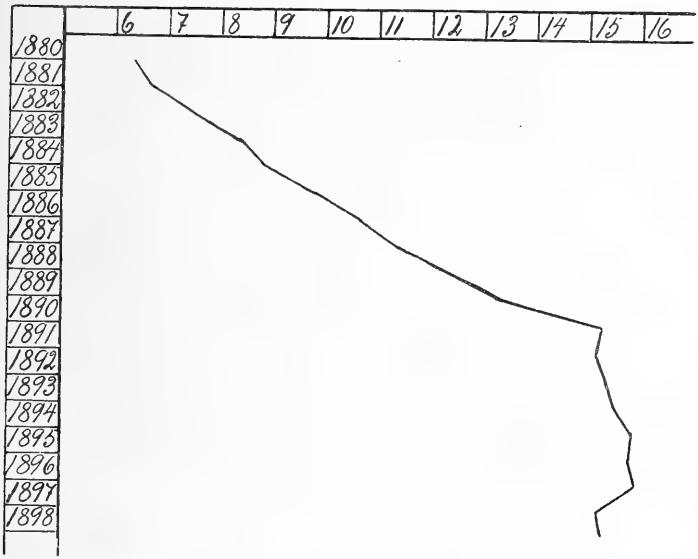


Fig. 7.
Curve representing the number of bag-nets in Fosen, Strinden and Selbu, Stjör- and Værdalen besides Inderöen in the years 1880—1898 (in hundreds).

When we view the main arguments generally propounded by those having river-interests, the course of these curves is must greatly surprise us. Supposing the fact which is asserted by those having river interests to be true, that the sea-fisheries have developed and exist at the expense of the river-fisheries, the curve representing the catch in the rivers must needs have

a continually sinking course, while the curve representing the yield of the sea must rise.

It must here, however, be remarked, that the number of rivers which are taken account of in the statistical tables, has gradually been increased without the total yield of the rivers presenting a corresponding rise.

The number of the rivers counted in the statistical tables was:

in 1880—1883:	55	rivers
- 1884—1886:	79	„
- 1887—1890:	89	„
- 1891—1894:	93	„
- 1895—1896:	108	„
- 1897—1898:	122	„

If however, we, examine the quality of the catches from the rivers, we find, that the main ones are included in the returns for 1886. This is in good harmony with the rise of the curve during this period. (Vide fig. 3, 1).

The rivers, added to the statistical returns after 1886, will upon examination be found to be less important.

If we further remember that year by year more and more rivers have been let for sporting purposes and their yield in salmon-flesh consequently lowered, it must be taken as granted that the curve of the rivers as represented in fig. 3, is reliable in the same degree as the other curves based on our statistics. At all events it is obvious that there is no reciprocal proportion between the yield of the fisheries in the sea and those in the rivers.

If the curves of the Trondhjem district are examined (fig.s 5 and 6) the same facts will be observed. Far from presenting any decrease in the yield, the rivers on the contrary show a large increase, while the yield of the sea has constantly been increasing.

If we now examine the curve in fig.s 4 and 7 representing the annual numbers of bag nets, there is not the slightest doubt that the constant increase in the number of fishing implements, is the only clear and obvious source of the progress of our salmon-fisheries.

Accordingly it seems to me perfectly evident, that if all fishing, in the sea were prohibited, this would not result in a proportionally large yield in the rivers. I have no doubt that the total yield of our salmon-fisheries would then be much smaller.

The scientific explanation of this fact is another matter. Personally I am inclined to believe that the phenomenon is to be attributed to the circumstance that a large proportion of the catch in the sea consists of grilse which are not yet sexually mature and consequently do not ascend the rivers. Possibly also, numbers of the large salmon caught in the sea are resting fish, which would not have spawned in the year when caught. Such investigations as would solve these questions (this could easily have been done by opening large numbers of salmon in the market) I have not been able to effect, on account of the large expense thus entailed.

Supposing, however, for the sake of argument, that we stopped all fishing in the rivers, and thus could spare the 250 000 kilos of sexually mature salmon which are annually caught in the rivers, spare it exclusively for the purpose of spawning, clearly we would possess an immense power of increasing the yield of the fisheries in the sea, supposing always the fundamental theories of the propagation of salmon to be correct.

The general opinion on this point at the present time is fairly unanimous, namely that an increase in the numbers of spawning fish and consequently that of fry would result in a corresponding increase in the numbers of individuals of the species. In other words a direct relation exists between spawning and the increase in the stock of fish. Whether this, generally

viewed, is correct, I personally entertain some doubts. Probably the progress is proportional up to certain point; but when this point is reached, the production of each new individual will demand a proportionally larger and larger number of eggs. It is even probable that this question as regards the salmon will be highly dependant on the power the rivers have of sustaining and nourishing the fry and young. If the young fish could only reach the ocean, this would evidently present greater chances of development and provide food for essentially larger numbers of salmon than at present.

It may, however, be taken as granted that the spawning in the rivers could far surpass the present spawning, before the young produced would not be able to find sufficient food. Even if this should ever happen, one might resort to artificial rearing.

Thus I have no doubt, that we possess the power of essentially increasing the yield of the fisheries in the sea by increasing the spawning in the rivers. Consequently I entertain no doubt that the rational course for the state would be to secure greater influence over the fishing in the rivers.

In this opinion I feel all the more confirmed when I consider the results of my own investigations. Only when the state was in possession of the power of fully regulating the spawning in the rivers and was more independant of the demands for an equal distribution of the catch, the possibilities which I have previously pointed out of an improvement of our sea-fisheries for salmon, trout and other sea-fish could be brought into full play.

Clearly the whole legislation relating to salmon- and trout-fisheries might then be considerably reduced.

In order to attain a realisation of the thoughts here mentioned, it will obviously be necessary to undertake a large preliminary work in order to collect material iliustrative of the means by which it would be possible to bring the rivers more under the influence of the state. The influence of the state must then, in my opinion, first of all, and in a more effective

degree than hitherto, be directed towards procuring the greatest possible production of fry and young fish principally by natural reproduction, and secondly by hatching and rearing to the extent which occasion really demands.

As the special object of the above mentioned preliminary investigations would be the collection of material in order to decide whether fixed fishing engines, veirs etc. and seines may be totally abolished or their employment be essentially reduced.

These sorts of fisheries must indeed at the present time be said to represent preeminently the river interests, as the number of pounds caught is much more important to these fisheries than to sportsmen, and it is just these fisheries which possess the power of putting the greatest obstacles in the way of ascending salmon. Quite another view would presumably apply to the much less destructive sport fishing.

The question, of the way in which the total measure might most practically be effected, and of the means by which the economic part of the matter might be arranged by the state, is not within the scope of my present commission.

It is, however, not impossible that the matter might be arranged even with relatively small pecuniary efforts, and I should strongly recommend our administration to undertake the collection of the material necessary for an accurate estimate of the scope and nature (besides also the economic part) of the measures which eventually would have to be taken.

g. Recapitulation.

According to what I have stated in this paper I would draw special attention to the following measures:

1) Protection of the young salmon and trout effected by a prohibition against the sale of trout under 15 cm. in length and a prohibition against wilfully killing salmon and trout smaller than 15 cm. in length in rivers where both species occur.

2) Entrusting administration with the power of reducing the size of mesh in rivers and river-mouths.
3) Total abolition of mesh regulations relating to all fishing gear in the sea, moveable and fixed. Entrusting administration with the power of locally interfering if occasion should arise.
4) Abolition of annual close-times in the sea.
5) Protection of the spawning process, and distribution of the catch to be effected by an annual close-time in the rivers and by a weekly close-time in the rivers as well as in the sea, provided the same principles, on which our present legislation is founded, are to be followed.
6) The necessity of effecting the collection of material, consisting of information, calculations etc., necessary to the clear understanding of the question, of whether it will be possible for the state to regulate and limit the fishery in the rivers in a degree essentially more effective than at present and in the rivers to adopt more effective means of securing and increasing the spawning, and consequently the growth and supply of young salmon.

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Fiskeriinspektørens erklæring om lakselovkommissionens udkast til lov om lakse- og sjøørretfiskerierne (Kristiania 1901).

Contents.

Trykt 15. December 1904.

Lappiske Navne paa Pattedyr, Krybdyr og Padder, Fiske, Leddyr og lavere Dyr.

Ved

J. Qvigstad.

Mine Kilder ved Udarbeidelsen af følgende Fortegnelser har foruden de almindelige lappiske Ordbøger og mine egne Optegnelser væsentlig været:

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I de lappiske Navne udtales:

c som ts, cc som tts.
č som tsj, čč som ttsj.
đ som engelsk th i father.
ʒ som ds, ʒʒ som dds.
ǯ som dsj, ǯǯ som ddsj.
ǥ som spirantisk (beaandet) g.
ŋ som n i norsk Enke.
š som sj, šš som ssj.
ŧ som engelsk th i thing.
χ som tysch ch i ach.
ž som engelsk s i pleasure.
ȧ som en Mellemlyd mellem a og æ.
ï som russisk y (Jeri).
ǫ som aaben o.

Forkortelser.

Arj. = Arjepluog i Pite Lapmark.
Bls. = Balsfjord.
E. = Enare-lappisk.
Fld. = Folden.
Hf. = Hammerfest.
Hm. = Hammerø.
Ht. = Hatfjelddal.
Ib. = Ibbestad.
Jmt. = Jemteland.
Kar. = Karesuanto.
Kl. = Kalfjord nær Tromsø.
Kr. = Karasjok.
Kt. = Koutokæino.
Kv. = Kvænangen.
Lg. = Lyngen.
Lnv. = Lenvik.
Lul. = Lule Lapmark.
Nb. = Nesseby.
Of. = Ofoten.
Pasv. = Pasvik.
R. = Russisk-lappisk.
S. = Svensk-lappisk.
Sors. = Sorsele.
Sdv. = Sydvaranger.
Ter. = Ter-lappisk.
Trond. = Trondhjems Stift.
Ts. = Tysfjorden.
Utsj. = Utsjok.
Vst. = Vesteraalen.

Hvor intet andet er bemerket, tilhører de lappiske Ord den finmark-lappiske Dialekt. I [ ] er tilføiet den ordrette Oversættelse af de lappiske Navne, hvor saadan er mulig.

A. Lappiske Navne paa Pattedyr.

1a. abmo-ačče (S.), *Ursus arctos*, L. Navnet indeholder Ordet ačče, Fader.

1b. afčo, pl. avčok (Finmarken), *Phoca vitulina*, L. ♀ *adulta*; s. Rost. p. 187.

2. aggja, pl. agjak | S. addjus, [Bedstefar, Gamling], *Ursus arctos*, L. ♂; s. 1a. 5. 136. 141.

3. ainne, pl. ainek (Finmarken), *Halichoerus grypus*, (Fabr.) ♀ l. *Erignathus barbatus*, (Müll.) ♀; se Leem, p. 212 f. Hannen heder dævok. Efter Rost., p. 188 er aine = Havert. | R. (Ter.) aine, = russisk: morskoj zajäts, der efter A. Podvïsotskij, Slovar oblastnogo archangelskago narečija, p. 55 er *Erignathus barbatus*..

4. aka (R. efter Friis), [gammel Kone], *Rangifer tarandus*, (L.) ♀; sml. akai l. akh (R. efter Friis), = (*fera*).

5. akko, pl. akok (Of.), [Bedstemor], *Ursus arctos*, L, ♀; s. 2.

6. albas, pl. albbasak | S. (Lul.) alpas, pl. al^{a}pasah, *Felis lynx*, L.; s. 87 a. 181.

7. alddo, pl. aldok | S. aldo, (Lul.) alltu, (Arj.) alldo, (Ht.) aldu, (Trond.) alldǫ, allda | E. aldu | R. (Ter.) alta, (Notozero, Pasv.) ald, *Rangifer tarandus*, (L.) ♀ (voksen, der almindelig kalver hvert Aar).

8. appe-njuorjo, [Havkobbe], *Erignathus barbatus*, (Müll.); s. 3. 116. 153 a; i Talvik = 10.

9. ard (R. efter Friis), *Rangifer tarandus*, (L).

10. avjor (Finmarken), *Cystophora cristata*, (Erxl.). Navnet afledes af avjo (en Egg) paa grund af Næsens Form. S. 32. 54. 160.

11. avskar-gatte l. avskar-gubbo, [Auskjerkobbe], *Phoca foetida*, Müll. (om unge Individer); se Rost., p. 189; s. 60. 104.

12. pa^{i}ldes, g. paltazï (R.: Ter.), (Notozero) pe^{i}ldes, *Canis lupus*, L.; s. 42. 56 b. 58. 85. 90. 91. 92. 139. 145. 161.

185. 208. 221. 222. 228. 229. 239. 243. 248. 258. 261. 279 b.

13a. bavdagas (Leem), *Catulus phocæ adhuc lactens.*

13b. biela (dat. biellaga) (Pasv.), = 28.

13c. peurek (S.), = 80.

14. bierdna l. birdna, pl. biernak l. birnak, (Ib. Of.) benna, (Vst.) bienna | S. berdn, (Lul.) pir^{e}na l. pier^{e}na, *Ursus arctos,* L.; s. 2. 5. 15. 16. 17. 19. 22. 27. 29. 37. 39. 42. 46. 95. 98. 124. 136. 141. 142. 145. 186. 210. 223 a. 225. 252. 262. 268. 283. 284.

15. bierdne, pl. biernek (Finmarken) = 14 (om Ungen) | S. berdn, = 14 (om aarsgammel Unge) | R. (Pasv.) biern l. guöbče-biern, = 14 (om Ungen).

16. bire (S.), (Hm.) birre, = 14.

17. bir^{e}fe (Hm.), = 14.

18. boaco, pl. bǫccuk | S. pǫco l. pǫcoi, (Lul.) pǫcui, (Arj.) bǫcui, (Sors. Ht. Trond. Jmt.) buce, (Sors. Trond. ogs.) buče, (Jmt. ogs.) boaca | E. poaco | R. (Ter.) poaʒai, g. pïeccï, (Kildin) poaʒ, (Pasv.) boaʒ, pl. boaccǫ, *Rangifer tarandus,* (L.) (*domitus*) (Tamren); s. 4. 7. 9. 65. 70. 73. 75. 77. 78. 87 b. 88. 110. 111. 120. 129. 133. 144. 146. 162. 164. 168. 170. 176 a. 178. 179. 182. 192. 198. 206. 218. 220. 230. 231. 232. 238. 251. 253. 257. 260. 266. 274. 276—278. 279 a. 280.

19. pǫba (R. efter Friis), = 14.

20. bǫkka l. bukka | S. (Hm. Arj.) bǫkkǫ, (Sors.) buökkie, (Ht. Trond.) buökke, *Caper,* Gjedebuk; s. 69. 84. 103.

21. bǫsso, pl. bǫssok, [Blæser], *Balænoptera.* Sml. Hvalens Navn paa Shetland: blower; s. 51.

22. pǫunǫk (S.: Lul.), = 14. Navnet afledee af pǫu^{e}nǫ, Tue.

23. bǫvlek l. bǫvle-sapan (Helgø), [Flekmus], *Myodes lemmus,* (L.); s. 82. 125.

24. pritte (Trond.), *Cervus alces,* L. ♂; s. 40. 87 c. 119. 196. 197. 258.

