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Palaeozoic Crustacea

The publications and notes on the genera and species during the past twenty years, 1895-1917

BY

ANTHONY WAYNE VOGDES

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TRANSACTIONS SAN DIEGO SOCIETY ON NATURAL HISTORY

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The object of this fasiculus is to give all the literature on the Palaeozoic Crustacea, also a general index to its contents, with a list of the species and remarks on them. This will aid the student in his researches and save time in looking up the descriptions of the species and genera.

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INTRODUCTION

In offering this supplement to the literature of the Palæozoic Crustacea, the author has brought the list up to date, and corrected some errors and omissions in his Bibliography, previously published by the California Academy of Sciences.

The author has consulted the original papers and the bibliographies of the following authors:

1 **Gehler** (J. C.) De quibusdam rarioribus agri Lipsiensis petrifactis.
Spec. 1, Trilobites Entomolithus pararadoxus Linne, Lipsiae, 1793, pp. 7-9.
The author gives a list of works on fossil crustacea.

2 **Walch** (J. E. T.) Des Trilobites dan le regne des petrifications, etc.
Natural History of Petrifactions to illustrate Knorr's Collection.
Nuremb. fol., part 2, pp. 95 (1768) and part 3, p. 120 (1771).
The author gives the name of Trilobites to the class and brought together everything that had been hitherto written on the Trilobites.

3 **Brunnich** (M. T.) Beskrivelse over Trilobiten.
Nye Samlig. of det Kongelige Danske Videnskabers Selskabs Skriften, Kiöbenhavn, 1781, pp. 384-389.
Gives historical sketch of the papers on Trilobites.

4 **Burmeister** (Hermann). The Organization of Trilobites.
German Edition, 1843; English Edition, 1846.
The author gives a Bibliography, pp. VII-X, 1698-1845.

5 **Barrande** (J.) System Silurien du centre de la Bohéme, 1852, Trilobites.
Vol. 1, and supplement.
Gives Bibliography of the families.

6 **Törnquist** (S. L.) Undersogningar öfver Siljansomradets Trilobitfauna.
1884, Sveriges Geol. Undersökning, ser. C, No. 66, pp. 4-7.
Gives list of authors.

7 **Schmidt** (Fr.) Revision of the Baltic Silurian Trilobites.
Mem. Acad. Imp. Sci., St. Petersburg, 1881-1907.
Notes on the genera and bibliography.

8 **Holm** (G.) De Svenska Arterna af Trilobitslaget Illaenus.
Bihang till K. Svenska Vet. Akad Handl. Bd. 7, No. 3, 1882.
Gives the Literature on the genus Illaenus, 1853-1872, pp. V-XIV.

9 **Vogdes** (A. W.) A Bibliography of Palaeozoic Crustacea from 1698 to 1889, including a list of North American species and a systematic arrangement of the genera.
Bull. U. S. Geol. Sur., No. 63, 1890.
This paper gives a list of authors; also that of the genera, but not that of the species described in each work.
The 2d and 3d parts a Catalogue of North American species.

10 **Vogdes** (A. W.) A classed and annotated Bibliography of the Palaeozoic Crustacea, 1798-1882, to which is added a Catalogue of North American species.

California Acad. Sciences Occasional Papers, No. 4, 1893.

This work contains a list of the genera and species described in each paper and a catalogue of North American species.

11 **Vogdes** (A. W.) A supplement to the Bibliography of the Palaeozoic Crustacea.

Proc. Cal. Aca. Sci., 2d ser., vol. V, 1895, pp. 53-76.

12 **Taschenberg** (O.) Bibliograeca Zoologica II. verzeichniss der schriften ueber Zoologie welche in den Periodischen werken, 1861-1880, pp. 5165-5188, Leipzig, 1905.

13 **Calman** (W. T.) Zoological Record Crustacea X, vol. 39-47, 1902-1913.

A Classified and Annotated Bibliography of the Palaeozoic Crustacea, Part 2; Supplement to Occasional Papers California Academy of Science, Embracing the Publications for the Years 1895 to 1917.

Airaghi (Carlo). Di alcuni Trilobiti della cina.

Atti Mus. Milano, vol. 41, 1902, pp. 3-13, plate.

The author describes *Agnostus Pii* n. sp. compares *Agnotus acadicus* Hartt and other species, the new species very much like *Agnotus Chinenis,* Dames, 1883.

Olenoides Paronai n. sp., *O. Leblanci* Berg. *Microdiscus Paronai* n. sp.

Drepanura premesnili, Berg. Trilobites gen. sp. ind.

Part 2 describes a Trilobite from Scitan tung, Teingan, as *Cheirurus Paronai* n. sp.

Ami (Henry). *Belinurus grandaevus,* a new species of Palæozoic limuloid Crustacean recently described by Prof. T. Rupert Jones and Dr. Henry Woodward, from the Eo-Carboniferous of Riversdale, Nova Scotia.

Ottawa Nat., vol. 13, 1899, pp. 207-208.

See also Geol. Mag., Decade 4, vol. 6, 1899, pp. 388-395, pl. 15.

The genus Belinurus has been found in Lower Devonian and Silurian forms in the Kiltorcan beds of Ireland.

See Review of this paper, Geol. Mag., Decade 4, vol. 7, p. 177, 1900.

Andrée (Karl). Zur Kenntniss der Crustaceen Gattung Arthropleura Jordan, und dern systematischer Stellung.

Palæontographica Bd. 57, Stuttgart, 1910, pp. 67-103, plates 4-5. *Arthropleura armata,* Jordan, *A. mammata,* Salter.

Gives a Bibliography of the literature on *Arthropleura,* 1854, 1909.

——— Neue Funde von *Arthroplcura armata* Jordan.

Centralbl. für Mineral, 1909, pp. 753-755.

Arber (E. A. Newell). The Culm Measures of the Exeter District.

Geol. Mag. Decade 5, vol. 8, 1911, p. 495.

The Arthropod remains from Nottinghamshire and Derbyshire coal fields in this paper are described and illustrated by Lewis Moysey.

Leaia trigonoides sp. nov. Glabella region of Prestwichia figured.

Baldwin (Walter). Belinurus Konig from Sparth, Rochdale.

Trans. Manchester Geol. and Mining Soc., vol. 28, pt. 6, 1905, pp. 198-202.

The author remarks Belinurus is generally associated with Unio-like shells and scattered plant remains, and suggests that it was an inhabitant of shallow, muddy water and lived in close proximity to the shore line. He also gives a Bibliography of the genus.

Belinurus forms were first discovered in the Pennystone iron nodules of the Coal Measures at Dudley in Staffordshire and Coalbrook Dale, in Shropshire.

Martin, the first author to describe a species in 1809 (Petrifacata Derbiensia, pl. 45, fig. 4), classes it among the Trilobites as *Entomolithus lunatus.*

Charles Koenig, who was the first keeper of the Mineralogical and Geological Department in the British Museum in the year 1825.

Published under the title of Icones Fossilium sectiles, n. d. (1820) in two parts:

The First Centuria has only 8 plates and 100 figures accompanied by descriptions.

The Second Centuria, consisting of plates 9-18, figures 101-248, was issued without text descriptions.

Koenig gives the name of *Belinurus bellulus* to fig. 230, without a description of the new genus.

———*Prestwichia anthrax and Belinurus lunatus* from Sparth Bottoms, Rochdale.

Trans. Manchester Geol. Soc. vol. 29, 1904-1905, pp. 124-127, with 2 figures.

The author figures *Prestwichia anthrax* described under the name of *Limulus anthrax* by Prestwich in 1840, and refers to *Belinurus lunatus* Konig's *Belinurus bellulus*.

The author remarks, that it certainly is not a fossil insect, as indicated by Martin in Petrifacata Derbiensia, pl. 45, fig. 4, 1809.

Bather (F. A.) *Harpes bucco.* A new Silurian Trilobite from the Carnic Alps.

Catania Rivista Italiana di Palæont., 1910, 7 pp., figure.

The trivial name bucco alludes to the swollen cheek roll, which with its ornament is so marked a character to the species.

Barth (Hermann von). Die Stellung der Trilobiten in Zoologischen Systeme.

Das Ausland 26 Jahrg, 1875, p. 25.

The author quotes Billings's paper; also that of Dana on the feet of Trilobites, and refers to the discoveries of E. von Eichwald in Wesenberg in Estland, and in the Island Dago near Hohenholm.

N. Jahrb für Mineral. and Geol. vol. 1, 1875.

Barton (Donald C.) A new genus of the Cheiruridae with descriptions of some new species.

Bull. Mus. Comp. Zoology, vol. LIV, No. 21, 1913, with one plate.

The new genus Ceraurinus is like *Cheirurus insignis* Beyrich in size.

The glabella is subrectangular or expanded only slightly. The posterior of the 3 pairs of glabellar furrows are straight, about one-third the width of the glabella in length, and slope gently backwards.

Their inner ends are connected with the neck furrows by curving constrictions, which are about parallel to the axis of the glabella.

The constrictions are strong in some species and flat in others.

The middle part of the axial portion of the neck furrow is parallel to the posterior edge of the neck segment.

The eyes large.

Thorax 11 segments, presumably.

Pygidium only in *C. icarus* Billings, three to four segments ending in six free spines of equal length.

Type *Ceraurinus marginatus* sp. nov.

The author includes in the genus *C. icarus* Billings, *C. trentonensis,* sp. nov., *Crytometopus scofieldi* Clarke, *Cheirurus polydorus* Billings, and *C. pompilius* Billings.

He refers *Ceraurus meekanus* Miller, 1889, to *C. icarus* Billings.

The paper ends with a fragment, described as *Ceraurinus confluens,* n. sp.

——— A revision of the Cheiruninae with notes on their evolution.

Washington Univ. Studies, vol. 3, part 1, No. 1, 1915.

BARTON (Donald C.)—Continued

The author places under the family cheirurinae twenty genera divided into two sections.

Group 1. Cheirurinae with plural furrow horizontal, thoracic segment rarely 9, generally with 10 or 12.

Under this group he places:

Eccoptochile Corda, genotype *E. claviger* Beyr., with figure.

Actinopeltis Corda genotype *A. globosus* Barr, with figure.

Cyrtometopus Angelin genotype *C. clavifrons* Dal., with figure.

Sphaerexochus Beyrich genotype *S. mirus* Beyr., with figure.

Anacheirurus Reed genotype *A. Frederici* Salt., with figure.

Pilekia new genus genotype *Ch. apollo* Bill., with figure in text.

This is an early Ordovician genus unlike the Cheirurinae. The author figures the glabella, which contracts forwards with three pair of glabellar furrows; pygidium composed of 4 complete segments and a terminal axial plate, the ribs terminating in long spines. He refers *Ch. gracilis* Barr. Cyr. *foveolatus Ang.* and with doubt *Ceraurus Clintoni* Foerste to the genus.

Nieszkowskia Schm. genotype *N. cephaloceras* Nieszk., with figure.

Kawina new genus genotype *Ch. vulcans* Bill., fig. of head in text.

The glabella large and composing one-half of the head strongly swollen, and with a tendency for a faint hump at the posterior. Three pairs of glabellar furrows, facial suture running almost parallel to the sides of the glabella, and cutting the border at the genal angles or slightly in towards the axis. Genal angles without spines.

The author refers to this genus *Ch. prolificus* Bill., *Ch. mercurius* Bill., *Pseudo-sphaer. Billingsi* Raym. and *Pseudo-sphaer. approximus* Raym.

Pseudosphaerexochus Schm. genotype *P. hemicranium* Kut., with figure, includes 11 species. *Cheirurus Paronai* Airaghi probably belong here, but the author does not include it.

Placoparia Corda genotype *P. Zippei* Boeck, with figure.

The author includes also *Calymmene tourneminei* Rouault, but does not mention *P. cambriensis* Hicks.

Area Barr. genotype *A. bohenica* Barr., fig. in text.

The author includes *A. Fritschi* Barr., but no mention of *A. suecica* Olin.

Prosopiscus Salter genotype *P. mimus* Salt., with figure.

Typhloniscus Salter genotype *T. Bainii,* figure in text.

Sphaerocoryphe Angelin genotype *S. dentata* Ang.

This is a Swedish species, the figure 16 in the text after Schmidt, looks more like *S. cranium* Schm. pl. 8, fig. 7.

Hemisphaerocoryphe Reed genotype *H. pseudo-hemicranium* Nieszk., with figure.

This is an intermediate genus between Cyrtometopus and Sphaerocoryphe. From Cyrtometopus this genus can be distinguished by its highly inflated frontal lobe. From Sphaerocoryphe it may be distinguished by its obtusely triangular free cheeks and by its posterior pair of glabellar furrows, which bend sharply backward instead of extending across the glabella.

The author includes besides the type *Metopias aries* Eichw. and Cyrt., *Rosentali* Schmidt.

Group 2. Cheirurinae with constricted pleurae and with diagonal pleural furrows, Lehua nov. genotype *Ch. vinculum* Barr.

The genus resembles Eccoptochile and Anacheirurus. From the former it is most readily distinguished by its lack of eyes or, if present, situated far forward, and by the diagonal pleural furrow, and by the slender spine-like termination of the pleurae.

The author includes besides the type *Typhloniscus princeps* Reed and *Ch. inexpectatus* Barr.

BARTON (Donald C.)—Continued

Cheirurus Beyrich genotype *Ch. insignis* Beyr., with figure.

The genus can be readily distinguished from Ceraurus and Ceraurinus by the triangular basal lobes of the glabella, the inner points of which are not separated by a portion of the glabella; also by the hypostoma.

Crotalocephalus Salter, genotype *C. Sternbergi* Boeck. Fig. of head in text.

Ceraurinus Barton, genotype *C. marginatus.* Fig. in text.

Distinguished from Cheirurus and Ceraurus by the rather large ovate to subrectangular basal glabellar lobes.