25. bulle (Friis), *Bos non castratus.*
26. buoida, pl. buoiddagak | S. puoitek, (Lul.) pueita(k) | E. puoidah | R. (Ter.) pïejtegaj, (Notozero) pujtij, (Pasv.) buidi, *Mustela erminea*, L.; s. 56 a. 71. 244.
27. puoldakač (S.), (Lul.) puöltak l. puöltakač, (Sors.) buöldakučča, (Trond.) buöldgučče, = 14. Disse Navne paa Bjørnen afledes af puold, puöllta, Bakke, Li. Heraf afledes ogsaa følgende Navne paa Bjørnen: puöllta-kuötu (Gellivare), [den som beiter i Lien], buöld-ajja (Ht.), puolde-aija (v. Düben, Lappland, p. 280), [Bakke-bedstefar], puolde-pǫdnje, [Bakkegubbe], puolda-cuobbo, [Bakkefrosk], puold-ossek (v. Düben, p. 280).
28. buovja, pl. buovjagak (Østfinmarken), *Delphinapterus leucas*, (Pall.); s. 13 b.
29. puöunje l. puöunjak (S.: Lul.), = 14.
30. buovnjak l. buovnjat, ogs. buovnjat sapan [Mus af brunsveden Farve], *Arvicola*; (Lg.) gukkes-sæibat-buovnjat, [langhalet buovnjat], *Arvicola amphibius* (L.).
31. burrok, (Varanger) burro, *Juvencus unum vel duo annos natus*; s. 163.
32. burs-njunne (Sdv.), [Pungnese], = 10.
33. bussa, (Ks.) busse-gatto, (Nb.) bus-gatto, (Sdv. Tn.) busa, (Senjen, Of.) busse, *Felis domestica*; s. 62. 64. 68. 86.
34. bæisko-njunne (Kt.), [Ødelægger-næse], *Sorex minutus*, L.
35. bæna, pl. bædnagak | S. pæna l. piæna l. piænja l. piædnak, (Lul.) pæna, pl. pætnakah, (Sors.) bienja, (Ht. Trond.) bienje, (Jmt.) biena | R. (Ter.) pienni̇g, (Kildin) pienneg, (Notozero) piannag, (Pasv.) biennaj, *Canis*; s. 41. 58. 61. 72. 93. 99. 100. 106. 107. 108. 158. 165. 174. 202. 242.
36. daiber (Friis), *Martes sylvatica*, Nilss.
37. tall (R.: Kildin, Notozero), = 14.
38. damma (Lg.), *Equa.*

39. tarfok (S.), = 14. „Ita interdum dicitur, quia cæspitibus sibi lectum sternit, aut quia subnigro est colore“ (Lindahl, Lex. Lapp.). Navnet afledes af tarfe, Torv, og har vel Hensyn til Bjørnens Farve.
40. tiev°na (Jmt.), (Trond.) d^e^ævna, = 24 ♀; s. 197.
41. tiks l. tikše (S.), (Lul.) tiku, (Fld.) diko, (Trond.) teika l. dæks l. dikse, *Canis* ♀.
42. divrre, pl. divrek (Tromsø, Senjen, Kar.), = 14 | S. djur l. čur, (Lul.) čiura, (Sors. Trond.) čure, (Jmt.) čuᵘra, = 12; (Ht. Trond.) dure l. düvrie, = 14.
43. tǫmp (S.), (Sors.) dǫmpe, (Tärna) duömpa, *Equus.*
44. dullja, pl. duljak (Friis), enslags Sæl.
45. dulsse-njunne (Friis), enslags Sæl.
46. tusse (S.: Lule), = 14 (et Navn paa Bjørnen, fordi den æder Bær).
47. dællja, pl. dæljak, l. dællje, pl. dæljek | R. (Pasv.) dællj, *Phoca groenlandica*, Müll. — suvja-dællje (Nb.), [Sule-dællje], id. (med lange sorte Render, der fortil løber sammen som en Sule). S. 187.
48. tære (S.), *Canis*; (Trond.) dære l. dēre, *Canis* ♂.
49. dævok, (Hf.) dævak, (Helgø, Kl.) dævkka | R. (Pasv.) dævatj, *Halichoerus grypus*, (Fabr.) ♂, maaske ogsaa *Erignathus barbatus*, (Müll.). Hunnen heder ainne. Det var denne Sælart, som tidligere fangedes paa Henøerne vest for Fiskerøen i Slutningen af November, naar Sælerne var gaaet iland for at yngle; den skal have Yngleplads paa Bondø udenfor Sørøen; s. 127. 169.
50. fakan, (Ib.) vakan, (Lnv.) stavrra-vakan, *Orca gladiator*, (la Cep.).
51. fales, pl. fallak | S. fales, (Lul.) svales, (Arj.) falis, (Ht.) fales | E. vålis | R. (Ter., Kildin) va^i^les, (Pasv.) vales, *Balænoptera*; s. 21.
52. farro-goaigge (Leem), *Lutra vulgaris*, Erxl. ♂ (aarsgammel).

53. farro-snakka, pl. -snagak (Leem), = 52 ♀ (aarsgammel).
54. fatte-njunne, [Blærenæse], l. fattenjunne-njuorjo' [Blærenæse-sæl], l. fatte-njuorjo (Rost. p. 188), = 10.
55 a. filla (Ib. Of.), (Lnv. Bls.) fulla, (Bls. ogs.) fallja | S. (Lul.) fela, (Hm. Ts.) svallje, (Fld.) svalljo, (Arj.) felo, (Ht. Trond.) fulle, *Pullus equinus*; s. 112. 265.
55 b. kafač (E. efter Fellman, p. 237), *Mustela nivalis*, L. s. 147. 201.
56 a. gađfe (Leem), = 26 ♀.
56 b. gaidne, pl. gainek (Leem, Nb. obsol.), = 12.
57. gaicca, pl. gaicak | S. gaica, (Lul.) kai^{e}ca, (Arj.) gaica, (Ht. Trond.) gaice | E. kaic | R. (Pasv.) gaic, *Capra*, Gjed.
58. gakšo, pl. gavšok, = 12 ♀ l. 35 ♀ | S. kaušo, (Lul.) kakkšu, (Arj.) gavšo, = 35 ♀.
59. galbbe, pl. galbek | S. kalbe, (Lul.) kal^{e}pe, (Ts. Hm.) gal^{e}bi, (Arj. Ht.) galbe | R. (Pasv.) galb, *Vitulus*, Kokalv; s. 153 b. 280.
60. gatte, pl. gatek, (Leem), gatti, *Phoca foetida*, Müll., norsk: Iskat (Varanger), Havkat (Leem, Lexikon, sml. Beskrivelse over Finmarkens Lapper, p. 215); s. 11. 156. 224.
61. kašš l. kǫss (R.: Notozero), = 35 ♀.
62. gatto, pl. gatok | S. katto, (Lul.) kattu, (Hm. Ts. Fld. Arj.) gatto, = 33.
63. kau^{e}ke (S.; Lul.), *Vulpes lagopus*, (L.).
64. kïe^{i}ške (R.: Ter.), = 33.
65. kiev-pie^{i}lle (R.: Ter.), = 18 ♀.
66. girdde-sapan (Kr.), [Flyvemus], *Vesperugo borealis*, (Nilss.); s. 216. 282.
67. kirreke (S.: Jmt.), = 18 (fireaarig, ugildet).
68. kissa, pl. kisah (E.), = 33.
69. gicce | S. (Lul.) kici, (Hm. Ts.) gicci, *Hædus*, Kid; s. 20.
70. kiæka (S.), (Sors.) giekka, (Ht.) gi^{e}ka, = 7.

71. goaigge, pl. goaigek, 1) *Lutra vulgaris*, Erxl. ♂ (voksen); s. 52; 2) (Leem) = 26 ♂.
72. goairre (Kt. sjld.) | S. kǫire, = 35.
73. goaistas l. goaistus | R. (Pasv.) gǫistas, = 18 ♂ (5aarig); s. 75.
74. koanʒai, g. kïancï (R.: Ter.), enslags *Phoca*, = russisk konžuj.
75. goassotas, (Kt. ogs.) goasǫhus | S. kosetes l. kosetus l. kǫsets, (Lul.) kǫsetus, (Artj.) gǫsites, (Sors.) gǫsets, = 73.
76. goašško, pl. goaškok, *Crossopus fodiens*, (Schreb.); s. 212. 246. 247.
77. gǫddas l. gǫddodas | S. kǫddotes l. kǫddets, (Lul.) kǫddutis, (Arj.) guddodes, (Sors.) guddets | R. (Notozero, Pasv.) gǫddas, = 18 ♂ (4aarig).
78. gǫddas-ald (R.: Notozero, Pasv.), = 18 ♀ (4aarig).
79. gǫddas-gǫdde, (Leem) gǫddos-gǫdde, = 77 (Vildren); s. 80.
80. gǫdde | S. kǫdde, (Arj.) gǫdde, (Ht. Trond.) gaddie, (Jmt.) kattie | E. kǫdde | R. (Ter.) kǫ^{i}nte, (Kildin) kǫ^{i}nt, (Notozero, Pasv.) gǫdd, *Rangifer tarandus*, (L.) (*ferus*); 13 c. 131.
81. gǫdde-alddo, = 80 ♀ (*adulta*); s. 7. 80.
82. gǫdde-sapan | R. (Ter.) ko^{i}nt-sapliŋk, (Pasv.) gǫdd-sapeli, [Vildren-mus], = 23.
83. gǫdde-sarves | R. (Ter.) ko^{i}nte-sa^{i}rves, = 80 ♂.
84. gǫkka, pl. gǫkak (Senjen) = 20 | S. (Gellivare) kǫkes, pl. kǫkkǫk, *Ovis*; (Ts. Fld.) gǫkkǫ, *Capra* l. *Ovis*.
85. kǫnc (S.), = 12.
86. kǫss (R.: Kildin, Notozero), (Pasv.) gǫss | E. kasi, = 33.
87 a. kris (Pasv.), = 6.
87 b. kris (S.), nyfødt Renkalv.
87 c. krǫvöke (Trond.), = 196.
88. kræuva (Jmt.), (Trond.) krieva, = 18.

89. guiggo, pl. guigok | S. kuoigo, (Lul.) kuigo, Hm. Ts. Arj.) guigo, (Ht.) gǫigo, *Juvenca*; s. 256.
90. gumppe, pl. gumpek | S. kumpe l. kumpek, (Lul.) kumpek, (Arj. Fld.) gummpe | E. kumppe | R. (Notozero) ku^{i}mp, (Pas.) gummp, = 12.
91. kuŋŋka (Gellivare), = 12.
92. guenče (Trond.), (Jmt.) škuonča, = 12.
93. kuoc (R.: Notozero), = 35 ♂.
94. kuovse (S.), *Castor fiber*, L. (aarsgammel); s. 128.
95. guovččа | S. kuopča l. kuobča | E. kuopč | R. (Ter.) kïmč, (Notozero) kuepč, (Pasv.) guöbč, = 14. I Kr. kaldes Hanbjørnen guovččа-aggja; sml. 2.
96. kurja (R. efter Friis), *Lepus timidus*, L.; s. 152.
97. gussa, pl. gusak | S. kuss l. koss, (Lul.) kussa, (Hm. Arj.) gussa, (Ht. Trond. Jmt.) guse | E. kussa | R. (Pasv.) guss, *Vacca*; s. 121. 176 b.
98. kussnjepele (S.), = 14 ♀.
99. kucce (R. efter Friis) | S. (Trond.) skuöččе, = 35 (Hvalp).
100. gučaš (Pasv.), = 35 ♀.
101. gæđge-njuorjo | R. (Pasv.) gæđge-nuerj, [Stenkobbe], *Phoca vitulina*, L.; s. 1 b. 153 a. 154. 177. 204. 269.
102. gætke l. gærkke | S. ketke l. kerrke, (Lul.) ker^{e}ke, (Arj.) gætke, (Sors.) gerkie, (Ht.) girkie, (Trond.) gærke l. gierke | R. (Notozero) kia^{i}tk, (Pasv. gætkj, *Gulo luscus*, (L.); s. 115. 211. 237.
103. harves, pl. harvvak | S. habres l. habra, (Lul.) habres, (Hm. Ts. Fld. Arj.) habris, = 20.
104. havskar-gubbo, [Auskjerkobbe], = 11.
105. hessen (S.), *Vespertilio*, efter Fellm. p. 213 *Vespertilio murinus*, L.; s. 205.
106. holjo l. hǫljo (S.). (Sors.) hulljo^{e}, *Canis magnus*.
107. hǫrtte, pl. hǫrtek | S. hǫrte, *Canis prægrandis*.
108. huikko, pl. huikok (Kl.), = 35.

109. hullun (Gellivare), (Hm.) ullon, (Trond. obsol.) ullunje, [den uldklædte], *Ovis.*
110. hurčo (S.: Sors.), = 18 ♂ (2aarig).
111. hærgge, pl. hærgek = 18 ♂ (kastreret og dresseret) | S. herke, (Lul.) her^{e}ke, (Arj.) hær^{e}ge | E. ærge | R. (Ter.) jierke, (Kildin, Notozero) ierk, (Pasv.) jærgj, = 18 ♂ (kastreret), (R.) (6aarig eller ældre). — (Ht. Trond.) hirgie, (Jmt.) hirkie, *Equus.*
112. hæssta, pl. hæstak | S. hæst, (Lul. Hm. Ts. Fld. Arj. Sors.) hæssta, (Ht.) hieste, (Trond.) hiešte, *Equus*; s. 55 a. 111. 113. 134. 265.
113. hævoš, pl. heppušak | S. hæpos | R. (Pasv.) hævaš, = 112.
114. jallobævrre | E. jalopævrre, *Leo.*; s. 118.
115. jer^{a}va, pl. jervah (Lul. Fld.), (Arj.) jærva, = 102.
116. jæges, pl. jækkasak, l. jieges, pl. jiekkasak | R. (Kildin) jiges, g. jiekkas, (Pasv.) jæest, = *Erignathus barbatus*, (Müll.); s. 8. I Helgø og Kalfjorden kaldes denne Sæl paa Norsk Grønsæl, og der skilles mellem čappis (sort) og vilgges (hvid) jæges.
117. labbes, pl. labbak, (Kar. Bls. Senjen, Of.) libba | S. labbas l. libba, (Arj.) lammba | E. labis | R. (Pasv.) labbes, *Agnus.* — la^{i}mbes (R.: Ter.), g. lampazï, (Notozero) la^{i}bbes, g. lappaz, *Ovis.*
118. legjon | S. lejon, (Lul. Hm.) læddjan, = 114.
119. lessvier (R. efter Friis), *Cervus alces*, L.; s. 24. 40.
120. lïepel (R.: Ter.), = 18 (4—7 Maaneder gammel).
121. limme (R.: Ter.), (Kildin) le^{i}χm, (Notozero) leaχm, = 97.
122. limme-jie^{i}rke (R.: Ter.), *Bos.*
123. lǫptur (Fld.), *Delphinus.*
124. luođoi ædne (Friis), [Vildmarkernes Moder], = 14 ♀.
125. luomek (S.), (Gellivare) sluöpmak, (Trond.) šluömege, = 23.
126. luöpek (Varanger), *Juvenca* (mellem 1 og 2 Aar gammel).

127. luöste, [hvid Stribe], aarsgammel Unge af dævok (s. 49) | R. (Pasv.) luest, Unge af dævatj (s. 49) eller af jæest (s. 116).
128. magjeg | R. (Ter.) majjeg, (Kildin) majeg, (Notozero) majij, (Pasv.) majej, *Castor fiber*, L.; s. 94. 191. 255. 273.
129. makan, (Kr. ogs., Fellm.) makanajes | S. makanes, = 18 ♂ (6aarig).
130. mart (S.), (Arj. Sors.) marta, *Martes sylvatica*, Nilss.; s. 155. 234.
131. mientuš (R.: Ter.), = 80.
132. mierï-virre (R.: Ter.), [Sødyr], *Phoca*.
133. miesse, pl. miesek | S. mese, (Lul.) messe, (Arj.) miesse, (Sors.) miessie, (Trond. Jmt.) miesie, = 18 (om Renkalv); s. 257. I Gellivare kaldes en 1aarig Renkalv kæčos messe, [en Renkalv der vogtes].
134. mǫrme (S.), = 112 (om Føl).
135. mǫršša, pl. mǫršak | R. (Pasv.) mǫrš, *Rosmarus arcticus*, Pall.
136. muödda-addja (Kt.) | S. (Fld.) muödd-addja, [Muddegubben], (Arj.) muottak, (Jmt.) m°atka, [den pelsklædte], = 2.
137. muoldak, *Arvicola*; (Kr., Fellm. p. 260) *Avvicola gregarius*, (L.); (Mela) *Arvicola glareolus*, Schreb. l. *Arvicola rufocanus*, (Sund.). Aavnet afledes af muoldda, Muld.
138. muoldda-sapan, [Muldmus], *Arvicola ratticeps*, Keys. & Blas.
139. mutte-karvon (R. efter Friis), [Hamskifter], = 12.
140. mærro | S. mærro, *Equa*.
141. mæcce-addja (Of.), [Vildmarkgubben], = 2.
142. mæccekas l. mæccehas, = 14.
143. mæcce-sapan, [Vildmark-mus], Skovmus.
144. namma-lapa l. -lapag l. -lappe | S. namma-lappeje, (Lul.) namma-lappe, (Arj.) -lapig | R. (Notozero) nemloaptekj, (Pasv.) namma-lǫptakj, = 18 ♂ (7aarig).

Navnet betyder egl. „den der mister Navn“, da Renoksen senere ikke faar noget Særnavn for hvert Aar.

145. navdde, pl. navdek (Kt. Kv. Lg. Bls. Kar.), = 12 | R. (Pasv.) ǫres-navd, = 14 ♂; s. 284.

146. nïrnjai, g. nïrnja (R.: Ter.), = 18 ♂ (4aarig).

147. nirppi (Mela), *Mustela nivalis*. L.; s. 55 b.

148. nisso | S. (Ts.) nisso | R. (Ter.) nïssse, (Pasv.) næss, *Phocæna communis*, Less.

149. njafčo (Leem), Phoca (nyfødt) (kaldes saa for Spøg).

150. njag (Leem), *Lutra vulgaris*, Erxl. (kaldes saa for Spøg).