Ceraurus Green, genotype *C. pleurexanthenus.* Fig. in text.

The author does not include Youngia, a genus described by Lindstrom, with *Cheirurus trispinous* for its type, in 1885—not Youngia, Jones & Kirby, 1886.

The genus has long genal spines with aculate occipital ring, and may be compared with Nieskkowskia.

Lindstrom genus has a peculiar axis to the thorax, the first axial joint being furnished with a pair of small lateral processes on the anterior margin.

Barbour (E. H.) Carboniferous Eurypterids of Nebraska.

Am. Jour. Sci., 4th ser., vol. 38, 1914, p. 507, figs. 1 and 2.

The author describes *Eurypterus (Anthraconectes) nebraskensis* nov., from the Coal Measures near Peru, Nebraska.

The main features are the vermiform appearance, the long spatulate paddles, and the spinous ridges upon the last 5 tergites of the post abdomen.

Fig. 2 represents an unnamed sp.

Basser (Ray S.) Bibliographic index of American Ordovician and Silurian Fossils.

U. S. Natl. Mus. Smithsonian Inst. Bull. 92, volumes 1 and 2, 1915.

The author gives a historical index to the genera and the North American species of Palæozoic crustacea during Ordovician and Silurian epochs.

Beecher (Charles E.) Notes on Cambrian fossils of St. Francis County, Missouri.

Am. Jour. Sci., ser. 4, vol. 12, 1891, pp. 362-363.

——— On the thoracic legs of Triarthrus.

Am. Jour. Sci., ser. 3, vol. 46, 1893, pp. 469-470.

——— The larval stages of Trilobites.

Am. Geol., vol. 16, 1895, pp. 166-197, plates 8-10.

The author gives a review of larval stages of Trilobites.

Analysis of variations in Trilobite larvae.

Antiquity of the Trilobite.

Restoration of the protaspis, etc.

The author remarks in regard to the larval stages of the following Trilobites from the Cambrian:

Solenopleura robbi Hartt., after Matthew.

Larva very minute and circular in outline; the glabella is obscurely annulated and extends to the anterior margin, where it is expanded.

The neck ring is only one, well defined; abdominal portion is less than one-third the whole length, and is limited by a slight transverse furrow; no traces of eyes or free cheeks.

Liostracus onangondianus Hartt., after Matthew.

BEECHER (Charles E.)—Continued

This form is similar to the preceding though larger, and with the glabella more rapidly expanding in front. The neck segment is the only one which is distinct.

Ptychoparia linnarssoni Walcott, after Matthew.

The axis is narrow, expanding in front, and obscurely ringed; 5 annulations belonging to the head and one to the pygidium, which is very short and separated from the cephalon by a distinct groove.

Ptychoparia kingi Meek.

The author remarks that fig. 6 which is referred to a later stage, shows the inception of several characters that have not as yet appeared in the previous larvae. The axis is very strongly annulated; the anterior lobe is nearly as long as the 4 posterior annulations of the cephalon, and on each side there is a furrow representing the eye line of the adult; the free cheeks are present as narrow marginal plates including the genal spines; the pygidium shows 2 segments separated by a furrow.

The author figures *Sao hirsuta* Barrande, pl. 8, figs. 8-1.

Ordovician species.

Triarthrus becki Green.

Two protaspidan stages of this species have been noticed, differing chiefly in the size of the pygidium. Both agree in showing a strongly annulated axis, not expanded in front and terminating some distance within the margin.

Acidaspis tuberculata Conrad.

In general form the larvae resembles those of the second larvae stage of Sao, but the pygidium is shorter and the glabella does not expand and terminate in the anterior margin. No eye-line is present, but the eye lobes may be seen a little within the margin. The glabella has the characteristic number of annulations: margin provided with a row of denticles; genal angles extended into spines; pygidium with 4 spines.

The generic term *Arges* Goldfuss pre-occupied. See Ceratages, Gürich, 1901.

Arges consanguineus Clarke.

As the main details of structure in Acidaspis and Arges are so similar the young Arges show the same acceleration in the development of the spines and surface ornamentation and the retention of the primitive features of the glabella.

Proetus parvisculus Hall.

The illustrations of this species show strongly annulated axis with groove at each side; large, prominent anterior eyes, pygidial pleura indicated by faint grooves.

Dalmanties socialis Barrande.

The author gives 4 figures of this species.

The anaprotaspis stage showing the large, strongly annulated axis, the prominent anterior marginal eyes, mucronate genal angles. Pygidium of 3 segments.

Figures 1-8 in the text illustrate the young of *Agnostus nudus* Barr.

A. rex Barr., *Trinucleus ornatus* Sternb., *Hydrocephalus saturnoides* Barr. and *H. carens* Barr., *Olenellus (Mesonacis) asaphoides* Emmons.

——— The Monophology of Triarthrus.

Am. Jour. Sci., ser. 4, vol. 1, No. 4, 1896, pp. 251-256.

Geol. Mag., Decade 4, vol. 3, 1896, pp. 193-197, pl. 9.

——— Outlines of a natural classification of the Trilobites.

Part 1, Am. Jour. Sci., ser. 4, vol. 3, 1897, pp. 89-106, plate 3; continued on pp. 181-207.

Order Hypoparia.

Free cheeks, forming a continuous marginal ventral plate of the head, and in some forms also extending over the dorsal side at the genal angles.

Suture ventral marginal, or submarginal.

BEECHER (Charles E.)—Continued

Compound paired eyes absent; simple eyes may occur on each fixed cheek singly or in pairs.

Including the families Agnostidae Dalman, Fam. 2, Harpeididae Barrande, Fam. 3, Trinucleidae Barrande.

The first family includes the genera Agnostus Brongniart and Microdiscus (Emmons) Salter.

The second family, the genera Harpes, Goldfuss, Harpina Novák and Harpides Beyrich.

The third family, Trinucleus Lhwyd, Ampyx Dalman, Dionide Barrande, Endymionia Billings, Lonchodomas Angelin, Raphiophorus Angelin and Salteria W. Thompson.

Order B Opisthoparia.

Free cheeks generally separate, always bearing the genal angles.

Facial sutures extending forwards from the posterior part of the cephalon within the genal angles, and cutting the anterior margin separately, or rarely uniting in front of the glabella.

Compound paired holochroal eyes on free cheeks, and well developed in all but the most primitive families.

Fam. 4, Conocoryphidae Angelin, including the genera and subgenera.

Conocoryphe Corda Aneucanthus Ang. Atops Emmons, Avalonia Walcott, Bailiella Matthew, Bathynotus Hall, Carausia Hicks, Carmon Bar.

Ctenocephalus Corda, Dictyocephalites Bergeron, Eryx Ang., Harttia Walc., and Toxotis Wallerius.

Family 5, Olenidae Salter, including the genera.

Olenus Dalm. and the following genera and subgenera, which should fall into several sub-family or even family groups.

Acerocare Ang., Acrocephalites Wallerius, Agraulus Corda, Angelina Salter.