151. njalla, pl. njalak | R. (Ter. Notozero, Pasv.) njall, *Vulpes lagopus*, (L.). I Kt. skjelnes mellem 1) ranes njalla, [graa Fjeldræv], 2) čappis njalla, [sort Fjeldræv], = Blaaræv (Fellm. p. 225, Mela), 3) vilggis njalla, [hvid Fjeldræv]; s. 226.

152. njoammel | S. niommel, (Lul.) njǫmmel, (Arj.) njǫmela, (Sors.) njǫmel, (Ht.) njuammele, (Trond.) njoammele l. šnjoame, (Jmt.) njuamele | E. njoammel | R. (Kildin) nju^{e}mmel, (Notozero) nju^{a}mmel, (Pasv.) njoammel, = 96.

153 a. njuorjo l. nuorjo | S. nuorjo l. nurjo, (Lul.) nuör^{e}ju | R. (Ter.) nïerje, (Kildin, Notozero) nu^{e}rj, (Pasv.) nuerj, *Phoca*; s. 8. 101.

153 b. njæbčo l. njæpčuč (S.: Lul.), nyfødt Kalv; s. 59.

154. nuorroš (Leem), = 101.

155. nætte, pl. næđek | S. nete | E. næte | R. (Ter.) niette, (Kildin) ni^{e}tt, (Notozero) niet, (Pasv.) n^{e}æt, = 130.

156. oaido, pl. ǫidduk, l. oaiddo, pl. oaidok, antagelig = 60 (om voksne Dyr); (Nb.) oaido-gatte, en liden oaido; s. 60.

157. oarre, pl. oarrek | S. ǫrre, l. ǫrrev, (Ht.) oarr^{e}va, (Trond.) oarr^{e}ve, (Jmt.) ǫrava | E. oarre | R. (Ter.) vïe^{i}rrev, (Kildin) ue^{i}rrev, (Notozero) ua^{i}rrev, (Pasv.) oarrev, *Sciurus vulgaris*, L.

158. ǫddǫk (S.), (Hm.) ǫdǫk, (Lul.) ǫtǫk, (Arj.) ǫđǫg, = 35 (Hvalp).
159. ǫđgė (Leem), *Vulpes vulgaris*, Gray (*nondum adultus*).
160. ǫineg (R.: Kildin), = 10.
161. ǫlgobuš (Leem, sjld.), [som er lidt længere borte], = 12.
162. orrek l. urrek l. ǫrak (S.), = 18 ♂ (2aarig); (Lul.) ǫrek, = 18 ♂ (fra Høsten i dens 2det Aar til Vaaren i dens 4de Aar) | R. (Notozero) oarekj, (Pasv.) ǫrekj, = 18 ♂ (2aarig); s. 260.
163. ǫrtok (Finmarken), = 31.
164 a. rabra (S.), = 18 ♀.
164 b. radn (S.), Vitulus rangiferinus, recens et primo vere natus.
165. rakka, = 35 (liden), (Kl. Vst.) = 35 ♂ | S. (Ht.) rako, = 35 ♀.
166. randivr (S.), *Cervus elaphus*, L.
167. ravdde (Kt. Leem), (alm.) ravdde-rievan | S. (Lul.) rau^{e}te, [Smed], *Vulpes vulgaris*, Gray, *var. C. cruciatus*, L. (Korsræv) (Leem, Friis); *id. var. C. ferrugineus*, L. (Brandræv), (Fellm., p. 221); *id. var. C. nigro-argenteus*, Nilsson (Svartræv) (Lul.); s. 171.
168. rebbič (S.), = 18 ♀ (meget gammel); (Ht.) rebče, = 18 ♀ (som har Kalv).
169. redde (Leem) = 49 (2 til 3aarig); (Sdv.) ræddá, (Friis) rædde, *Phoca* (om Unge).
170. remste (Lul.), = 18 (aarsgammel, om Vaaren).
171. rieban l. rievan, (Kl. Helgø) revnjes, (Senjen) rebeš, pl. repehak | S. repe l. repeha, (Lul.) repi, pl. repihah, (Hm. Ts. Fld. Arj.) rebe l. riebe, Sors.) riebie, (Ht.) rebe l. rebše, (Trond.) rieve l. rievǫ, (Jmt.) riævǫ | E. riemnjis l. riebnjis | R. (Ter.) rimnje, (Kildin) rimnj, (Notozero, Pasv.) riemnj, *Valpes vulgaris*, Gray; s. 159. 167. 189. 203. 241. Der skjelnes mellem dǫlla-rieban (Kt.), [Ildræv], *var. C. ferrugineus*, L. (Brandræv); gǫlle-rieban (Kt.), [Guldræv], sort Ræv med skinnende Haar;

ranes rieban (Kt.), [graa Ræv], (Leem) ranak [et graat Dyr], efter Fellm. p. 228 *var. C. nigro-argenteus*, Nilsson (Svartræv); rissta-rieban l. ruossa-rieban, (Lul.) ruössa-repi, [Korsræv], *var. C. cruciatus*, L.; čappis rieban (Kt.), [sort Ræv], (Leem) čapok, [et sort Dyr], *var. C. nigro-argenteus*, Nilsson; čuörre-rieban, Sølvræv; vilggis rievan (Sdv.), [hvid Ræv], = 270.

172. riekko, pl. riekok, antagelig *Halichoerus grypus*, (Fabr.).

173. rievddo, pl. rievdok (Leem), = 83 (naar Parringstiden er forbi); (Friis) gǫdde-rievddo, = 83 (stor) | R. (Ter.) riefta, g. rievda, = 83.

174. roaksu (Ht.), (Sors.) rǫkso^{e}, = 35 ♀.

175. roatto, pl. roatok, (Sdv. Ks.) rǫtta | S. (Ts.) roatto, *Mus decumanus*, Pall.

176 a. rǫdno, pl. rǫnok, = 18 ♀ (som enkelte Aar har Kalv, andre ikke), (Kt. Of.) (som ikke har kalvet, eller som har mistet Kalven om Vaaren), (Of. ogs.) = 18 ♀ (ufrugtbar) = æme-rǫdno | S. rǫdno l. rǫnno, = 18 ♀ (1) ung, 2) som ikke har Kalv), (Lul.) rǫttnu, = 18 ♀ (3aarig eller ældre), (Arj.) runoč, (Sors.) rudnǫče, (Trond.) rǫdnuče l. rudnače, = 18 ♀ (3aarig), (Ht.) rǫdnu, = 18 ♀ (som i det Aar ikke har kalvet), (Jmt.) rǫttnača, = 18 ♀ (4aarig, som ikke har kalvet) | R. (Ter.) run-alt, (Notozero) rǫn-alt, (Pasv.) rǫnn, = 18 ♀ (ufrugtbar).

176 b. rǫdno-gussa | S. (Ht.) rǫdnoke l. rǫdnu, = 97, (ufrugtbar).

177. rǫkka, pl. rǫgak | R. (Ter.) rǫkk, = 101 ♂ (*adultus*).

178. rǫnnčo^{e} (Sors.), = 18 ♂; (Lul.) rǫnnču, = 18 ♂ (om et gammelt Trækdyr).

179. rǫnuš (Gellivare), = 18 ♀ (2aarig, om Sommeren); rǫnuš-rǫttnu, id. (om Vinteren).

180. rǫsse, pl. rǫssek (Ib.), *Equus* (stor og sterk) | S. (Hm. Ts.) rǫssi | R. (Ter.) rǫ^{i}sse, *Equus*.

181. rǫttem l. rǫtem (S.), (Arj.) rǫttim, (Sors.) rǫtem, (Ht.) roaddem, (Trond.) roadde, = 6.
182. rui^{e}pe (Lul.): vuöras [gammel] r., = 18 ♀ (gammel).
183. ruksis sapan, [rød Mus], *Arvicola rutilus*, (Pall.).
184. ruolla-bǫsso, [Troldhval], *Megaptera boops*, (Fabr.).
185. ruomas, pl. ruobmasak (Ib. Of.), = 12.
186. ruomse-kalles (S.), [Mosegubben], l. ruomsek, = 14 („quia muscos lichenesque autumno colligit sibi lectum sternens hibernum").
187. ruoššа-njuorjo | R. (Pasv.) ruöššа-nuerj, [Russekobbe], = 47.
188. ruövdde-gaʒʒa, [Jernklo], en liden Art Sæl.
189. ruovsok, [et rødt Dyr], *Vulpes vulgaris*, Gray; hilla-ruovsok, [et glorødt Dyr], en ildrød Ræv.
190. ryca (S.), (Ht.) ruce, (Trond.) röce, *Arvicola amphibius*, (L.); s. 245. 247.
191. ræbbares (S.), = 128 (2aarig).
192. ræi^{e}na (Of. Vst.) | S. (Lul. Hm. Ts.) ræi^{e}na, = 18.
193. sagge-njunnje-sæipak (Gellivare), [spidsnæset Langhale], *Sorex* (*minutus?*), L.
194. saidde-bǫsso, [Seihval], *Balænoptera laticeps*, Gray.
195 a. sapan | E. sæplig | R. (Ter.) sa^{i}pliŋke, (Kildin) sa^{i}pleŋk, (Notozero) sa^{i}plig, (Pasv.) sapeli, *Mus*.
195 b. sapan-čoavje, [Musebug], en Ræv, som har Musens Farve under Bugen.
196. sarva, pl. sarvvagak, l. sarvva, pl. sarvak | S. sarv, (Lul. Arj. Ht.) sar^{a}va | E. sǫrv | R. (Ter.) sarv, (Kildin) serv, (Pasv.) sörv, *Cervus alces*, L.; s. 24. 40.
197. sarva-alddo, = 196 ♀.
198. sarves, pl. sarvvak | S. sarves | R. (Ter.) sa^{i}rves, (Notozero) se^{i}rves, (Pasv.) sörves, = 18 ♂ (*non castratus*).
199. savcca, pl. savcak | S. sauca | E. savca | R. (Pasv.) sauc, *Ovis*.

200. seibbun (Ib.), [langhalet Dyr], Storfæ.
201. seibuš (Leem), (Utsj.) sæibbelakke, = 55 b.
202. siŋŋka (Kl.), = 35 ♀.
203. skaingo (S.), = 35 ♀, undertiden = 171; (Arj.) bænaskanjgo, = 35 (ung); (Ht.) skannje, (Sors.) škannja, (Tärna) škaŋŋa, = 35 (Hvalp).
204. skavddo, pl. skavdok, = 101 (paa 2det Aar).
205. skilčak (S.), *Vespertilio*, svensk: nattskata.
206. skippa (S.), = 18 ♀.
207. skǫvva-njunne (Friis), enslags Mus.
208. šlukke (Vst.) | S. (Gellivare) slǫkke, = 12.
209. smalla, pl. smalak, (Ib.) smallo, (Ib. ogs., Bls. Of.) smoallo | S. smala, *Ovis*.
210. smalde (S.), = 14 ♀.
211. smegᵉli (Lul.), = 102.
212. smiril (Friis), = 76.
213. snakka, pl. snagak, *Lutra vulgaris*, Erxl. ♀ (voksen); s. 53.
214. snatte, g. snate (Gullesfjord, Vst.), *Lutra vulgaris*, Erxl.; s. 254. 263.
215. snurkka, pl. snurkak (Ib.) | S. snorka, (Ht.) snǫrka, (Trond.) šnurge l. šnǫrga, (Jmt.) snarᵃka, *Sus*, (Ht.) ♂; s. 217.
216. soadje-sapan (Kv.), [Vingemus], = 66.
217. sǫkke (Leem sjld.) | E. šahe, g. šave, l. sǫhe | R. (Ter.) šaⁱkke, (Kildin) šaⁱkk, (Notozero) šakj, (Pasv.) šakje, *Sus;* s. 215. 219.
218. spailek l. spailak, = 18 ♂ (gildet, men utæmmet) | S. svailek, = 18 ♂ (utæmmet).
219. spidne, pl. spinek | S. svine, = 217.
220. stainak | S. stainak, = 18 ♀ (som aldrig føder eller har født Kalv); (Kt.) bipo-s., id.
221. stakke (Of.) | S. stakke, = 12.
222. stalppe | S. stalpe, = 12.

223 a. stuör-muödda (Fld.), [Storpels]. = 14.
223 b. stuöč (Trond.), = 196.
224. stuora-fiččo (Helgø), [Storsveiv], = 60.
225. suokok (S.), [den haarrige], = 14.
226. svala (S.), (Lul. Fld. Arj.) svalla, (Ht.) svale, (Trond.) švale, (Jmt.) švala, = 151.
227. sviddek (S.), (Lul.) svitek, (Ht.) sverre (akk. sverregeb), (Trond.) šverreke, *Sorex.*
228. sæibak l. sæibag, [langhalet Dyr], 1) Storfæ, 2) = 12; (Senjen) sæibek | S. seipeg l. seipek, (Lul.) sæipak, (Jmt.) seipike, (Trond.) gukkes sieibe, [Langhale], = 12.
229. sæibbe-navdde (Ib. sjld.). [Haledyr], = 12.
230. sæmel (S.), = 18 ♀.
231. šalmaⁱte (R.: Ter.), = 18 ♂ (3aarig).
232. šaimaⁱt-vaⁱʒ (R.: Ter.), = 18 ♀ (3aarig).
233. ševak (Friis), enslags Mus, = 240? | S. (Lul.) čepak, *Sorex.*
234. škakče (Jmt.), = 130.
235. šnekåla l. šnjakala (Jmt.), *Vespertilio.*
236. šnjierra, pl. šnjierak, (Kv.) snirra l. snirre-sapan, (Vst.) sneris, g. snera, (Friis) snjiras l. snjieras-sapan | S. snjæra, (Lul.) šnjerra, (Arj. Sors.) šnjierra, (Sors. ogs.) šnjieris, (Ht.) snjierra, (Trond.) šnjiæra l. šnjeærra, 1) *Mus musculus*, L., 2) *Mus sylvaticus*, L.
237. šnubbe (Trond.), = 102.
238. šnurra (Jmt.), = 18 (2aarig).
239. šnölke l. šnuölke (Trond.), (Jmt.) snölke, (Ht.) snǫlᵃka, = 12.
240. ciebak l. cievak l. ciebag | S. cæpanje, (Sors.) ciebaga, [Gnaver], *Sorex araneus*, L.; s. 259.
241. ciffa (Ib.), = 171.
242 a. ciko | S. (Lul.) ciku, (Gellivare) cika | R. (Pasv.) ceik, = 35 ♀. I Kt. ogsaa om Hun af Ræv, Fjeldræv, Ulv, Bjørn, Jerv.

242 b. cǫhha (Ht. Trond.) = 35, (Trond.) ♂.
243. čalk (R.: Ter.), = 12.
244. časke (S.), = 26.
245. čace-vešek (S.), [Vand-vešek], = 190; s. 267.
246. čacce-boaššto (Kv.), = 76.
247 a. čacce-goašško, pl. -goaškok (Varanger), (Sdv. ogs.) -goaško pl. -gǫššku̇k, (Leem) -guškos, (Friis) -gǫška | R. (Pasv.) čace-guötkjes, = 76, efter Fellm. p. 260 = 190.
247 b. čacce-mašško, pl. -maškok (Tn.), = 76.
248 a. čelp (R.: Kildin), = 12.
248 b. čiermma (Sdv.), (Kl.) čirmma | R. (efter Friis) čierma, (Pasv.) čörm, = 12.
249. čïpe (R.: Ter.), [en som skjærer], = russisk kosatka (*Orca gladiator*, (la Cep.)?).
250. čoarvve-buovja, [Horn-buovja], *Monodon monoceros*, L.; s. 28.
251. čoavčes, pl. čoakčak, = 18 ♀ (en Rensimle om Høsten, som har mistet Kalven om Sommeren eller Høsten) | S. čǫpčes l. čǫpča, (Lul.) čǫpčes, pl. čǫpčah, = 18 ♀ (som har mistet Kalven).
252. čǫdde (Lul.), = 14 (1aarig).
253. čærmak l. čærbmak | S. čerbmak l. čærmuk, (Lul.) čærmak, (Sors.) čurmu, (Jmt.) čǫrma, (Trond.) čurma l. čiermake | R. (Pasv.) čermakj, = 18 (1aarig), (Sors. Jmt. Trond.) ♀.
254. čævres, pl. čævrrak, (Kl.) čaures | S. keura l. čæura l. čæures, (Lul.) čeures, pl. čæu^{e}rah, (Arj.) čevris, (Sors. Ht. Trond.) čævra | R. (Ter.) ča^{i}rves, (Kildin) čievres, (Notozero) čevres, (Pasv.) čævres, = 214.
255. vadnem (S.), = 128.
256. vađok, *Juvenca* (i 3dje Aar) | R. (Pasv.) vadakj, *Juvenca*.
257. vaʒ (R. efter Friis), = 133.
258. vaiše (Arj.), (Sors.) vaišie, = 12 (egl. vildt Dyr); (Trond.) vaiše l. raves [graa] vaiše, (Jmt.) vaišie, = 196.

259. vandes, pl. vanndak, (Bls. Of.) vadda, pl. vaddagak, Lnv. Ib.) vadda, pl. vaddak | S. (Arj.) vǫndǫ, (Sors. vǫnda, = 240.

260. varek | R. (Ter.) vïe^{i}reg, = 18 ♂ (2aarig), (Ter.) (fra Dyrets 2den Sommer til Mai i det Aar, da det bliver 2 Aar); s. 162.

261. vargga, pl. vargak (Kl. Ib. Vst.) | S. varg, (Hm.) varja, (Fld. Arj.) varga, = 12.

262. vari-ajja (S.), [Berggubben], = 14.

263. var-lagges, pl. -laggak. (Leem), = 214 (ikke aarsgammel).

264. varra-navag (Sdv.), [som har blodig Navle], *Catulus phocæ* (1 à 2 Dage gammel).

265. varssa l. varsse, (Kr.) hæsta-varssa, = 55 a.

266. vača, pl. vačamak (Kt. Ib. Of.), = 18 ♀ (2aarig eller ældre, som følger Moderen) | S. vača l. vačev = 18 ♀; (Lul. Arj.) vačau, pl. vačamah, = 18 ♀ (3aarig eller ældre (Lul.), som har Kalv (Arj.)), (Sors.) vačo = 18 ♀ (ung) | R. (Ter.) vaǯ, g. vaččïme, (Pasv.) vaj, = 18 ♀ (ung).

267. vešek (S.), = 190; s. 245.

268. vibe (S.), = 14 ♂.

269. viekse l. viefse, pl. vievsek, = 101 (ikke aarsgammel, men som har ophørt at die).

270. vielgok, [hvidt Dyr], = 171 (hvid Ræv med sorte Øren, sorte Fødder og sorte Haar paa Enden af Halen) (Leem, p. 194).

271. vielpes, pl. vielppak, (Kl.) goalp | S. felpes l. felpa, (Ht.) f^{i}elpa l. guolpa, (Trond.) kuölpa, (Jmt.) kuolpa | E. vielpis | R. (Pasv.) vielpes, = 35 (Hvalp).

272. viercca, pl. viercak, l. fiercca | S. værca, (Lul.) ver^{e}ca, (Hm. Ts. Fld. Sors.) vierca, (Arj.) værca, (Ht. Trond.) vierce | E. vierca | R. (Notozero, Pasv.) vierc, *Aries.*

273. viækes l. viæka (S.), = 128 (stor).

274. vuöbers l. vuövers, (Kr. ogs.) vuöves, (Ib.) vuöbes | S. vuobberes, (Lul.) vuöpes l. vuöperis, (Arj.) vuöbires, (Sors.) vuöberse, (Jmt.) vuæprs, = 18 ♂ (3aarig, (Lul.) om Høsten) | R. (Ter.) vïbers, = 18 ♂ (2aarig), (Pasv.) vuevers l. vueres, (Notozero) vueres, = 18 ♂ (3aarig).

275. vuöksa l. vuöfsa, pl. vuövsak | S. vuokses l. vuoksa, (Lul.) vuökksa, (Hm.) vuöusis, (Ts. Fld. Arj. Ht.) vuöksa, (Trond.) vuæksa, (Jmt.) vueksa | E. vuoksa | R. (Pasv.) vuöχs, *Bos* ♂.

276. vuonjal, pl. vuodnjalak, = 18 ♀ (2aarig) | S. vuonjel, (Arj. Sors.) vuonjal, (Trond.) vuenjele, = 18 ♀ (i 3dje Aar), (Lul.) vuönjal, = 18 ♀ (fra Høsten af dens 2det Aar til Vaaren i dens 4de Aar), (Jmt.) vuæŋele = 18 ♀ (3aarig, som endnu ikke har kalvet) | R. (Ter.) vïnjl, g. vïnnjïlï, = 18 ♀ (fra dens 2den Sommer til Mai det følgende Aar), (Pasv. Notozero) vuönjal, = 18 ♀ (2aarig).

277. vuonjal-alddo, = 18 ♀ (2aarig, som har Kalv om Vaaren) | S. (Lul.) vuönjal-alltu, = 18 ♀ (3aarig, om Vaaren) | R. (Pasv.) vuönjal-vaj, = 18 ♀ (3aarig), Ter.) vïnjl-vaʒ, = 18 ♀ (2aarig).

278. vuonjal-rǫdno | S. (Lul.) vuönjal-rǫttnu, = 18 ♀ (2aarig, (Lul.: 3aarig), som ikke har Kalv, om Vaaren).

279 a. vuöperis-čǫr-take (Lul.), [en vuöperis, som arbeider paa sine Horn], = 18 ♂ (3aarig, om Vaaren); s. 274.

279 b. vᵘorŋeše (Jmt.), = 12.

280. vuöse (E), = 59 | R. (Ter.) vïⁱsse, (Kildin) vuⁱss, (Notozero) vuaⁱss, (Pasv.) vues, = 18 (Renkalv, før den faar nye Haar).

281. vuövdde-sapan, [Skovmus], *Arvicola rufocanus*, (Sund.).

282. væigge-cicaš, [Skumring-spurv], = 66.

283. ænak (Leem) | S. ænak, = 14 ♂.

284. æste (Leem) | S. (Lul.) esteu, pl. estemah, (Fld.) esteu, pl. esteva | R. (Pasv.) jæst-navd, = 14 ♀; s. 145.

Tillæg.

A. Rennavne.

Rensdyret har efter de forskjellige Alderstrin forskjellige Navne[1]. De almindeligste er:

1. ruksis miesse, (Lul.) ruöpsis messe, (Ts.) ruöpsok, [rød Renkalv], nyfødt Renkalv; den kaldes saa, fordi dens første Haar er rødbrunagtige.
2. muovjak l. muovja-miesse l. muovjadam-miesse, (Lul.) muivak, en Renkalv, som har begyndt at miste de første Haar og faar nye. Naar Renkalven har mistet de første Haar, kaldes den i Lul. pil^{e}sa messe.
3. bǫrgge-miesse, (Lul.) pǫr^{e}ke messe, en Renkalv i dens første Aar, naar den har faaet nye Haar. Naar de nye Haar om Høsten er blevne tætte, kaldes Renkalven čæp-bǫr(gge)-miesse.
4. čærbmak l. čærbmat, en Renkalv fra Nytaar til Sommeren i dens 2det Aar; (Lul.) čærmak, en Renkalv om Vaaren i dens 2det Aar. — Det kan hænde, at en čærbmak ♀ faar Kalv, og den kaldes da čærbmak-alddo.
5. smavas, pl. smavvasat (Kt.) kaldes Renen, fra den har skiftet Haar om Sommeren i dens 2det Aar, Hannen, til den bliver vuöbers, og Hunnen, til den faar Kalv; (Lul.) smavas, Ren om Sommeren i dens 2det Aar. En smavas ♂ kaldes i Finmarken varek, en smavas ♀ vuonjal. I Lul. er ǫrek en Hanren og vuönjal en Hunren fra Høsten i dens 2det Aar til Vaaren i dens 4de Aar. — Naar en Hunren har fyldt 2 Aar, kaldes den om Vaaren i sit 3dje Aar, hvis den har Kalv, vuonjal-alddo, og hvis den ikke

[1] Om Rennavne se G. von Düben, Om Lappland och Lapparne, p. 296 f., J. Fellmann i Suomi, 1848, p. 265 f. og 268, Stockfleths norsk-lappiske Ordbog, p. 532 b (Ren). Se ogsaa foranstaaende Fortegnelse No. 4. 7. 9. 18. 65. 70. 73. 75. 77—81. 83. 87 b. 88. 110. 111. 120. 129. 131. 133. 144. 146. 162. 164. 168. 170. 173. 176 a. 178. 179. 182. 192. 198. 206. 218. 220. 230—232. 238. 251. 253. 257. 260. 266. 274. 276—278. 279 a. 280.

har Kalv, vuonjal-ro̧dno. I Lul. er vuönjal-alltu en Hunren, der har Kalv, og vuönjal-ro̧ttnu en Hunren, der ikke har Kalv, begge 3aarige, om Vaaren. — Senere faar Hunrenen ikke nye Navne, men kaldes i Finmarken, naar den følges af Kalv, alddo. Kalven pleier at følge Moderen, til der kommer en ny Kalv; nogle Kalve følger Moderen 3—4 Aar, endog efterat de selv har faaet Kalv; en saadan Hunren, som selv har Kalv og dog følger sin Moder, kaldes i Kt. vača. En Hunren, som ikke har kalvet, eller som har mistet Kalven om Vaaren, kaldes ro̧dno; en Hunren, som har mistet Kalven om Sommeren eller Høsten, kaldes čoavčes: gæsse[Sommer]-čoavčes eller čakča[Høst]-čoavčes.

6. Naar Hanrenen begynder sit 3dje Aar, kaldes den i Kt. vuöbers, naar den begynder sit 4de Aar, go̧ddodas, naar den begynder sit 5te Aar, goaso̧hus, naar den begynder sit 6te Aar, makan, og naar den begynder sit 7de Aar, namma-lapa. Senere faar Hanrenen ikke noget Særnavn.

Se videre No. 73. 78. 79. 87 b. 110. 111. 120. 146. 164 b. 168. 170. 179. 231. 232. 238. 257. 279 a. 280.

Vildrenen kaldes go̧dde, og dette Ord kan nærmere bestemmes ved at tillægge Renens Navne paa de forskjellige Alderstrin, f. Eks. go̧dde-miesse, -čærbmak, -vuonjal, -alddo, -varek, -vuöbers, -go̧ddodas osv.

Der gives desuden mange Rennavne, som er hentede 1) fra Forhold vedkommende Parring og Fødsel og Moderens Forhold til Kalven, 2) fra Haarbeklædningens Farve og Beskaffenhed, 3) fra Hornenes Form, 4) fra Legemsform og Legemsfeil, 5) fra eiendommelige Egenskaber og Vaner, 6) fra Rensdyrets Anvendelse. Her følger en Opregning af de Navne, som ikke allerede er anførte i det foregaaende:

I. 1. aidnavalddo l. ainovalddo, den sterkeste Renokse, som i Parringstiden tilkjæmper sig Herredømmet over Simlerne. Der kan være flere saadanne i en Hjord, og de holder de smaa Grarener borte.

2. arakes alddo | S. (Lul.) arrak, Simle som føder tidlig om Vaaren.

3. batte, Simle, som lidt før Kalvningen altid søger hen til det Sted, hvor den før har kalvet.

4. gaskek l. gasket, gildet Ren (kaldes saa, til Vinteren er forbi); den kaldes efter Alderen vuöbers-gasket, goddodas-gasket, goasǫhus-gasket. Almindelig gildes Renen som goasǫhus. I Lul. er kaskek en 4aarig gildet Renokse. En Ren, der er gildet om Sommeren, kaldes gæsse-gasket, en, der er gildet om Høsten, čakča-gasket.

5. gǫlgok | S. kǫlkok, efter Parring udmattet Renokse.

6 a. guđǫldak guödde, Simle, som føder tidligere end de andre.

6 b. gæsek l. gæset, 1) Simle, som føder sent paa Vaaren, = gæset-alddo l. gæset-guödde, 2) Renkalv, som fødes sent paa Vaaren, = gæset-miesse.

7. luotvar l. luædvar, (S.) Renko, som føder gode Kalve.

8. luovas, pl. luovvasak, Løsren, som ei har Kalv, Gjeldren. I Kt. er luovvasat, pl. Hanrener, som om Vaaren skilles fra Simlerne.

9. miesse-alddo | S. mesek-aldo, (Lul.) mesak, 1) drægtig Simle, 2) Simle som har Kalv.

10. ragak l. ragat, Renokse, som gaar i Brunst, = rakke sarves | S. rakkeje sarves.

11. sarak l. sarat, mindre Renokse, som af Frygt for de større ikke tør komme til Simlerne.

12. suoppa | S. suoppa, Simle, som ikke vil vide af sin nyfødte Kalv, men spænder den fra sig.

13. čoavjek l. čoavjet, drægtig Simle, som snart skal føde.

14. čuöđđe, Hanren, som løber omkring og søger efter Hunren.
15. vuölltu (Lul.), (Fld.) vuölldo l. vuölldo-sarvis, den sterkeste Renokse i Hjorden.

II. 1. biddojuölgge | S. (Gellivare) pittuk, (Jokkmokk) pittus, Ren med hvide Ben fra Knæet nedover.
2. duörssse-gallo, Ren, som er hvid i Panden og ellers hvidgraa.
3. gabba, snehvid Ren med hvide eller sorte Klover.
4. gabbanulppo, snehvid, kollet Ren.
5. gairrejuölgge-boaco, Ren med hvid Rand paa Foden.
6. galbegaʒʒa, Ren med hvide Klover.
7. galbegallo, Ren med hvidt Blis i Panden.
8. galbenjunne, Ren med en hvid Flek fra Panden nedover til Næsen.
9. garek, liden ugildet Renokse om Vaaren, naar den har mistet Dækhaarene paa Halsen.
10. kepak-sica (Lul.), ganske sort Ren med hvide Flekker om Snuden.
11. gilgan: jevja (čappis)-duodnjas-gilgan (Kar.), Ren, som har en hvid (sort) Flek paa Siden.
12. girjenjunne, Ren med hvide Flekker paa Næsen.
13. guorban, Ren, hvis Haar er afsvedne eller afnyggede.
14. gucak l. gucat, Ren, som har Haar med lys Top eller indsprængt lys Farve, og som i Regelen ogsaa er langhaaret.
15. jevja l. jievja | S. (Jmt.) jǫuje, hvid Ren.
16. lidne-oaivve, Ren med hvidt Hoved.
17. linak l. linak-stalek (Lul.), Ren med hvidt Hoved og hvide Fødder.
18. luostag l. luostak | S. (Lul.) luöstak, Ren, som har en lys Stribe langs Siden.
19. mǫsag (Of.), hvidgraa Ren.
20. mǫsat-jevja (Kt.), sort Ren med hvide Haar iblandt og med hvidt Hoved og hvide Fødder.
21. mǫsat-mucet (Kt.), sort Ren med hvide Haar paa Siden.

22. mǫssǫ (Lul.), lysegraa, næsten hvid Ren.
23. musstur (Ib. Of.), sort Ren.
24. mucek l. mucet, sort Ren (uden hvide Pletter).
25. rajak (Lul.), hvid Ren med hvidagtige Øine og Klover, men med brune Flekker paa Skindet (meget sjelden).
26. ranat l. ranok, graa Ren.
27. ranat-jevja (Kt.), graahvid Ren.
28. riššagabba, snehvid Ren med hvide Klover og hvidgule Øine.
29. ruške, Simle med graabrune Haar.
30. ruškot (Kt.), Ren med graabrune Haar.
31. siednja-njunne, Ren med hvide Næsevinger.
32. sica (Lul.), Ren, som har smaa hvide Flekker om Snuden.
33. sica-čuösek (Lul.), blisset Ren, som har smaa hvide Flekker om Snuden.
34. sledda (Lul.), ganske hvid Ren med hvidagtige Øine og Klover.
35. slekkŋa (Lul.) = sledda.
36. stalek (Lul.), Ren med ganske hvidt Hoved.
37. sæfte-njunne (Kr.), Ren med en eller flere hvide Flekker omkring Næseborene.
38. šnjilčča, Ren som har mistet de gamle Haar og derfor er snauhaaret.
39. šælgok l. šælgot, Ren med tætte, vakre Haar.
40. česskis-jevja, ganske hvid Ren.
41. českis-pæjuk (Gellivare), ganske hvid Ren med hvide Øine og Klover.
42. českok (Gellivare), = českis-pæjuk.
43. čuoivag l. čuoivat, hvidgraa Ren. I Kt. skjelnes mellem duolvva[skidden]-č., ranat[graa]-č, šelggis [skinnende]-č.
44. čuösse-njunne, Ren med en hvid Flek paa Næsen.
45. čæpbǫrgge, en Ren med nye Haar, der begynder at blive tætte; naar de nye Haar er tynde, er Renen

bǫrgge | R. (Ter.) čïepï^{i}rke, Renkalv indtil 15de August, gammel Stil.

46. čæskok, ganske hvid Ren.

III. 1. abmel l. abmel-bælle | S. abmel, (Lul.) appmel, Ren, som af Naturen kun har 1 Horn (alm. Simle) | R. a^{i}mmel-akaj l. -va^{i}ʒ, hornløs Simle.

2. duölb-oaivve, Ren, hvis Horn spriker; sml. (Lul.) tuölp-ǫi^{e}ve, Gevir med udbredte Horn.

3. giellan-oaivve, Ren, paa hvis Horn Enderne bøier sig sammen bagtil.