Anomocare Ang., Anopolenus Salter, Asaphelina Bergeron, Bavarilla Barr.

Bergeronia Matthew, Boeckia Brögger, Ceratopyge Corda, Chariocephalus Hall.

Corynexochus Ang., Crepicephalus Owen, Ctenopyge Linnarsson, Cyclognathus Linrs, Dikelocephalus Owen (Centropleura Ang.), Dorypyge Dames.

Ellipsocephalus Zenker, Elliptocephala Emmons, Euloma Ang., Eurycare Ang., Holmia Matthew, Hydrocephalus Barr. (young Paradoxides), Leptoplastus Ang., Liostracus Ang., Loganella Devine, Menocephalus Owen, Mesonacis Walc., Micmacca Matthew, Neseuretus Hicks, Olenelloides Peach, Olenellus Hall, Olenoides Meek, Oryctocephalus Walc., Paloeopyge Salter, Parabolina Salter, Parabolinella Brögger, Paradoxides Brong., Peltura Ang., Plutonides Hicks, Proceratopge Wallerius, Protagraulos Matthew, Protolenus Matthew, Protopeltura Brögger, Protypus Walc., Pterocephalia Roemer, Ptychaspis Hall, Ptychoparia Corda, Remopleurides Portlock, Sao Barr., Schmiditia Marcou, Solenopleura Ang., Sphaerothalmus Ang., Telepus Barr., Triarthrella Hall, Triarthrus Green, and Zacanthoides Walc.

A number of genera have been made the types of family divisions, as Paradoxides, Olenellus, Remopleurides, Ellipsocephalus, Ptychoparia, etc.

Family 6, Asaphidae Emmrich, including the genera and subgenera.

Asaphus Brong., Asaphellus Callaway, Asaphiscus Meek, Barrandia McCoy, Basilicus Slater, Bathyurellus Billings, Barthyuriscus Meek, Bathyurus Bill., Bolbocephalus Whitfield, Brachyaspis Salter, Bronteopsis W. Thompson, Dolichometopus Ang., Gerasaphes Clarke, Holasaphus Matthew, Homalalopecten Salter, Isotelus Dekay, Megalaspides Brögger, Megalaspis Ang., Niobe Ang., Ogygia Brong., Ogygiopsis Walc., Phillipsinella Novak, Platypeltis Callaway, Ptychopyge Ang. and Stygina.

The author includes under Illaenidae the genera Illaenus Dalm., Æglina Barr.,

BEECHER (Charles E.)—Continued

Bumastus Murch., Dysplanus Burmeister, Ectillaenus Salter, Holocephlina Salter, Hydralenus Salter, Illaenopsis Salter, Illaenurus Hall, Nileus Dalm., Octillaenus Salter, Panderia Volboth, Psilocephalus Salter, Symphysurus Goldfuss, and Thaleops Conrad.

Family 7, Proetidae Barrande.

Genera Proetus Steininger, Arethusina Barr., Brachymetopus McCoy, Celmus Ang., Cordania Clarke, Crotalurus Volb., Cyphaspis Burm., Dechenella Kayser, Griffithides Portl., Phaetonella Novák, Phillipsia Port., Prionopeltis Corda, Pseudophillipsia Gemmellaro, Schmidtella Tschernyschew, Tropidocoryphe Novak, and Xiphogomium Corda.

Family 8, Bronteidae Barrande.

Family 9, Lichadidae Barrande.

Genus Bronteus Goldfuss (Goldius DeKoninck).

Genera Lichas Dalm., Arctinurus Castelnau, Arges Golf., Ceratolichas Hall and Clarke, Conolichas Dames, Dicranogmus Corda, Homolichas Schmidt, Hoplolichas Dames, Leiolichas Schmidt, Metopias Eichwald, Oncholichas Schmidt, Platymetopus Ang., Terataspis Hall, Trochurus Beyrich and Uralichas Delgado.

Family 10, Acidaspidae Barrande.

Genera Acidaspis Murch., Ancyropyge Clarke, Ceratocephala Warder, Dicranurus Conrad, Odontopleura Emmrich and Selenopeltis Corda.

Order C, Proparia.

Free cheeks not bearing the genal angles; facial sutures extending from the lateral margins of the cephalon in front of the genal angles, inward and forward, cutting the anterior margin separately or uniting in front of the glabella.

Compound paired eyes, scarcely developed or sometimes absent in the most primitive family; well-developed and schizochroal in last family.

Family 11, Encrinuridae Linnarsson.

Genera Encrinurus Emmrich, Areia Barr., Cybele Loven, Dindymene Corda, Placoparia Corda and Prosopiscus Salter.

Family 12, Calymmenidae Brongniart.

Group 1, Calymmene Brong., and Calymenella Bergeron and Calymenopsis Munier-Chalmas and Bergeron.

Second Group, Homalonotus Koenig, Brongniartia Salter, Burmiesteria Salter, Trimerus Green, Ptychometopus Schmidt; Pharostoma.

Calymenopsis and Calymenella are closely related to Calymmene.

Family 13, Cheiruridae Salter.

Genera Cheirurus Beyrich, Actinopeltis Corda, Amphion Pander, Anacheirurus Reed, Ceraurus Green, Crotalocephalus Salter, Cyrtometopus Ang., Deiphon Barr., Diaphanometopus Schmidt, Eccoptocheile Corda, Hemisphærocoryphe Reed, Nieszkowskia Schmidt, Onycopyge Woodward, Pseudosphaerexochus Schmidt, Sphaerexochus Beyrich, Sphaerocoryphe Ang., Staurocephalus Barr., and Youngia Lindström.

Family 14, Phacopidae Salter.

Genera Phacops Emmrich, Acaste Goldf., Chasmops McCoy, Coronura Hall, Corycephalus Hall and Clarke, Cryphaeus Green (preoccupied for a genus of Coleoptera, 1833), Dalmanites Emm., Homalops Remele and Dames, Monorachos Schmidt, Odontocephalus Conrad, Pterygometopus Schmidt, Symphoria Clarke, and Trimerocephalus McCoy.

Note—Other subdivisions and classification of the Lichidae have been made by Gürich, and also by Reed.

The other families have been reclassified by Reed, Walcott and Raymond. Walcott remarks, in regard to Damesella, that the facial suture cuts the postero-lateral margin outside of the genal angle, so as to leave the genal angle on the fixed cheeks; the spine corresponding to the genal spine in other genera of the order Proparia is on the free cheeks.

BEECHER (Charles E.)—Continued

——— Trilobites in the Text Book of Palæontology (Zittel's).

Translated by Charles R. Eastman, London and New York, 1900, pp. 607-638.

——— Restoration of *Stylonurus Laconus*, a giant Arthropod from the Upper Devonian of the United States.

Am. Jour. Sci., ser. 4, vol. 10, 1900, pp. 145-150, plate.

——— The same.

Geol. Mag., Decade 4, vol. 7, 1900, pp. 481-485.