4. goalla, Ren, som aldrig faar Horn; (Kr.) kun om Simler.

5. gǫbmaras-čoarvve, Ren, hvis Horn er krogede og foroverbøiede; sml. (Lul.) kǫbbmǫris ǫi^{e}ve, Gevir, hvis Horn er bøiede i en Halvcirkel.

6. gærdo-čoarvve, Ren, hvis Horn begge vokser op fra samme Rod; sml. (Lul.) kærtus ǫi^{e}ve, om saadant Gevir.

7. honka (S.), kollet Simle.

8. jǫlle hærgge, kollet Kjøreren, som aldrig faar Horn; jǫlle alddo, kollet Simle, som aldrig faar Horn.

9. lieđme-oaivve, Ren, hvis Horn forgrener sig lige ved Roden og er mangegrenede (Friis); Ren, hvis Horn i Enden har flade, pladeformede Takker.

10. lænco-oaivve, Ren, hvis Horn spriker.

11. nalak | S. (Lul.) nalak, Ren med afkappede Horn.

12. namme-hærgge l. namme-čoar-hærgge l. namm(e)-oai-hærgge, l. namm-oaivve l. namm-oai-čoarvag, en Kjøreren, som endnu ikke har skuret Huden (namme) af Hornene.

13. njaggo, Ren med bagoverbøiede smale Horn (mest om Simler).

14. njaidd-oai-hærgge, Ren, hvis Horn gaar langt bagover.

15. njarbbis-oaivve, Ren, hvis Horn har faa Grene.

16. njavc-oaivve, Ren, hvis Horn har mange Grene.

17. nulppo | S. nolpo, (Lul.) nul^{e}pu, Ren, som har mistet Hornene; nulppo-hærgge, kollet Kjøreren; nulppo-alddo, kollet Simle.
18. rǫčo-oaivve, Ren, hvis Horn ikke spriker, opp. lænco-oaivve.
19. ruöbba, Ren, som har fældet sine Horn uden at faa nye igjen.
20. ruossa-čoarvve, Ren, paa hvis Horn en Gren gaar fremover og en bagover, saa der dannes et Kors.
21. rænc-oaivve (Of.), Ren, hvis Horn gaar ud til Siderne.
22. sagge-čoarvve, Ren, hvis Horn ikke har Grene eller Takker.
23. sarvva-čoarvve, Ren, hvis Horn ligner Elgens.
24. snarre l. snarre-oaivve, Ren, som har lave eller smaa Horn med mange Tagger.
25. snǫg(o)-oaivve l. snǫgo-čoarvag, Ren, som har sterkt fremoverbøiede Horn.
26. snuoggo-oaivve, = frg.
27. spačo-čoarvag l. spačo-oaivag, Ren med høitragende Horn.
28. sukkis-oaivve, Ren, hvis Horn har mange Takker.
29. cægg(o)-oaivve, Ren med ret opadstigende Horn.
30. čal(o) (čala)-oai-hærgge l. čalo (čala)-čoar-hærgge, Kjøreren, af hvis Horn Huden er skallet af.
31. čig-a^{i}mme^{i}l (R.: Ter.), Simle med 1 Horn.

IV. 1. bævrek, et høibenet og slankvoksent Rensdyr | S. peurek, 1) Vildren, 2) Ren, som er Afkom af Vildrenokse og tam Renko; (Lul.) peurek, høi og statelig Ren.
2. guögge-boaco, sveirygget Ren.
3. kurg (S.), enøiet Ren; Ren, som tager feil af Veien.
4. gurmak, Ren, som har Larver af *Oestrus tarandi.*
5. gæigo-bællje, Ren, hvis Ørespidser ved Merkningen ikke er skaaret af, men staar ud.

6. hubak l. hubat, (Of.) hubar, Ren, hvis Øren næsten er afkuttede paa Grund af Merkning.
7. janhek (Kr.), stor, fed Renokse.
8. napak (Lul.), Ren med Nappa-merke (afskaaren Ørespids).
9. njalppe- l. njoalppe-boaco, Ren, hvis Bagdel er afrundet og lavere end Ryggen.
10. rǫvvak (Lul.), Ren som halter.
11. skarjak (Lul.), Ren med Skarja-merke (Udsnit i Ørespidsen).
12. skurre-čalbme, enøiet Ren.
13. urkka, Ren, som er ualmindelig liden af Vekst.

V. 1. bǫdo-boaco, Ren, som gaar udenfor Flokken.
2. dildan, Ren, som bærer Bjelde.
3. kallok (S.), en tæmmet Ren, som lader sig lede.
4. gavlok, Ren, som springer hurtig afsted, skjønt man holder Kjøretømmen paa dens venstre Side.
5. kur^{e}ja (Gellivare), Ren, som altid slikker op Urin.
6. jaskak, stad Kjøreren, som under Kjøringen lægger sig ned.
7. lidnja-boaco, Ren, som gaar og sjangler eller vakler.
8. lǫjak, en Ren, som er saa tam og folkegod, at den kan tages med Hænderne uden Lasso.
9. luovdak l. luovdat, Ren, som under Kjøringen modvillig lægger sig eller kaster sig ned.
10. manne l. mannes boaco, Ren, som af sig selv gaar i Spidsen for Flokken.
11. nappe-rǫggan, Simle, som har den Uvane at sparke til Melkekoppen.
12. nirro l. njirro, Hunren, som ei vil holde sig til andre Rener, men helst gaa alene.
13. rates skǫnka (Lul.), Ren, som altid vandrer hid og did paa Veiene.
14. ravdat l. ravdda-ælak, Ren, som altid vil holde sig i Udkanten af Hjorden.

15. ravnok l. ravnot, Ren, som er modig til at trække sit Læs.
16. rievtag, Ren, som let lader sig styre bent under Kjørselen.
17. skilan, Simle, som bærer Bjelde.
18. skindeg, Ren, som ikke lærer at lade sig lede; Ren, som er urolig under Melkningen.
19. cissa-banne, Ren, som følger Mennesker for at grave op Sneen og slikke op deres Urin.
20. čuovvo l. čuovvos boaco, den Ren, som gaar først i Renflokken efter den Ren, der ledes foran.
21. udamag, utæmmet Ren.
22. visa, Vildren, som gaar i Spidsen for og leder Renflokken.

VI. 1. raiddo-hærgge, Kjøreren, der trækker Læs i en Række.
2. ronk l. runk (S.), gammel Kjøreren.
3. rǫnčo (S.), Kjøreren.
4. čoanohas l. čanatus, Ren, som bindes bag en anden Ren for at holde igjen og stoppe Farten under Kjørsel; Stopperen.
5. vuögjem-hærgge, Kjøreren.
6. vuöjan, Kjøreren.
7. varre-hærgge, Reserveren.

J. Fellman bemerker p. 268: „Alle Simler har sine Navne, i Utsjok almindelig efter Fugle og andre Dyr, som de ligner med Hensyn til Farve, Kvikhed m. m., saasom Koalse (*Mergus*), Lahul (*Eudromias morinellus*), Njalla (*Vulpes lagopus*), Njoammel (*Lepus timidus*). De hvide benævnes almindelig efter de 2 sidste. Renokser kaldes ofte efter sine Mødre, saasom Lahul hærgge (Lahuls Renokse); men i nedre Lapmarken har de andre Navne, ofte efter Eieren m. m.“

B. **Hundenavne.**

1. bajan (Kt.), en Hund, som altid gjør.
2. bavges (Kar.), (Ib.) bavgge-čæbet, en Hund, som er hvid om Halsen.
3. benne (Kt.), (Kr. Nb.) bennu, en liden Hund.
4. biddos, Tispe, som er hvid paa en eller flere Fødder fra Knæet nedover.
5. darra (Kt.), en kort, liden Hund.
6. dielkko (Nb. Kr.), (Kt. Kv. Kar.) dilkko, sort Hund med hvide Flekker.
7. tigga, (Kt.), en Hund med smaa Flekker.
8. diggal (Nb. Kr.), en Hund med en liden gul Flek over hvert Øie, (Friis) en Hund med brune Øienbryn.
9. duörššе (Kt.), en Tyksak.
10. fašško, en kjælen Hund, der pleier at logre med Halen.
11. fliŋko (Kv.), Hundenavn.
12. gaires, en Hund med hvid Snude og hvide Fødder.
13. girjes, en flekket Hund (hvid- og sortflekket).
14. girjo (Kv.), en flekket Hund.
15. gugat (Kt.), en lang Hund.
16. gučča (Sdv.), Hundenavn.
17. guvge, en Hund, som er guovggad (blakket, lysebrun).
18. habba (Kt.), (Kar.) habo, en liden mager Hund.
19. haippa (Kt.), en stor taabelig Hund.
20. jevja, en hvid Hund.
21. jǫrbbe (Kt.), (Kar.) jǫrbbo, en Hund, der er født uden Hale. I Kt. fødes mange saadanne Hunde, der kun har en liden Antydning til Hale; det skal være en egen Art.
22. jælpper, en Hund, der er til Hjælp.
23. lino, Hundenavn.
24. lummbo (Kt.), en Hund med nedhængende Øren.
25. lurffo l. lurvve, en Hund med tykke Haar.
26. læjjo (Kar.), en Hund, der allerede som Hvalp er kvik og modig.

27. musste, en sort Hund.
28. nasste, [Stjerne], Hundenavn.
29. njalla, [Hvidræv], Hundenavn.
30. njirbbe (Kt.), en meget tyndhaaret Hund.
31. ranne, en graa Hund.
32. rašško (Kt.), en tyndhaaret Hund.
33. riŋŋgo (Kar.) en Hund med krum Hale.
34. runne, Hundenavn.
35. ruövsot (Kt.), en rød Hund.
36. siegges, en Tispe med hvide Haar bag paa Fødderne.
37. skoalddo, en Hund med stor, krum Snude.
38. skuölffe, en hvid Hund med nedhængende Øren.
39. spartte (Kr.), Hundenavn.
40. šaikke, en Hund, som altid gjør uden Grund.
41. šuvon | S. šovonja l. šuovonja, (Lul.) šuövun, (Gellivare) čuövun, (Ht.) šǫvunje, dresseret Renhund, (S. ogs.) Hyrdehund.
42. cigga, en sort lidenvoren Tispe.
43. cigan, Tispenavn.
44. cirkko (Kv.), Hundenavn.
45. cǫbbe, en kort liden Hund.
46. čainne (Kt. Kar.), en Hund med spids Snude.
47. čalmo, en Hund med røde Flekker over Øinene.
48. čappe, en sort Hund.
49. čebu, en Hund, der er hvid om Halsen.
50. čierges, en Hund, som har hvid Krave om Halsen.
51. čǫpparas (Nb.), en Hund med en hvid Ring i Nakken.
52. čuöres, en rød Hund med lidt brune Haar iblandt.
53. čurre (Hm.), en graa Hund.
54. čævan (Lul.), en liden Hund.
55. virkko, en kvik Hund.
56. vuövdda, en graadig Hund.

C. Konavne.

1. aprila, Ko født i April.
2. berju (Nb. Kt. Kr.), (Kv.) bærja, Ko født paa en Fredag.
3. bǫna, en rød Ko.
4. buna-gǫrvva, en Ko med røde Øren.
5. davleg l. davllo, en Ko, der er flekket paa begge Sider.
6. duorek l. duoret, Ko født paa en Torsdag.
7. dæđet, en Ko med store Flekker.
8. girjo, en flekket Ko.
9. goalla, en kollet Ko.
10. goalsse (Maasø), en Ko graa som en goalsse (Fiskeand).
11. gǫmmaras (Nb.), en Ko med foroverbøiede Horn.
12. gulda-gavla (Kt.), en Ko med rød Hals.
13. helbmo, [Perle], en Ko, der er hvid om Halsen.
14. idda-rusa, (Kt.), en sort Ko.
15. jǫlle, kollet Ko.
16. lavga, Konavn.
17. lavgger, Ko født paa en Lørdag.
18. lette-gǫrvva (Kt.), hvid Ko med røde Øren.
19. letik, Konavn.
20. lieppa, en Ko hvis Horn kun er fæstede i Huden.
21. linat (Kt.), en Ko med hvidt Hoved.
22. linu, en hvid Ko.
23. lumet (Kt.), en snehvid Ko.
24. mai-rusa (Kt.), Ko født i Mai.
25. manne, Ko født paa en Mandag.
26. muörja, Ko med meget smaa Flekker.
27. mussta, en sort Ko.
28. mussta-gǫrvva (Kt.), en Ko med sorte Øren.
29. nassta l. nastat, en hvid Ko med sort Flek i Panden eller omvendt.
30. njoammel, [Hare], en ganske hvid Ko.
31. njæmma, Konavn.
32. riekko, en flekket Ko.

33. russke, en brun Ko.
34. rusa (Kt.), en hvid Ko med meget smaa røde Flekker.
35. sunnek, Konavn.
36. vilggon, en hvid Ko.

B. Lappiske Navne paa Krybdyr og Padder.

1. dæčalagges l. dæʒalagges l. stæʒʒalagges, pl. -laggak, (Ib.) staʒʒalaggo, (Of.) stæʒʒǫlaggis | S. tydčol, (Lul.) tæʒʒula(ka), (Fld.) dæʒʒola, (Arj.) diʒʒol, (Sors.) diččol | R. (Friis) tanslensk l. teⁱnšlink, (Pasv.) dæʒʒeli, *Lacerta vivipara.*
2. gukkes guöle (Trond.), [Langfisk], *Serpens*; s. 3. 4. 7.
3. guövdde | S. (Jmt.) kuutie, (Trond.) guevde | E. kuovdde | R. (Kildin, Akkala) kuvt, *Serpens,* (Finmarken) Søorm; kacklas kuvt (Akkala), [bidende Slange], *Vipera Berus,* L.; s. 11.
4. gærmaš, pl. gærbmašak | S. kærbma l. kærbmas l. kermesk, (Lul.) kærmai, pl. kærmahah, (Ts.) gærmai, (Arj.) gerbma, pl. gærbmaha, (Sors.) giermas, (Ht.) giermuše, *Serpens.*
5. lisme-kuele (S.), [Dyndfisk], *Rana temporaria,* L.; s. 6. 9. 10. 12. 13.
6. malani (Pasv.), = 5.
7. miχχe (R.: Ter.), *Serpens.*
8. mæra-gærmaš, Søorm; s. 3.
9. njæččе-dænččе (Helgø), = 5.
10. runta-kuölaš (Lul.), [liden Vandpyt-fisk], = 5.
11. suđem-kærbma (S.), [Giftslange], (Arj.) suđe-kulle, [Giftfisk], *Vipera Berus,* L.
12. šlubbo-oaivat, pl. -oaivagat (Kv.), [Klubbehoved], = 5 (som Unge), norsk: Rovetroll.
13. cuobbo, pl. cubbuk | S. cuobbo, (Lul.) cuöbbu, (Fld.) čuöbbui, (Arj.) cuöbbǫ, (Sors.) cubbǫ, (Ht:) cǫbbǫ | R.

(Ter.) cïembai, g. cïmpï, (Kildin) cuemp, g. cumpu, (Notozero) cuab, g. cueppu, (Pasv.) cuöbba, demin. cuöbbagaž, = 5.

C. Lappiske Navne paa Fiske.

1. akabiddo, [Kjærringbukse], (alm.) *Cottus scorpius*, Fabr., (Varanger) *Cyclopterus lumpus*, L.; s. 4. 6. 89. 90.
2. akali (R.: Pasv.), *Scymnus microcephalus*, (Schneid.); s. 3. 5. 28. 116. 118.
3. akaš, pl. akačak (Tromsø), [liden Kjærring], = 2.
4. akacinco, *Cottus scorpius*, Fabr., (Leem, Hf. Ks.) *Cyclopterus lumpus*, L.
5. akkolagges l. akkalagges, pl. -laggak, = 2.
6. akobiddo (Varanger), [Gammelkjærringbukse], *Cottus scorpius*, Fabr.
7. akšonadđa, [Økseskaft], Hunlaks, som har lagt Rogn.
8. alli (R.: Pasv.), Seimort; s. 38. 40. 59. 71. 137.
9. allpesk l. albas (S.), *Coregonus lavaretus*, L.; s. 50. 68. 69. 70. 91. 110. 126. 127. 136.
10. baldes, pl. balddak | S. (Hm.) =, *Hippoglossus vulgaris*, Flem.; s. 11. 23. 27. 45. 67. 81. 82. 83. 96.
11. bipo-oaivve, [Pibehoved], = 10 (overmaade stor, mindst paa 180 Kg.).
12. bišaŋke (Varanger), *Ammodytes tobianus*, L.; s. 73. 112. 124 a.
13. bǫdnek l. bǫdnet l. bǫnnet, [Bundfisk], *Pleuronectes*; s. 19. 25. 30. 31. 33. 34. 35. 36. 44. 78. 98. 99. 103. 109.
14. brugda, *Selache maxima*, (L.); s. 129.
15. dabmok | S. tabmok, (Lul.) tapmuk, (Arj.) dæbmuk, (Ht.) dǫbmug, *Salmo eriox*, L.; s. 46. 48. 143.
16. dalvek, [Vinterfisk], Laks, som staar Vinteren over i Elven; s. 17. 141.
17. dalvve-čuoʒok, [Vinterstöing], = 16.