The author remarks that this specimen was collected in 1870, and loaned to Prof. Hall and described as *Eurypterus Beecheri* Hall, in 1884, in 36th Ann. Rep. N. Y. Mus. Nat. Hist. as *Stylonurus excelsior* as Hall's species. This paper appeared some months later than Claypole's paper, and the name *Dolichocephala Lacoana* has priority over *Stylonurus excelsior* and must be recognized.

Claypole's paper appeared in Proc. Am. Phil. Soc., vol. 21, April, 1883, to Jan., 1884.

——— Discovery of Eurypterid remains in the Cambrian of Missouri.

Am. Jour. Sci., ser. 4, vol. 12, 1901, pp. 364-366, plate.

Strabops Thacheri n. gen. et sp.

See also Geol. Mag., Decade 4, vol. 8, 1901, pp. 559-564, figure.

The generic name is in allusion to the inward turning or squinting of the eyes (squinting face).

The cephalthorax is comparatively shorter and wider than in Eurypterus; the eyes are further forward, nearer together and more oblique, and besides it has a telson, but 11 abdominal somites can be determined on the dorsal side, instead of 12 as in Eurypterus.

——— Ventral integuments of Trilobites.

Am. Jour. Sci., ser. 4, vol. 13, 1902, pp. 165-174, with 3 plates; also Geol. Mag., Decade 4, vol. 9, 1902, pp. 152-163, with 8 figures.

The author illustrates *Triarthrus Becki* Green, *Ptychoparia striata* Emm., *Asaphus magistus* Locke, and *Calymmene senaria* Conrad.

——— Note on a new Xiphosauran from the Upper Devonian of Pennsylvania.

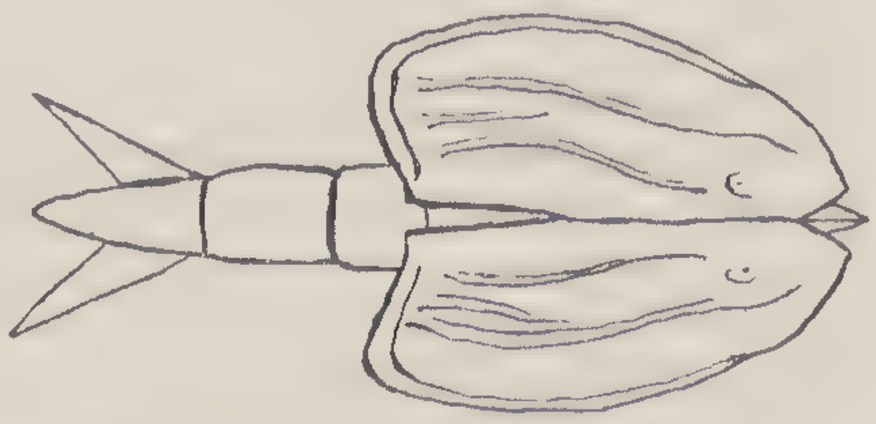
Am. Geol., vol. 29, 1902, pp. 143-146.

Prestwichia Randalli n. sp., with figure.

——— On Palæozoic Phyllopocarida from Pennsylvania.

Quart. Jour., Geol. Soc., vol. 58, 1902, pp. 441-449, plates.

Tropidocaris bicarnatus Beecher, *T. alternata* Beecher, *Elynocaris siliqua* Beecher.



Tropidocaris Bicarinata Beecher

Benden Van (M. E.) On the systematic position of the King Crabs and Trilobites.

Ann. Mag. Nat. Hist., ser. 4, vol. 9, 1872, p. 98.

Bernard (Henry M.) Trilobites with antennae at last.

Nature, 1903.

——— Systematic position of the Trilobites.

Geol. Mag., Decade 5, vol. 1, 1894, p. 230.

The author remarks the trilobites may be briefly described as fixed specialized stages in the evolution of the Crustacea, from an annelidan ancestor, with its mouth bent round ventrally, so as to use its parapodia as jaws.

——— Application of the sand blast for the development of Trilobites.

Geol. Mag., Decade 4, vol. 1, 1894, p. 553.

Berkey (Charles P.) Geology of the St. Croix Dalles.

Am. Geol., vol. 21, pp. 270-294, plates 18-21, 1898.

The author includes and illustrates the following Trilobites:

Agraulus convexus Whitf., with var. A and B, *A. hemisphericus* n. sp.

Ptychoparia calymenoides (Whitf.). The genotype of Menomonia new genus by Walcott, 1916.

Cheilocephalus n. gen.

The author figures the glabella and fixed cheeks. Cephalic shield semi-circular, strongly convex, about equal to one-fourth part of a spheroid (front limb), formed by a narrow ring projecting at a right angle beyond the general surface of the shield. Glabella broad, convex anteriorly, slightly convergent and reaching to the narrow marginal rim; surface nearly smooth with two pairs of scarcely perceptible furrows; marginal grooves not strongly marked; faint occipital ring, but more strongly marked on the cheeks. Fixed cheeks, broad and conforming to the general spherical outline; the posterior margin developed in a spine-like projection a little removed from the glabella. Eyes a little anterior to the middle and remote from the glabella. Facial sutures extend from the eyes forward almost parallel to the side of the glabella and backward, with a double curve to the genal angle.

Cheilocephalus St. Croixensis n. sp. (Facial suture like Cyclognathus.)

The author also figures *Dikelocephalus misa* Hall, referred by Walcott to the genus Amomocare.

Berjeron (J.) Notes Palaeontologiques.

Bull. Soc. Geol. France, 3rd ser., vol. 23, 1895, p. 465, plates 4-5.

Calymenopsis Filacovi n. gen. et sp. *Amphion Escorti* n. sp.

Dicellocephalus? Villerbruni n. sp. *Asaphelina Barroisi* Mun. Ch. et J. Berg. *Ogygia Lignieresti* n. sp. *Æglina Sicardi* n. sp. *Æglina? Savini* n. sp. *Dictyocephalus Villerbruni* n. gen. et sp.

The author remarks that the new genus *Calymenopsis,* "Il est caracterise par la presence de pointes genales par la forme de la grande suture; par le presence de cavites dans le sillon anterieur, cavites qui semblent etre comparable a cellos du limbe des *Trinucleus;* par la presence d'une bande oculaire; enfin par la forme en pyramide des joues mobiles."

——— Notes Paléontologique—Crustacés iv. étude de quelques Trilobites de Chine.

Bull. Soc. Geol. France, 3rd ser., vol. 27, 1899, pp. 499-515. Plate.

Calymmene? sinensis n. sp. This species forms the genotype of *Blackwelderia* Walcott, new genus. *Agnostus Douvillei* n. sp. *Olenoides Leblanci* n. sp.

Dicellocephalus? sinensis n. sp. Walcott Cambrian Fauna of China, p. 35, places this species under his new genus *Damesella.*

Drepanura Premesnilli n. gen. et sp. Compare *Bathynotus. holopyga* Hall.

Arthricocephalus Chauveaui n. gen. et sp.

"La caracteristique de cette forme est la structure annelee de tout son corps et en particulier de la glabella. Celle-ci semble formee d'anneaux superposes et a ce point de vue seulement elle rappelle la disposition caracteristique du genre *Olenellus.*"

Bézier (T.) On *Niloeus Beaumanti* Rouault, 1847.

Palæontologia Universalis Fasc. 3, ser. 2, 1907, p. 119, plate.

The species was described by Rouau[14], Bull. Soc. Geol. Fr., 2d ser., vol. 14, 1847, pp. 321 and 326.

Distinguished from *Niloeus Armadillo* by its large pygidium.

——— On *Prionocheilus Verneuili* Rouault, 1847.

Palæontologia Universalis Fasc. 3, ser. 2, 1907, p. 120, plate.

The author refers *Calymmene pulchra* Barr., to this species, and refers Corda genus Pharostoma to Rouault's older genus Prionocheilus, which was described by Rouault in Bull. Soc. Geol. Fr., 2 ser., vol. 4, 1847, pp. 320-321, pl. 3, figs. 3 and 3a.

As *Prionocheilus Verneuili,* the holotype shows spines on the outer margin of the head.

The species has been referred to Calymmene by Barrande.

To Pharostoma by Corda, Pompecki and Angelin.

The name of *Verneuili* for a species of Calymmene has been used by d'Orbigny, 1842. Tromelin and Lebesconte, 1876, Assoc. Fr. Sc., Congres Nantes, p. 629, changes the name from *Calymmene Verneuili* to that of *Calymmene Prionocheili.*

Bigot (A.) Catalogue critique de la collection Defrance, conservée au Musée d'histoir Nat. de Caen.

Bull. Soc. Normand, vol. 8, pp. 250-273. Trilobites, pp. 264-65.

Alexander Bronginart and A. G. Demarest used the collection of the Museum in making up their celebrated work on Fossil Crustaceans in 1822.

The collection contains Defrance's original of figs. 2f and 2g.

Calymmene Tristani, which is reproduced, Plate 1A Palæontologia Universalis, by M. Pompejck, in 1903.

The *Ogygia Guettardi* Brong. was reproduced by Oehlert in Palæontologia Univ.

Bolton (Herbert). On the occurrence of a Trilobite in the Skiddaw Slates of the Isle of Man.

Geol. Mag., Dec. iii, vol. 10, 1893, pp. 29-31.

Æglina or Asaphus.

See also Mem. Geol. Sur. United Kingdom, The Geol. Isle of Man, 1902, p. 93.

Bigney (Andrew J.) A new bed of Trilobites.

Indiana Acad. Sci. Pro., 1910, p. 139-1911.

Records the discovery of Calymmene bed in Richmond formation.

Bolton (H.) On faunal horizons in the Bristol Coalfield.

Quart. Jour. Geol. Soc. London, vol. 67, p. 316, 1911, pl. 27.

Palæontological Notes, Ostracoda and Phyllopoda, on p. 324.

The author figures the following species:

Estheria tenella Jordan, *Bairdia* cf. *amplex* Reuss, *Leaia Leidyi* Lea, var. *salteriana* Jones.

Bonnema (J. H.) Beträge zur Kenntniss der Ostrakoden der Kuckersschen Schicht.

Mitteilungen aus dem Min. Geol. Inst., vol. 2, part 1, Leipzig, 1909, 84 pp. with 8 plates.

The author gives the literature of this family, and describes and figures the following genera and species:

Primitia Tolli nov. sp., *P. Molli* nov. sp., *P. dentifera* nov. sp., *P. rossica* nov. sp., *P. decumana* nov. sp., *P. Kuckersiana* nov. sp., *P. Kapteyni* nov. sp., *P. Esthonica* nov.

sp. *Primitiella Kuckersiana* nov. sp. *Tetradella Calkeri* nov. sp.; also *convexa* n. sp. et nov. var. *Ctenobolina carinata* Krause, *C. Kuckersiana* nov. sp. *Ceratopsis Schmidti* n. sp., *C. cornuta* Krause. *Strepula Kuckersiana* nov. sp., also var. *acuta. Ulrichia* cf. *bidens* Krause, *U. Kuckersiana* n. sp. *Macronotella Kuckersiana* nov. sp. *Bollia minor* Krause var., *Kuckersiana* nov. var., also var. *robusta. Bollia ornata Krause*, also var. *latimarginata* nov. var., *B. granulosa* Krause. *Entomis oblonga* Steusloff var., *Kuckersiana* nov. var., *E. variolaris* nov. sp., *E. obliqua* Krause var. *Kuckersiana* nov. var., *E. flabellifera* Krause, *E. quadrispina* Krause. *Cytherellina Ulrichi* nov. sp., *C. Jonesii* nov. sp., *C. Krausei* nov. sp., *C. Ruedemanni* nov. sp. *Leperditia (Cypridina) ovulum*, referred to *Primitia Tolli* n. sp. *Leperditia minuta* Eichw., referred to *Cytherellina Ulrichi* n. sp. *Beyrichia obliquejugata* Schmidt to *Ceratopsis* sp. *Beyrichia complicata* Salter, referred to *Tedradella Kuckersiana* n. sp., *B. stangulata* Salter to *Bollia minor* Kr. var. *Kuckersiana, B. strangulata* var., *B. Jones* to *Bollia ornata* Kr. or *Entomis.*

Bornemann (J. G.) Die Versteinerungen des Cambrischen Schichen systems der Insel Sardinien.

N. Act k. Leop. Carl d. Acad. d. Natur., vol. 56, No. 3, 1891.

Under the new generic name of Olenopsis the author includes a genus which differs from Olenus in the form of its small, rounded pygidium with an unjointed axis; the head is semicircular in front and not straight as in Olenus; it has also a conical smooth glabella, with 14 or 15 thorax segments.

The genus has been referred by Frech *Lethaea geognostica,* I Theil. *Lethaea palaeozoica,* 2 Bd., I Lieferung, p. 41, to *Olenellus* sub. genus *Holmia.*

The author describes *Olenopsis Bornemanni* n. sp., *O. Zoppii Menegh., O. longispinatus* n. sp., *O. micruroides* n. sp., and *O. maximus.*

Metadoxides torosus Menegh. n. gen. et sp.

This genus is similar to *Paradoxides* with numerous thoracic segments and a small pygidium. The head is short and wide; the front margin nearly straight; the glabella is similar to that of the Olenidae, and has three oblique furrows, which do not extend to the center.

Metadoxides armatus Menegh., *M. Bornemanni* Menegh., *M. arenarius* n. sp.

Matthew, in Studies on Cambrian Fauna, No. 3, p. 87, classifies the genus *Metadoxides* as follows:

1—Species having a widely expanded front to the cephalic shield; somewhat prolonged eye lobes; short posterior extension of the dorsal suture. No costae on the side lobes of the pygidium.

Catadoxides n. subgen., type *C. magnificus* Matt.

2—Species having a compacted front to the cephalic shield, short eye lobes, prolonged posterior extension to the dorsal suture.

a—No costae on the side lobes of the pygidium.