18. didde, liden Elvelaks | R. (Pasv.) didd, „Titlinglaks". Ordet er vel = russisk tinda, Laks paa 5 Pund og derunder.
19. diggel-bǫdnet (Lg.), [Flek-bundfisk], *Pleuronectes platessa*, L.; s. 13. 35. 36. 103.
20. dikso l. difso, pl. divsok | R. (Ter.) tïksa, (Notozero) teχs, (Pasv.) dæks, *Gadus æglefinus*, L.; s. 58. 85.
21. dǫrske | E. tǫrska | R. (Ter.) tǫrske, (Pasv.) dǫraskj, *Gadus morrhua*, L.; s. 32. 43. 57. 88.
22. duövve, pl duövek, Rognlaks.
23. faccabælle, [Vante], = 10 (liden), norsk: Kveitelap.
24. fikan, en Søfisk af Størrelse som Smaasild og lig Silden; men den har større Hoved og lever i dybt Vand.
25. findar, (Kr. Ks. Sdv. Vst.) flindar, (Of.) lendar | R. (Pasv.) lendar, = 13.
26. fital, *Gadus merlangus*, L.
27. gadda, = 10 (middelsstor).
28. gaʒʒ-akali (R.: Pasv.), [Klo-haakjærring] en mindre Art Haakjærring; s. 2.
29. kaito (S.), *Esox lusius*, L.; s. 39. 55. 79. 131.
30. gaicca-bǫdnet, [Gjede-bundfisk], en Art Flyndre; s. 13.
31. gaicca-guormat (Kv.), [Gjedeskrubbe], *Pleuronectes microc phalus*, Donov.; s. 44.
32. gakran, = 21 (liden), norsk: Modd.
33. kambel, pl. kambalak (Sdv.) | R. (Ter.) kambel, g. kampalï, = 13.
34. garra-bæsk (R.: Pasv.), [Haardpels], *Pleuronectes flesus*, L.; s. 44.
35. girje-bǫnnet (Kv.), [Flek-bundfisk], = 19.
36. girje-kambel (Sdv.), [Flekflyndre], = 19.
37. goagjem, voksen Hanlaks | S. (Lul.) kǫddjem, Hanlaks.
38. kǫja (Ks.), Seimort i 1ste Aar; s. 40.
39. gǫles, pl. gǫllasak (Leem) | S. kǫlla, = 29 (meget stor).
40. gǫlnet (Lg.), = 38.

41. kǫms, pl. kǫmsak (Leem), en Laks, der er sort paa Skindet.
42. gugjor (Kr.), *Salmo trutta*, L. (Søørret, der er bleven stationær i Elven); s. 47.
43. guölle-gǫnagas, [Fiskekonge], = 21 (med misdannet Hoved), norsk: Torskekonge.
44. guormak l. guormat, [som har grovt Skind], = 34; (Kr.) *Perca fluviatilis*, L.; s. 111.
45. guovdda-čalašak, pl. (Friis), = 10 (mindre).
46. guovčur (E.), = 15.
47. guvččа, (Lg. Bls.) guvččе | R. (Ter.) kuvče, *Salmo trutta*, L.; s. 42.
48. guvčur (Sdv.), = 15?
49. gæđge-noarsse l. -noarssa, [Sten-noarsse], *Phoxinus aphya*, (L.).
50. kæčuk (Lul.), = 9 (middelsstor).
51. hakka, pl. hagak | S. (Hm. Ts.) =, *Sebastes norvegicus*, (Ascan.); s. 54. 142.
52. hammir (Kv.), (Lg.) hoabmir, *Lamna cornubica*, (Gmel.).
53. harre | S. =, *Thymallus vulgaris*, Nilss.; s. 117.
54. havgga, (Leem) hav, pl. havak, = 51.
55. havgga | S. hauk, (Lul.) hau^{a}ka, = 29.
56. hoakka, pl. hoakak, *Acanthias vulgaris*, Risso.
57. jadda (Senjen), (Vst.) jadde | S. (Hm. Ts.) jadde = 21 (liden), norsk: Gjedd.
58. jukso l. jufso, pl. juvsok, = 20.
59. lagga (Nb.), Smaasei; s. 100.
60. laggo | S. (Hm. Ts.) =, *Molva vulgaris*, Flem.; 79.
61. loakka, pl. loakak (Tromsø), *Brosmius brosme*, (Ascan.); s. 74.
62. lǫddo l. loaddo, *Mallotus villosus*, (Müll.); s. 77. 107. 125.
63. luossa, pl. luosak | S. luosa, (Lul. Arj.) luössa | E. luos | R. (Kildin) luss, (Notozero) luoss, (Pasv.) luöss, *Salmo salar*, L.; s. 7. 16. 17. 18. 22. 37. 41. 64. 65. 87.

132. 135. 139. I Karasjok kaldes Laksen efter sin Størrelse 1) didde, 2) luossa-juölgge, 3) luossa-giera, 4) jotto-luosa, [Vandrelaks], 5) luossa (fuldvoksen Laks), hvoraf goagjem er Han, duövve Hun.

64. luossa-giera, pl. -gierragak (Kr.), [Lakse-top], = 63 (mindre).

65. luossa-juölgge, [Laksefod], = 63 (mindre).

66. luossa-næring (Friis), *Lampris guttatus*, (Brünn.)

67. læppadak, = 10 (dog ikke af de største).

68. majhk (R.: Kildin), = 9 (større).

69. maiv (R.: Pasv.), = 9 (Unge).

70. moanji (R.: Pasv.), = 9; moanjigaž, = 9 (liden).

71. murtto l. mǫrtto, Seimort i 3dje Aar; (Nb. ogs.) Torsk- og Hyse-mort.

72. nava^{i}g (R.: Ter.), *Gadus navaga*.

73. navllo, pl. navlok, = 12.

74. njakka, pl. njagak | S. njaka | E. njåhe | R. (Pasv.) javre-njatj, *Lota vulgaris*, Jen. I Finmarken er njakka ogsaa = 61, der i Pasvik kaldes m^{e}æra-njatj [Sø-njatj] til Forskjel fra javre-njatj [Indsø-njatj]; s. 140.

75. njoavdnja, *Salmo alpinus*, L. (meget ung).

76. njunne-sildde, [Nebsild], *Belone vulgaris*, Flem.; s. 133.

77. njuorjo-šakša (Leem), [Kobbelodde], = 62 (fordi Kobben gjerne æder den).

78. njuvvak (Friis), *Pleuronectes limanda*, L.

79. nu^{i}kkeš (R.: Kildin), (Notozero) nu^{i}hkeš, (Pasv.) nutješ, = 29; i Pasv. er m^{e}æra-nutješ, [Sø-nutješ], = 60.

80. næzzeni-guöll (R.: Pasv.), [Kvindefisk], *Anarrhichas*, L. (Hun).

81. oaivvadak, = 10 (stor).

82. oaivve-čargaš, pl. -čargačak, = 10 (mindre).

83. rađke-guölle, [Rav-fisk], = 10 (noget større end 27).

84. ravddo, pl. ravdok | S. raudo, (Lul.) rau^{e}tu, (Hm.) rav^{e}do | E. ravdu | R. (Ter.) ravta, (Pasv.) ravd,

Salmo alpinus, L., (Hm. Pasv.) om Hunnen; s. 75. 114. 134. 138.

85. ribšik (S.: Hm.), = 20.

86. riepas (R.: Kildin), enslags *Coregonus*; s. 97.

87. rïps kï^{i}lle (R.: Ter.), [Rødfisk], = 63 (Sølaks).

88. rudnok l. rudnog | R. (Pasv.) runnag, = 21 (liden).

89. rundiermes, pl. -diermak (Friis, Sdv.), (Nb.) -dærmes, pl. -dærmak, 1) *Cyclopterus lumpus*, L. (Friis, Sdv.), 2) *Cottus scorpius*, Fabr. (Nb.); s. 1.

90. runčufso, pl. -čuvsok (Hf.), (Tn.) runčæksa, pl. -čævsak, *Cyclopterus lumpus*, L.

91. ruotak (S.) = 9; (Lul.) ruötak, *Coregonus albula*, L. (middelsstor); s. 95.

92. ruövdde-gulmek, [Jern-gulmek], *Gasterosteus aculeatus*, L.; s. 93. 94. 128.

93. ruövdde-laiggo (Skjervø), = 92.

94. ruövdde-čilla, pl. -čilat (Lg.), = 92.

95. ræsska, pl. ræskak (Nb. Utsj.), *Coregonus albula*, L. (Mela); s. 91. 128.

96. ræšek, = 10 (meget liden); (Lnv.) *Pleuronectes* | S. (Hm.) rešek, *Pleuronectes*; s. 13.

97. rævas, en Indsøfisk med større Hoved og større Øine end Siken (Friis), = 86?

98 a. rævčak (Sdv.), [Utleirfisk], = 13.

98 b. saddog (S.: Hm.), [Sandfisk], = 13.

99. saddo-lindar (Ib.), [Sandflyndre], = 34.

100. saidde | S. saide, (Lul.) sai^{e}te, (Hm. Ts.) sai^{e}de | R. (Ter.) saite, (Pasv.) said, *Gadus virens*, L.; s. 8.

101. saivva-guölle, (Nb.) savja-guölle, Ferskvandsfisk, især Laks og Søørret.

102. salled | S. (Lul.) sallet, (Hm. Ts.) sallid, *Clupea harengus*, L,; s. 106. 108.

103. sandok (Hf. Ks.), = 13. Der skjelnes mellem gæđge-s., [Stenflyndre, Flyndre der lever paa Stenbund], saddo-s.,

[Sandflyndre, Flyndre der lever paa Sandbund], jǫkka-s., [Elveflyndre, Flyndre der lever i Elvemundinger], starra-s., [Tareflyndre, Flyndre der lever mellem Tare], ruksis-s., [rød Flyndre], = 19.

104. sappeg (S.), *Leuciscus rutilus*, (L.); s. 122.

105. savja-findar (Nb.), [Ferskvandsflyndre], Flyndre, som holder sig i Elvemundingerne.

106. sieltte (R. efter Friis), = 102.

107. sieppa (Lg.), = 62; jǫkka-sieppa, [Elvelodde], norsk: Vaslodde; ape-sieppa, Havlodde.

108. sildde | S. sillda | E. sildde | R. (Ter.) silte, = 102.

109. sinekj (R.: Notozero), = 13.

110. sirkke, pl. sirkek, = 9 (Unge).

111. sittek (S.), *Perca fluviatilis*, L.; s. 44. 115. 142.

112. sivllo, (Kr. Tn.) sivlla, (Kv. Lg.) sila, = 12.

113. skatto, pl. skatok | S. (Hm.) = | R. (Pasv.) skat, *Raja*, L.

114. skiddo, = 84 (Han) | S. skito, = 84, (Gellivare) hvidagtig do., (Hm.) skido, = 84 (Han).

115. skǫdek (S.), = 111 (liden).

116. snuölgga-junne (Helgø), [Snotnæse], = 2.

117. soavvel (Tn. Polmak) | R. (Ter.) sïvel, g. sïevvalï, (Kildin) suevvel, (Notozero) sǫ^{i}vvel, (Pasv.) soavvel, = 53.

118. spælg, pl. spielgak (Kl.), = 2.

119. staggoš, [liden Stang], *Centronotus gunnellus*, (L.); s. 124 b.

120. stainir l. stainar, pl. staidnarak | R. (Pasv.) stainar, *Anarrhichas*, L. *Anarrhichas pantherinus*, Zouiew kaldes i Kv. bǫvlle-stainir, i Tn. girjag-stainir, [Flekstenbit].

121. stevel, [Støvle], = 2 (af 4—5 Fods Længde).

122. særgge | S. særg, = 104.

123. sævnjat, pl. sævnjahat (Kt.) | S. (Jokkmokk) siuŋna, pl. siuŋnakah, (Fld.) sievna, pl. sievnaga | R. (Kildin) sivn, g. sivneg, *Leuciscus idus*, (L.).

124 a. saggaš l. šaggaš (Sdv.) | R. (Pasv.) šagaš, = 12; (Notozero) sageš = 12?

124 b. šagoš, (Nb.) šagguš | R. (Pasv.) saggaš, = 119.

125. šakša l. šafša, pl. šavšak, 1) = 62 (Varanger); ǫrddešakša, Hanlodde (af ǫrdde, Kant); mæđđem-šakša, Rognlodde; ruövdde-šakša (Leem), [Jernlodde], Lodde, der har Jernfarve. 2) = 12 (Kr. Hf. Lg.).

126. šall (R.: Ter.), = 9 (større).

127. šappa, pl. šaba (R.: Ter.), (Kildin) šapp, = 9 (mindre).

128. šilla, pl. šilat (Lg., Helgø) = 92? | S. šilah, pl., Smaafisk; (Lul.) šilla, = 95 (liden).

129. šuorja, = 14.

130. coakan (Tn.), *Trigla gurnardus*, L.?

131. čarva (R.: Ter.), = 29.

132. čoarran (Friis), Laks, som har gydet og er gaaet til Søen, men straks er vendt tilbage igjen; (Kr.) šoarran, Laks med sølvblankt Skind, uden Melke eller Rogn, aldeles mager og uspiselig.

133. čoarvve-sildde, [Hornsild], = 76.

134. čoavčak (Kr.), = 84 (Gjeldrøe uden Melke eller Rogn).

135. čuončča (Kr.) = 63 (Gjeldlaks uden Melke eller Rogn).

136. čuovčča, pl. čuovčak | S. čuouče, (Lul. Arj.) čuöuča, = 9, (Lul.) (meget stor). I Kt. kaldes Sik efter sin Størrelse: 1) gila-sirkki (se 110), 2) gasskan-sirkki, [middels-sirkki], 3) luöbbot-laikko, [middelsstor Flekkefisk]. 4) stuora-laikko, [stor Middelsfisk], 5) čoavjebælle, [Bugside], 6) stuora-čuovčča, [stor Sik].

137. čusska, Seimort i 2det Aar; s. 8 | S. čussk, Smaafisk; (Lul. Fld.) čusska, = 9 (mindre end 136).

138. valas, pl. vallasak (Kr., Varanger), blank Ørret (rød under Bugen) | R. (Pasv.) völas, = 84 (Han).

139. vaᵢlčer (R.: Ter.), = 63 (Ferskvandslaks).

140. vïšne (R.: Ter.), (Kildin) vuᵢšn, (Notozero) vuešn, *Lota vulgaris*, Jen.; s. 74.

141. vuorro, pl. vuorrok l. vuorok (Kr.), = 16.
142. vuosko, pl. vusskunak (alm.) l. vusskumak | S. vuoskon, (Lul.) vuöskun l. vuöskui, pl. vuösskunah | E. puš̄ko | R. (Ter.) vïezvan, g. vïsvïne, (Kildin) vuesk, g. vueskan, (Notozero) vuask, g. vuaskan, (Pasv.) vueska (dem. vueskanaž), = 111, (Nb.) = 51. I Finmarken er mærra-vuosko, [Sø-aborre], = 51, diff. savja-vuosko, [Ferskvandsaborre], = 111.
143. væjek | S. vejek, en liden Fiskeunge, (Nb.) = 15 (Unge), (S.) især om Laksyngel; (Nilss.) kadde-vejek, Bækforell.

D. Lappiske Navne paa Leddyr.

1. arkko, pl. arkok (Nb.), etslags stikkende Insekt.
2. acatj (Pasv.), Edderkop; s. 42.
3. acciš-ædne l. hacciš-ædne l. ačiš-ædne, (Tn.) hatteč̄en, (Nb.) haceč̄an | S. aciče, (Lul.) hacek, (Arj.) ačič̄-hætne, *Carabus*, Bille; (Sdv. Kr.) *Thanatophilus lapponicus*, (Kt.) *Thanathophilus thoracicus*, L.; s. 63. I Lule-Lapmark er efter L. L. Læstadius ačič̄-edne Navn paa „den stora dagsländan“.
4. ačæn-gaicca (Lg. Krl. Kl.), [Risegjed], *Carabus*.
5. ačæn-guss (Kl.),]Riseko], *Carabus*.
6. balgatægje (Nb.), [som bringer til at skjene], = 7.
7. batta-bǫsska l. -bǫskan | S. patta-pǫske l. pattok, (Arj.) bidok, (Jmt.) spæhta l. spahta, (Trond.) špætta, [en der stikker med Bagdelen], *Oestrus tarandi*; s. Zetterst. p. 622. S. 6. 15. 36. 37.
8. bismar-batta (Tn.), [Bismer-bagdel], *Æschna juncea*, Øienstikker; s. 18. 19. 20. 21. 22. 27. 74. 87. 89. 113.
9. boalddahaš (Tn.), [som brænder], etslags Insekt; opgives at være = finsk polttiainen (Knott).
10. poarmas (R.: Ter.), *Larva oestri tarandi?*; s. 36.
11. boaro, pl. borruk, (Kv. Lg.) boarro, pl. boarok | S.

pǫrev l. pǫrrev | R. (Ter.) poara, (Kildin) poara, g. purru, (Notozero) poar, g. poarro, (Pasv.) boara, demin. boarragaž, *Oestrus*, i Finmarken især *Oestrus trompe*; (Lg. Kv.) *Tabanus*.

12. boači (Pasv.), [som skyder], Renbremse.
13. bǫgge, etslags Seiaate (en Krebsart?).
14. bǫrǫnj (Arj.), [som æder], *Oestrus trompe*; s. 11. 24. 43. 67. 83. 91.
15. bǫt-bǫlkan (Leem), etslags Insekt, vel = 7.
16. bureke (Trond.), Renbremse, Klegg, Spyflue.
17. bæivve-lǫdde | S. (Hm.) bæivač-lǫdde | R. (Pasv.) bæive-lǫdd, [Solfugl], Dagsommerfugl; s. 28. 44.
18. bællje-bǫskan (Helgø), [Ørestikker], = 8.
19. bællje-navlag (Friis), (Of.) -navlahak, [Ørestikker], = 8.
20. bællje-rǫggan, [Øregraver], = 8; (Leem, Kr. Kv.) *Tipula*, Høyhest; s. 22.
21. bællje-skuran (Kt. Vst.), = 8.
22. bællje-skurban | S. (Ht.) biellje-skurbadakke, [Ørekradser], = 8; (Kv. Kt.) *Tipula*, Høyhest.
23. dikke | S. tikke | E. tikke | R. (Ter.) tike, (Kildin, Notozero) teke, (Pasv.) dikj, *Pediculus*; s. 41. 101.
24. trumpi (S.), = 14.
25. dæččalma (Ht.), *Hæmatopota pluvialis*; s. 49. 110.
26. gaskat, pl. gaskahat (Kt.), [Bider], *Musca domestica*.
27. gačas, (Kr. ogs.) skačas | S. (Lul.) kačuk, = 8.
28. giesie-laddie (Ht.), Sommerfugl; s. 17.
29. gifsa l. giksa, pl. givsak | E. kifse, et sort Insekt, der ødelægger Skindklæder (*Larva thanatophili lapponici?* l. *Thanatophilus lapponicus?*), (Of.) *Staphylinus maxillosus*.
30. koabjo (E.) | R. (Kildin) kueiχ, Møl.
31. gǫbba-lafčo l. -lakčo, pl. -lavčok, *Dytiscus*.
32. gǫllebat-čurruk (Utsj. efter Andelin, p. 192), [Guldbagflue]; (Kt.) gǫlle-batta, [Guldbag], *Musca sarcophaga*, Spyflue; s. 95. 107.

33. gǫtka l. gǫđka l. gǫrkka | S. kǫtka l. kǫtakes, (Lul.) kǫrkǫ, (Arj.) gǫtkǫ, (Ht.) garke | R. (Ter.) kǫtk, (Pasv.) gǫtk, *Formica.*

34a. guöledikke, [Fiskelus], *Caligus*; s. 102.

34b. guöle-čoakkal (Hf.), Gjelleorm (en Snyltekrebs i Fiskens Gjeller).

35. guosta-hævdne, [Tøveir-Edderkop], et Insekt af Størrelse som en Husflue, der i Slutningen af Vinteren kan findes i Mængde paa kram Sne og er et Tegn paa Tøveir (*Opilio?*).

36. gurbma, pl. gurmak | S. kurbma l. kǫrmes, (Lul.) kur^{a}ma, (Arj.) gurbma, (Ht.) gǫrma, *Larva oestri tarandi* (Zetterst. p. 622); s. 10.

37. gurbma-lǫdde (Kt.), [Gormfugl], = 7.

38. gærp (Pasv.), *Musca.*

39. hiđaš, pl. hittačak, (Kt.) hittat, pl. hittahat, *Ceratopogon pulicaris*; s. 56. 60. 61. 84.

40. hiŋs l. heŋs (Sors.), etslags Insekt, norsk: Skorva.

41. hǫrse (S.), *Pediculus,* proprie quibus ægrotantes afficiuntur; s. 23.

42. hævdne l. hævnne, pl. hævnek | S. heune, (Lul. Hm.) heu^{e}ne, (Arj.) hævdni, (Sors.) fievni, (Ht.) hevnie | E. ævnne | R. (Ter.) jeavnai, g. jievnï, (Kildin) eavnanč, (Notozero) eavniš, (Pasv.) ævn, demin. ævnaž, *Araneus*; s. 2.

43. jǫrbba, pl. jǫrbat (Lg.), (Kr.) jǫrbba boaro, [rund Bremse], = 14.

44. lablok (S.), Sommerfugl; peive-lablok, (Sors.) bieivielublǫk, (Ht.) biejje-lable, [Sol-sommerfugl], enslags Sommerfugl; s. 17.

45. lafes l. laffes, pl. laffak | S. lafa, (Lul.) lafes, pl. laffah, (Arj.) lafis, *Pulex irritans*; s. 46. 47. 92.

46. lappes, pl. lappak, l. lappo, pl. lappok | S. (Sors.) lǫppö, (Ht.) lappo, (Trond.) lappe | R. (Pasv.) lap, demin. lappaš, = 45.

47. lavkes, pl. lavkkak, = 45.
48. lavčča, pl. lavčak, (Sdv. ogs.) lavččo, (Kv. Tn. ogs.) lavčis, (Kl. Bls. Lnv. Ib. Of.) slavčča | S. klaččе l. slaččе l. slauča l. lauča, (Lul.) slau^{a}ča, (Ht.) glaččе(e), (Trond.) klaččе, *Tabanus, Oestrus,* Klegg.
49. lidda (Friis), (Kv.) liddan, (Kl. Lnv. Ib. Of.) liddam, = 25.
50. lǫkk (S.), Græshoppe; s. 70.
51. luttak l. luttek, (Tn.) luttekaš, (Nb.) luttehaš, (Kar., Tromsø) luđaš, pl. luttahat, (Ib.) ludag | S. lude, *Cimex,* Væggelus.
52. main-kïe^{i}tte l. main-koadai (R.: Ter.), en Insektpuppe, som findes i Birkens Grene, og som holdes i Munden mod Tandpine.
53. makka, g. maga (Gullesfjord), en liden Myg.
54. mieđiš-ædne (Leem) [Mjød-moder] | R. (Notozero) miedaš, (Pasv.) miedažaž, *Bombus*; s. 109.
55. moatta, pl. moatak (Tromsø, Senjen), Møl (større end 59).
56. mueiva (S.), (Gellivare) mǫivǫ, = 39 (Zetterst. p. 821).
57. muöger, pl. muökkerak | S. muoker l. muokker, (Lul.) muöker | R. (Notozero) mækjer, (Pasv.) muevver, *Simulia reptans* (Zettersl. p. 802); s. 69.
58. muöšk (Pasv.), Knott.
59. muoco, pl. muccuk, l. muocco, pl. muocok, (Ib. Of.) muöcce | S. muece, (Lul.) muöce, Møl, (Lul.) hvidt Møl i Bøger o. lign.; s. 55.
60. namek (S.), = 39.
61. nja^{i}ble (R.: Ter.), = 39?
62. njavalak (S.), Møl.
63. njaveš-ædne (Kt.), *Thanatophilus lapponicus,* Fabr.; s. 3.
64. njivnja, pl. njivdnjagak, (Kv.) njievnja, (Kr.) njivdnje, pl. njivnjek | S. (Arj.) šnjimnja, *Psocus.*
65. njunne-boaro (Utsj. efter Andelin, p. 192), [Næsebremse], *Oestrus.*

66. njunne-čuoikka (Kt. Kar., Helgø), [Snabelmyg], (Kl.) njunodak, *Culex*; s. 105.
67. nurpa (Jmt.), (Trond.) šnurbe, = 14 (Zetterst. p. 622).
68. nöika l. näika (Trond.), en liden Myg.
69. orbmes l. urbmes (S.), = 57.
70. rasse-lǫkko, pl. -lǫkkok | S. grase-lǫkk l. rase-kappan l. -kappanis, *Pezotettix*, Græshoppe; s. 50.
71. rïvte-poara (R.: Ter.), (Kildin) ru^{i}vt-poara, [Jernbremse], *Oestrus*; s. 11.
72. rǫude-goaškos, pl. -gǫššusak (Ib.), en Bille større end 77, = 74?
73. rǫute-kǫnk (S.), *Scarabæus*, Tordivel.
74. ruövdde-garanas | S. (Ts.) ruöude-garranes [Jernravn], *Carabus*, ogs. *Carabus glabratus*; (Lg.) = 8.
75. ruövdde-gačas (Kr. Lg.), etslags Insekt; s. 27.
76. ruövdde-gǫbba, (Kr.) -gǫbbas, (Varanger) -gubbas, *Carabus*; (Lg.) *Chrysomela*.
77. ruövdde-gǫmp (Kl.), (Lnv. Ib. Of.) rǫude-gǫmpa | S. (Lul.) ruöut(e)-kǫmpǫ, (Hm.) rǫude-gǫmba, *Carabus*, (Hm.) Skarptrold.
78. ræbba l. gaʒʒa-ræbba, [Klokrabbe], *Hyas araneus*; s. 97 b.
79. sađeu (akk. sæđđemau) (Arj.), *Larva oestri trompe*; s. 80. 82. 90.
80. sadkem (S.), (v. Düben, Lappland, p. 49) sarkem, (Trond.) sargelma, = 79 (Zetterst. p. 622).
81. sakke, pl. sakkek l. sagek, (Kv.) sakkit, pl. sakkihat | S. sakke, et lidet Insekt med stort Hoved, der opholder sig i Vand, norsk: Vasskolp, Vasskvalp.
82. savla, pl. savllagak | S. (Lul.) saula, pl. sau^{a}lakah, = 79 (Zetterst. p. 622).
83. savla-lǫdde, [savla-Fugl], (Kar.) savla-batta, = 14.
84. sicca, pl. sicak, (Kt. Sdv.) cicca, (Kr.) cicok, (Ks.) cico, pl. ciconak, (Sdv. ogs.) cisag | S. (Lul.) sica, pl.

sicakah, bittesmaa Myg, der i stille Veir svæver i Sværme over Vandet, og som ikke bider. Efter v. Düben, Lappland, p. 85 er sicca i Lule Lapmark = 39.

85. skoarppa (Kl.), et sort mangefodet Insekt, norsk: Balskroppa.

86. skoattag (Of.), *Tabanus bovis.*

87. skǫdde-cice (S.: Lul.), [Snauskind-spurv], = 8.

88. skrǫtta, pl. skrǫttak (Hf.), (Of.) skroatto, *Oniscus*, norsk: Skrotte.

89. skurban, = 22; (Kv. Kt.) *Tipula.*

90. snavlle, pl. snavlek (Friis), (Nb.) snavla, pl. snavllagak, = 79.

91. snompat (S.), = 14.

92. sǫnsar l. soamsur (E.), = 45.

93. suin-njučkei (R.: Kildin), [Græshoppe], = 70.

94. suoksa, pl. suovsak | S. suoksa, (Lul.) suökksa | R. (Ter.) sïks, (Kildin) suks, (Notozero) sueχs, (Pasv.) suöχs, *Larva sarcophagæ.*

95. suoksa-čuruk, [Maddikflue], (Nb.) suoksa-batta-čurruk, (Gullesfjord) suöksa-čuöikka | R. (Pasv.) suöksbat-čueraš, = 32.

96. sæidne-ravdde, [Vægsmed], *Anobium*, et Skaldyr.

97 a. širra l. hirra, *Gammarus locustus.*

97 b. cuobbo, pl. cubbuk (Leem) | R. (Pasv.) juelgj-[Fod-] cuöbba, = 78.

98. čakkalagges, pl. čakkalaggak (Leem), et lidet Dyr, som efter Lappernes Udsagn har sit Tilhold i dybe Vandkilder og fanges ved Smør, som paa et Fad sættes ved Bredden.

99. čam-bǫkkal, (Leem) šambukel, (Sdv.) šam-bǫggal, (Hf.) čalme-bǫgge, *Thysanopoda inermis.*

100. čacce-čuoikka (Leem), [Vasmyg], *Tipula.*

101. čivros, pl. čivrrusak, (Nb.) čivru, pl. čivrruk | S. čuros, (Lul.) čiurus | R. (Ter.) čuⁱvres l. čuⁱrves,

(Kildin) čivres, (Notozero) čevres, (Pasv.) čævres, *Ovum pediculi*; s. 23.

102. čoakkan, = 34 a.

103 a. čǫrve-navva (Lul.), [Horn-haar], en Art Myg (meget liden).

103 b. čoarve-vævses (Pasv.), [Hornhveps], *Sirex?*

104. čuoika-ædne | S. (Lul.) čueikan-eddne, [Mygmoder], *Tipula*, Høyhest.

105. čuoikka, pl. čuoikak | S. čuoik, čǫik, (Lul.) čuöi^{e}ka, (Arj.) čoaika, (Jmt.) čuoika | R. (Ter.) čïšk, (Kildin) čušk, (Pasv.) čuöšk, *Culex*, (Helgø, Ib. Of., Gullesfjord ogs.) *Musca*; (Jmt.) kittien čuoika [Eng-čuoika] *Oestrus*; kǫta-č., [Hus-čuoika], *Musca*.

106. čuruk l. čurruk, (Tn.) čuro, pl. čurrukak | S. čurok, (Lul. Hm. Ts.) čiruk | R. (Ter.) čï^{i}res, g. čïerrazï, (Kildin) čueraš, (Notozero) čuaraš, (Pasv.) čueraš, *Musca*.

107. čuro-čuoik (Kl., Helgø), = 32.

108. ussa l. ussek l. ǫssok (S.), (Ht.) husseg, Fællesnavn paa alleslags Insekter og Orme i Vand.

109. uvllo, (Tn.) huvllo, (Kv.) ulvva, (Senjen, Of.) ublo | S. ǫblo, oblo, (Lul.) hub^{e}lu, (Arj.) hublo, (Sors.) ublo, (Ht.) ǫblu, (Trond.) ǫbla, = 54.

110. valppo (Lg.): čalmehes [blind] valppo, = 25.

111. vannca-divrre (Kt.), [Baad-insekt], etslags Insekt, som løber paa Vandet.

112. vievses, pl. vieksak | S. vepses, vepsa, (Lul.) vepses, (Sors. Arj.) viepsis, (Ht. Trond.) væpsa | R. (Ter.) veažvas, (Notozero) væfsaž, (Pasv.) vævses, *Vespa*.

113. vuöpta-bagan (S.: Hm.), = 8.

E. Lappiske Navne paa Orme, Bløddyr, Pighudede og Tarmløse.

1. akale-lied (Pasv.), [Haakjærring-slim], *Cyanea capillata*, Manæte; s. 3. 4. 18. 26.
2. akkar-guölle, [Akkerfisk], (Ib. Of.) akkar, (Lg.) aŋkir, *Ommatostrephes todarus*: s. 23.
3. akkolag-šliedda (Varanger), [Haakjærring-slim], = 1.
4. bǫsso-čǫlgga, [Hvalspyt], = 1.
5. garanas-batte (Kr.), [Kraakegryde], *Echinus*.
6. garanas-ruitto (Varanger, Ks.), [Kraakegryde], = 5.
7. garja-batte, (Kl.) garja-gritto, [Kraakegryde], = 5.
8. garra l. karra (Nb.), *Cardium*, norsk: Renskjel.
9. gavdnjaragges, pl. -raggak, (Nb.) gainaragges, (Kv.) gavnjeriegges, (Lg.) gavnriŋŋga, (Helgø) gamrigges, (Kl.) gamlegges l. gævnjerigges, (Bls.) gævnjarigga, *Ascaris*, en Traadorm der findes i Fisk; s. 30.
10. gǫžža-guölle (Kv.), [Pis-fisk], = 2.
11. gǫvva, pl. gǫvak (Sdv,), hvidt, stort Skjel med glinsende Inderside, *Cardium?*, (Leem) gǫv, pl. gǫvak, Sneglehus paa Stene i Fjæren.
12. guiske, Musling: bǫkka-g., [Bukkeskjel]; gaica-g., [Gjedeskjel], *Mytilus*; hæsta-g., [Hesteskjel], *Pecten islandicus*; spine-g., [Svineskjel], *Mya*; s. 20. 24.
13. matto, pl. mađok | S. mato l. matok, (Lul.) matu | E. matu | R. (Notozero) mat, g. mađ, Mark, især *Lumbricus*; s. 25.
14. mer-sǫpt (R.: Akkala), [Havskum], Svamp, *Spongia*; s. 27.
15. ribun (Lg.), enslags Snegl.
16. ripu, (Kv.) ripa, Snegl.
17. ruossa-ræbba, [Korskrabbe], *Asterias*, Korstrold.
18. sieđak, Manæte; s. 1.
19. skadna, pl. skanak, *Balanus*.