Metadoxides sen stric., type *M. torosus.*

b—One or more pair of costae on the side lobes of the pygidium.

Anadoxides n. subgen., type *A. armatus.*

The following species are also included in Bornemann's paper:

Paradoxides Gennarii Menegh., *P. asper* n. sp., *?P. ingens* n. sp., *?P. bifidus* n. sp., *? Paradoxides* sp. *Olenellus solitarius* n. sp.

? Peltura inflata n. sp. *Ptychoparia laticops* n. sp., *? P. Adamsi* Bill., *P. enantiopa* n. sp. *Sao sarda* n. sp. *Meneghinella* n. gen., *M. serrata* n. sp.

The glabella has four cross furrows, with a center row of spines.

Arionellus ? dubius n. sp., *A. zancanthoides. Anomocare arenivagum* Menegh. *Neseuretus? discurus* n. sp. *Giordanella* n. gen.

The species of this genus resembles in structure of the thorax those of *Illaenus,* from which they differ by the more arched axis, and the side spines of the pygidium.

Angelina differs from *Giordanella* in its flat head, and the margin around it; also in the size of its pygidium.

Giordanella Meneghinii Bormen., *G. dilatata* n. sp., *G. elongata* n. sp.

Boulay (M. L'abbe). Sur un nouveau genre de Trilobite dans le terrain. Houiller du nord de la France.

Ann. Sci. Bruxelles, 4 Anne, 1879-80, Memori, p. 277-280.

Under the new generic name of Anthracopeltis, the author describes and illustrates a pygidium as *Anthracopeltis Crepini.*

The pygidium resembles that of Phaeton Barrande, but may be distinguished by the shape of the axis, also by a groove which runs around the tail near the base of the spines.

Boule (M.) Sur des debris d'Arthropleura trouvés en France.

Bull. de la Soc. de l'Industrie Minerale, 3rd ser., tome 7, 4 livr, 1893, pp. 619-638, plates 54-55.

Brodie (P. B.) On the Passage beds in the neighbourhood of Woolhope, Herefordshire, and on the discovery of a new species of Eurypterus and some new Land plants in them.

Geol. Mag., Decade 1, vol. 8, 1871, p. 230.

The author describes as the passage beds between the Silurian and Old Red sandstone formation near Woolhope, a series of shales and sandstones. The Olive shales contain several crustacean fossils, including *Pterygotus Banksii,* and a new Eurypterus named by Henry Woodward *Eurypterus Brodiei.*

Branson (E. B.) The fauna of the residuary Auburn Chert of Lincoln County, Missouri.

Trans. Acad. Sci. of St. Louis, vol. 18, No. 4, 1909, pp. 39-49, pl. 7.

The author describes as new *Pterygometopus Lincolnensis,* which differs from *P. eboraceous* in the absence of genal spines, and slightly in the shape of the first lateral furrow of the glabella from *P. intermedius* Walc., which he figures on pl. 8, fig. 20.

Brögger (W. C.) Ueber die Verbreitung der Euloma Niobe Fauna.

Nyt. Mag. Natv., vol. 35, 1896, pp. 164-240.

The author refers to the new genus *Dikelokephanina.*

Centropleura dicraeura Ang. *Dikelocephalus furca* Salt. *Asaphelina Barroisi* Mun-Chalm et Berg. and *Dictyocephalites Villebruni* Berg., to this genus.

Under the new genus Apatokephalus, the author places *Tril serratus* S. & B. *Centropleura angusticauda* Ang. (probably a variety of Apatokephalus serrata Brögg., p. 21).

Dik. finalis Walc., *D. Schlotheimi* Bill. *(Remopleuridesi Schlotheimi* Bill., 1865.) *Dikelocephalus Magnificus Conocorphyhe invita,* Salter.

Bureau (L.) Notice geol. sur Loire Inférieure, 1900.

The author gives a fig. 23 of *Calymmene pulchra* Barr.

Bezier refers it to *Prionocheilus Verneuili* Rouault.

Burling (L. D.) The Albertella Fauna in the Middle Cambrian of British Columbia.

Am. Jour. Sci., 4th ser., vol. 42, 1916, p. 469.

Albertella Bosworthi and *A. Helena* Wal.

Burr (Henry T.) A new Lower Cambrian fauna from Eastern Massachusetts.

Am. Geol., vol. 25, 1900, pp. 41-50.

The fossils described from a red slate and impure limestone from North Weymouth, Mass.

Olenellus (Holmia) *bröggeri* Walc., *O. (Mesonacis) asaphoides* Emm. *Olenellus* sp. *Metadoxides magnificus* Matt. *Agraulus (Strenuella) strenuus* Bill. var. *nasutus* Walc. *Microdiscus* cf., *M. Helena* Walc. *Leperditia* cf., *L. solitaria* Barr.

Burhenne (H.) Fauna d. Tentaculitenschiefer in Lahngebiet bes d. Schiefer v. Leun bei Braunfels. 1899.

Proetus laevigatus and *granulosus,* pl. 1, fig. 1-6; *Proetus Holzapfeli* referred by Richter to *P. cornutus.*

Cyphaspis hydrocephala Roemer.

Calman (W. J.) On *Pleurocaris* a new Crustacean from the English Coal Measures.

Geol. Mag., Decade v, vol. 8, 1911, p. 156. Fig. in text.

Pleurocaris annulatus g. et sp. n.

The specimen is without a carapace, with at least 7 of the thoracic somites distinct and provided with horizontally expanded pleural plates; with at least 7 pairs of the thoracic appendages, not greatly differing in size; with the abdomen longer than the thorax; with the telson and uropods forming a tail fan—the former distinct from the last somite and tapering to a sharp point, the latter with long, narrow rami.

Acanthotelson Simpsoni Meek and Worthen

The author includes the genus in Syncarida allied to the genus *Acanthotelson* Meek and Worthen.

Calman (W. T.) On some Crustacea of the division Syncarida from the English Coal Measures.

Geol. Mag., Decade v, vol. 8, No. 11, 1911, pp. 488-495, figures 1-5.

The author regards the genus Preanaspides Woodward, as a synonym of Palæocaris Meek and Worthen.

Figures and describes *Palaeocaris praecursor* H. Woodw., also *Palaeocaris typus* after Packard's figure of the species.

The author also gives some additional notes regarding *Pleurocaris annulatus,* with a figure of the restoration of dorsal surface of the head region.

Calvin (Samuel). Description of *Asaphus susae.* Calvin in MS.

Whitfield Geol. Wisconsin, vol. 4, p. 236, pl. 5, fig. 3, and pl. 10, fig. 8, from the Trenton Group.

——— Description of *Isotelus florencevillensis* n. sp.

Iowa Geol. Sur., vol. 13, 1902, p. 46, foot-note, from the Maquoketa or Hudson River shales.

This is the rather short and broad trilobite, with rounded cephalon and pygidium, which Clarke Geol. Pal., vol. 3, part 2, p. 708, referred to *Isotelus susae.*

Cardot (H.) and **Legendre** (R.) Nouvelles traces d'autotomie chez des Crustaces fossiles.