20. skalččo | S. skalčo, (Lul.) skallču | R. (Pasv.) skalč, Muslingskal. De norske Lapper skjelner mellem: bǫccu-s. l. boaco-s., [Renskjel], *Mytilus edulis*; bukka-s. l. bǫkka-s., [Bukkeskjel]; gaicca-s., [Gjedeskjel], *Mytilus modiolus*; garanas-s., [Kraakeskjel], *Echinus*; gussa-s., [Koskjel], *Cyprina islandica*; hæsta-s. l. hævoš-s., (Kv. ogs.) rǫsse l. rǫse-s., [Hesteskjel], *Pecten islandicus*; savcca-s., [Sauskjel], *Astarte*; spine-s., [Svineskjel], *Mya*; s. 12. I Kv. Ib. bruges bædnag-s., [Hundeskjel], om Sneglehuse, der findes i Fjæren.
21. skelčim (Sdv.), *Pecten islandicus*; s. 12. 20. 22.
22. skirčeg (Nb.), = 21.
23. skuftar (Hf.), = 2.
24. skuiske, Muslingskal; s. 12.
25. skuörva (S.: Sors.), = 13.
26. snuolgga, [Snot], = 1.
27. spielder-facca, [spielder-vante], = 14.
28. čerggim (Leem), *Pecten* (med hvidt og stribet Skjel).
29. čivrre, en brandgul Mark, som sidder ved endel Fiskes, især Torskens Mave, ogs. paa Leveren; *Ascaris*.
30. čoalle-gaimrigges (Pasv.), [Tarm-gaimrigges], vel = 9.
31. varfa (Gullesfjord), *Mytilus modiolus*.
32. vuöddas-cærv (Pasv.), [Sandmark], *Arenicola piscatoria*.

Trykt den 20. December 1904.

Tab. I. Table shewing the variation of the scale-figure in salmon and trout.

	Salmon *(salmo salar)*	**Trout** *(salmo trutta)*
	Under 16 cm.s length	Under 16 cm.s length
11	o o o o o	
12	o o o o o o o	
13	o o o o o o o o o o o o o o o o o o o o o o o o o	o
14	o o o o o o o o o o	
15	o o	o o o o o
16		o o o o o o o o o o
17		o o o o o o o o
18		o o
19		o
20		
	From 16—50 cm.s length	From 16—50 cm.s length
11	o	
12	o o o o o	
13	o o o o o o o o o o o o o o o o o	
14	o o o o o o o	o o o
15	o	o o o
16		o o o o o o o
17		o o o o o o o o o
18		o o o o o
19		o o
20		
	Over 50 cm.s length	Over 50 cm.s length
11		
12	o o o o o o o o o	
13	o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o	
14	o o o o o oo o o o o o	
15	o	o o
16		o o o o
17		o o
18		
19		
20		

Tab. II. Table representing variation of tailcoeffecient I
ɔ: The lenght of the tail: the altitude of analfin.

	Salmon *(salmo salar)*	**Trout** *(salmo trutta)*
	Under 16 cm.s length	Under 16 cm.s length
1,30		
1,20	o	
	o o	
1,10	o o o o o	
	o o	
1,00	o o o o o o o o o o o o o o o o o o o o o o o o o	
	o o o o	o
0,90	o o o	o o
	o	o o o o o
0,80		o o o o o
		o o o o o o o o o
0,70		o o o
0,60		
	From 16–50 cm.s length	From 16–50 cm.s length
	o o	
1,40	o	
	o o	
1,30	o o o	
	o o o	
1,20	o o o o	
1,10	o	
1,00		o o o o o
		o o o o o o o
0,90		o o o o o o
	o	o o o o o o o o o
0,80		o o o o o o
		o o o
0,70		
	Over 50 cm.s length	Over 50 cm.s length
1,60		
1,50	o	
	o o o	
1,40	o o	
	o o o o o	
1,30	o o o o o	
	o o o o o o o o o o o o o o o o	
1,20	o o o o o o o o	
	o o o o o o o o o o	
1,10	o o o o	
	o o o	
1,00	o	
		o o
0,90	o	o o o
		o o
0,80		o
0,70		

Tab. III. Table shewing variation of tailcoefficient II.
ɔ: Length of tail: minimum altitude of tail.

	Salmon *(salmo salar)*	**Trout** *(salmo trutta)*	**Salmon** *(salmo salar)*	**Trout** *(salmo trutta)*
	Under 16 cm.s length	Under 16 cm.s length	Over 50 cm.s length	Over 50 cm.s length
2,10			2,50	
			o	
2,00	o		2,40	
1,99	o o		2,30	
	o			
1,80	o		2,20	
	o		o	
1,70	o o		2,10	
	o o o			
1,60	o o o		2,00	
	o o o		o	
1,50	o o o		1,90	o
	o			o o
1,40	o	o	1,80	o
	o	o		o o o
1,30		o o o o	1,70	o
		o o		o o o o
1,20		o o o o o o o	1,60	o o o
		o o o o o o o		o o o
1,10		o o o o o	1,50	o o
		o o		o o
1,00			1,40	o o o
	From 16-50 cm.s length	From 16-50 cm.s length	1,30	o
	o			o
2,50			1,20	
2,40			1,10	
2,30	o o		1,00	
2,20	o			
2,10				
	o			
2,00	o o o			
	o o o o o			
1,90	o o o o			
	o o o o			
1,80	o o			
	o o o o			
1,70	o o o			
1,60	o o	o		
	o	o o o		
1,50		o o		
		o o		
1,40		o o o o o		
		o o		
1,30		o o o o		
		o		
1,20				
1,10				
1,00				

Tab. IV. Table representing the sizes of emigrating young salmon.

Cm.	Orkla and the mouth of the Orkla $^{8}/_{5}-^{13}/_{8}$ 1898 Eelhandseine.	The mouth of the Gula $^{26}/_{5}-^{6}/_{6}$ 1898 Eelhandseine.	Gula and the mouth of the Gula $^{16}/_{8}-^{17}/_{8}$ 1898 Eelhandseine.	The mouth of the Gula $^{9}/_{6}$ 1899 Eelhandseine.	Uddevold, Gula $^{15}/_{7}$ 1901 Fly.	Bak, Orkla $^{16}/_{7}$ 1901 Fly.	Kalstad, Orkla [illegible] 1901 Fly.
0							
1							
2							
3							
4							
5							
6							
7	o						
8					o o o o		o o
9			o o o o o		o o	o	o o o o o o
10	o o o	o o o o o o o o	o o o o o o o o o o	o o o o	o o o o o o o	o o o	o o
11	o o o o o o o o	o o o o o o o o o o o o o o o o o o o o o	o o o o o o o o o o o o o o o o o o	o o o o o o	o	o o o	o
12	o o o o o o o	o o o o o o o o o	o o o o o o o o o o o o o	o o o o o		o o o o	
13		o o	o o	o o		o	
14							
15							
16	o						

Tab. V. Table representing the size of the trout caught during the researches

Cm	Orkla and the mouth of the Orkla $^{10}/_{5}$—$^{14}/_{6}$ 1898 Eelhandscine.	Gula and the mouth of the Gula $^{23}/_{5}$—$^{4}/_{6}$ 1898 Eelhandscine.	Borselven and Borsbugten $^{7}/_{6}$—$^{10}/_{6}$ 1898 Eelhandscine.	Lensviken, Rissen and Selven $^{17}/_{6}$—$^{22}/_{6}$ 1898 Eelhandscine.	Gula and the mouth of the Gula $^{15}/_{6}$—$^{17}/_{6}$ 1898 Eelhandscine.
6					
7					
8					
9					
10	o		o		o o o
11	o o o	o	o o o o o o	o	o o o
12	o o o o o o o o o	o o o	o o o o o o o o o o (plus 14)	o o o o o o o o o o o	o o o o
13	o o o o o o o	o o	o o o o o o o o o o o (— 34)	o o o o o o o o o o o o (plus 8)	o o o o o o o o o o
14	o o o o o o o o o o o o o o o	o o o	o o o o o o o o o o o (— 18)	o o o o o o o o o o o o (— 8)	o o o o o o o o
15	o o o o o o o o o o o o o o o o o	o o o o o o o	o o o o o o o o o o o (— 14)	o o o o o o o o o o o o (— 17)	o o o o
16	o o o o o o o o o o o o	o o o o o o o o	o o o o o o o o o o o	o o o o o o o o o o o o (— 8)	o o o o o o o o
17	o o o o o o o	o o o o o o o o o o o o	o o o o o o o o o o o o	o o o o o o	o o o o o o
18	o o o o o o o o	o o	o	o o o	o o
19	o o o o o	o o	o	o o o o	o
20	o o o o	o o o o o	o	o o	
21	o o o	o o o o o o o o		o	o o
22	o o o o o o o o	o o o o	o		o o o o o
23	o o o o o o	o o o o o		o o	o o o o o o o o
24	o o o o o o o o o o o o	o o o o o o o			o o o o o o o o o
25	o o o o o	o o o o o o			o o o o o o o o o o o o o o o o o o
26	o o o	o o o o o o o o o o o o o			o o o o o o o o
27	o o o o	o o o o o o o o o o o o o o o			o o o o o o o
28	o o	o o o o o o o o o o			o o o o o
29	o o o	o o o o o o o o o o o o o			o o o o
30	o o o	o o o		o	o
31		o o o o o	o	o	
32	o	o o o			o
33	o o o	o o o o o			o
34					o
35	o	o	o	o	
36	o	o	o		o
37	o				
38	o	o o			o o o o
39					o
40	o o o				o
41					
42			o		
43		o o			
44			o		
45					
46			o		
47					
48	o				
49					
50			o		
51	o			o	
52					
53					
54					
55					
56					
57					
58					
59					
60					

Tab. VI. Table representing the size of the trout caught during the researches.

9 = spent or sexually mature fish.

Cm.	The mouth of the Orkla 23/10 1898 Eelhandseine. ♀	The mouth of the Orkla 23/10 1898 Eelhandseine. ♂	Orkla Kalstad 23/10 1898 Eelhandseine. ♀	Orkla Kalstad 23/10 1898 Eelhandseine. ♂	Orkla, Forve bridge 1890 Eelhandseine.
6					
7					
8					
9					
10					
11					
12					
13					o o
14	o				
15					
16					
17	o o o o o o o	o o o			o o
18	o o o o o o o o o o	o o o o			o o
19	o o o o o o o o	o o o o o o o			o o
20	o o o o o o o o o o o o o o o o o o	o o o o o o o o o o o o			o o o o
21	o o o o o o o o o o o o o o o o o	o o o o o o o o o o o o o o			o o o o o o
22	o o o o o o o o o o o o o o o o o o o o o	o o o o o o o o o o o o			o o o o o o o
23	o o o o o o o o o o o o o o o	o o o o o o o o			o o o o o o o
24	9 o o o o o	o o o o			o o o o o o o o o o o o o o o o o
25	o o o o o o	o o			o o o o o o o o o o o o o o o o o o o
26	o o	o o			o o o o o o o o o o o o o o o o o o
27	o	o	9		o o o o o o o o o o o o o o o o o o
28	o				o o o o o o o o o o o o o o o o o o o o
29					o o o o o o o o o o o o o o o o o
30	o o o			o	o o o o o o o o o o o o
31		9 o	9	9	o o o
32	o o			9	o
33	o		9	9	o o o o o o
34		9			o o o o o o o
35			9		o o o
36					o o
37		9			o o
38				o	o
39					
40					o
41			9		
42					
43			9		
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					

Tab. VII. Table representing the size of the trout caught during the investigations.

9 = spent or sexually mature fish.

Cm.	The Beitstadfiord may 1900 Eelhandseine and ordinary seine.	Beitstadfiord august 1900 Eelhandseine.	The Battenfiord $^{15}/_{9}$ 1900 Eelhandseine.	The Gula (Sundet) $^{12}/_{10}$ 1900 Eelhandseine.	Lerkjær, Mandalriver $^{27}/_{10}$ 1901 Eelhandseine.
6					
7					
8					
9					
10					o o o o
11					o o o o o o o o o o
12					o o o o o o o o o o o o o o o o o
13					o o o o o o o o o o o o o o o o o o
14					o o o o o o o o o o o o o o o o o o o o o o o
15				o	o o o o o o o o o o o o
16	o				o o o o o o o o o
17		o	o o o	o	o o o o o o o o o o o o
18	o	o o	o		o o o o o
19	o o o o o o	o o o o o o	o o		o o o o o o o o
20	o o o o o o o o o o o o o o	o o o o o o		o	o o o o o o
21	o o o o o o o o o o o o o o o o o o o o o o o o o o o o o	o o o o o o o	o o o o	o o o o o	o o o
22	o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o	o o o o o			o o o o
23	o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o o	o o	o o o	o	o o
24	o.o o o o o o o o o o o o o o o o o o o o o o o o o o o	o o		o o o	o o o o o
25	o o o o o o o o o o o o o o o o o o o o o o o o o o o	o o o	o		o o o
26	o o o o o o o o o o o o o o o o	o			o o o o o o
27	o o o o o o o o o o o	o	o	o	o o o o o o o o o 9
28	o o o o o o o o				o o o o o o
29	o o o o o o o o o o				o o o
30	o o o o		o	o	o o o
31	o o o o				o
32	o o o o o o				o
33	o o o				
34	o o o o				o 9
35	o o o o o o o				
36	o o o o o o				
37	o o o o				
38	o o o				
39	o o o o		o		
40	o o o				
41	o o				
42	o o o		9		
43	o o o o o o		9		
44	o o o			9	o
45	o o o				9
46	o o o			9	
47	o o				
48	o o o				
49	o				
50	o				
51	o				
52	o				
53	o				
54					
55					
56			9		
57	o				
58	o o				
59					
60					

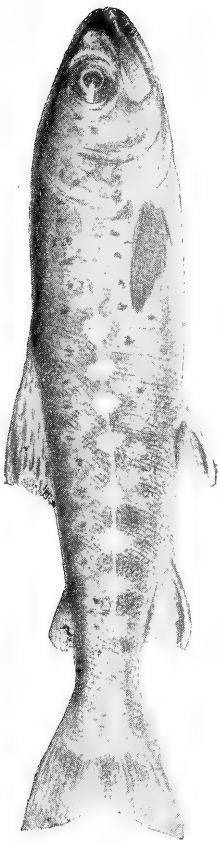

Fig. 1. Emigrating young trout, nat. size.

Fig. 2. Emigrating young salmon (smolt) nat. size.

Fig. 1. Trout 20 cm. long.

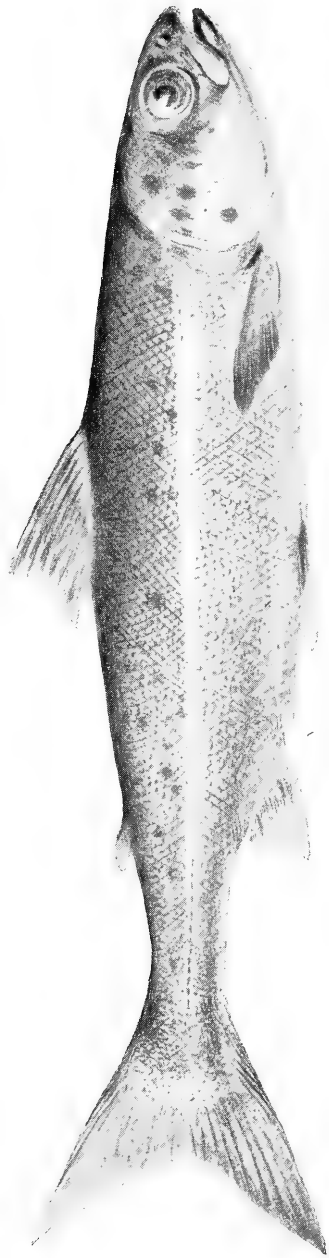

Fig. 2. Salmon 21,5 cm. long.

Fig. 1. Trout 25,5 cm. long.

Fig. 2. Salmon 28 cm. long.

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Bergens Museum den 12te oktober 1903.

G. A. Hansen.

Brunchorst.

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Botanisk Museum, København.

Morten P. Porsild.

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DEN PHYSIOGRAPHISKE FORENING
I CHRISTIANIA

BIND 42, Hefte 2

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Dr. Pehr Olsson-Seffer.
Stanford University, California.
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