Bull. Mus., Paris, 1912, pp. 131-132.

Carruthers (William). Note on some supposed fragments of a Eurypterus in Dr. Henry Woodward's British Fossil Crustacea Merostomata.

Mon. Palaeont. So., pp. 168-71.

The author remarks that the specimens figured and described by Salter as portions of a Eurypterus, are fragments of a large Equisetaceous plant.

Chapman (Frederick). On a new species of Leperditia from the Silurian of Yaas, New South Wales.

Proc. Roy. Soc. Victoria, vol. 22, pp. 1-5, plates 1 and 2.

Leperditia shearsbii nov.

——— New or little known Victorian Fossils in the National Museum, Part XIV. On some Silurian Trilobites.

Proc. Roy. Soc. Victoria, vol. 24, 1912, pp. 293-300, plates 61-63.

The author describes:

Ampyx parvulus Forbes var. *Jikaensis* nov., *A. yarraensis* nov. *Illaenus jutsoni* nov. The Victorian species differs in ornamentation of the glabella from *Illaenus Davissi.* It has a narrow and rounded median ridge, extending along the summit of the glabella, tapering off into a mere thread before reaching the anterior margin.

Encrinurus (Cromus) spryi nov. *Homalonotus vormer* nov.

——— New or little known Victorian Fossils in the National Museum, Part XVIII. Some Yeringian Trilobites.

Proc. Roy. Soc. Victoria, vol. 28, 1915, pp. 157-171, plates 14-16.

The author includes eleven species of Trilobites in this paper:

Goldius greenii nov., which he compares with *Bronteus oblongus* Corda. *Goldius Cresswelli* nov. *Proetus euryceps* McCoy. *Cyphaspis Browningensis* Mitchell, *C. Lilydalensis* nov. of the *Cyphaspis Burmeisteri* type, *C. yassensis* E. & M. *Calymmene angustior* nov.

Compares *C. tuberculosa* and other species.

The lateral riblets of the pygidium in *C. angustior* are furrowed or bifurcated distally, but in *C. tuberculosa* they are simple. *Calymmene Blumenbachi* Brong. Refers *C. duplicata* (Murch.) Jenkins, 1879, p. 27, pl. 6, fig. 4, to this species.

Cheirurus Sternbergi Boeck. *Phacops Crossleii* E. & M., *P. serratus* Foerste.

Chevillard (J. L.) Trilobites du Devonien du Mount de la Revenue.

Bull. Soc. Geol. de France, 2d ser., vol. 24, 1866-67, pp. 124-126.

Not descriptive.

The author remarks that *Phacops laevis* Münst. is very much like *Phacops cryptophthalmus* Emmrich.

Chmielewski (Czeslaw). Die Leperditien der obersilurischen Geschiebe des Gouvernement Kowno und der Provinzen Ost und Westpreussen.

Phys. ökonomischen Ges zu Köningsberg, 1900, 37 pp., 3 plates.

The author describes the following species:

Leperditia Hisingeri Fr. Schmidt var., *angulata* Lebedew, *L. lithuanica* n. sp. and var. *intermedia, L. Dossi* n. sp., *L. Hisingeri* var. *abbreviata* Schmidt, *L. baltica* His., *L. phaseolus* His. Stammform, *L. phaseolus* His. var. *Angelini* Schmidt, also types and var. *lata* n. var., *L. phaseolus* His. var. *ornata* Eichw., included under Group A.

His. Group B, includes *Leperditia gregaria* Kiesow and var. *coccinnella* n. var., *Leperditia gregaria* var. *tumulosa* n. var. and var. *conoidea* n. var. with var. *seimgalliensis* n. var. *Leperditia Schellwieni* n. sp., *L. gigantea* Roemer and var. *Poniewieshensis* n. var. *Leperditia* sp. cf. *tyraica* Schmidt. *Leperditia Keyserlingi* Schmidt and *L. baltica* var. *Eichwaldi* Schmidt.

Clarke (J. C.) Relation of the Palæozoic Arthropods to the Strandline.

Bull. Geol. Soc. America, vol. 22, No. 2, pp. 279-280, 1911.

Clarke (John M.) Notes on some Crustacea from the Chemung Group of New York.

49th Ann. Report N. Y. Museum, vol. 11, 1895, pp. 729-738.
Pephicaris horripelta n. gen. et sp. *Bronteus serescens* n. sp.

——— The stragraphic and faunal relations of the Oneonta sandstone and shales, the Ithaca and Portage Groups in Central New York.

49th Ann. Report N. Y. Museum, vol. 11, 1895, Part 2, p. 69, fig.
Rhinocaris ? bipennis n. sp.

——— Upper Silurian fauna of the Rio Trombetus, State of Para, Brazil, and Devonian Mollusks from the State of Para.

Archiv. Mus. Nacional, Rio de Janeiro, vol. x, 1899.
Primita minuta, Eichw. *Bollia lata*, Vanuxem.

Rhinocaris Columbina

——— *Eucrustacea* (pars) *acerta.*

Text Book of Palæontology by A. von Zittel. Translated by Charles R. Eastman, London and New York, 1900, pp. 639-658.

——— The Oriskany fauna of Becaft Mountain, Columbia Co., New York.

Memoirs New York State Museum, vol. 3, No. 3, Albany, 1900, 9 plates.
Dalmanites (Synphoria) stenmatus n. sp., *D. (Synphoria) stemmatus* var. *convergens* n. var. *D. phacoptyx* H. and C., *D. bisignatus* n. sp. *Phacops correlator* n. sp., *P. Logani* Hall. *Cordania becraftensis* n. sp., *C. Hudsonica* n. sp. *Cyphaspis minuscula* Hall. *Proetus Conradi* Hall. *Acidaspis tuberculata* Conrad. *Lichas* cf. *pustulosus* Hall. *Homalonotus* sp. *Beyrichia* sp.

——— Appendix 3, Notes on Palæozoic Crustaceans. The genus *Pseudoniscus* in the *Eurypterus* beds below and above the Gypsum and Salt beds of the Salina stage in New York.

Ann. Report State Palæontologist, 1900.
Pseudoniscus Roosevelti n. sp.

CLARKE (J. M.)—Continued.

——— Phyllocardia from the Black shales at the base of the Salina beds in Western New York.

Ann. Report State Palæontologist, 1900, pp. 92-110.
Ceratiocaris (Limnocaris) praecedens n. sp. *Emmelezoe decora* n. sp.

——— The occurrence of the Phyllopod Crustacean *Estheria membrancea* of the Old Red Sandstone of Northern Scotland and Northwestern Russia in the Oneonta.—Catskill sediments of Eastern New York.

Ann. Report State Palæontologist, 1900, pp. 103-110, plate 4.
Estheria Ortoni n. sp.

——— Limestone of Central New York interbedded with bituminous shales of the Macellus, with notes on the nature and origin of their faunas.

Bull. N. Y. Museum, vol. 49, 1901, pp. 115-138, plate 8.
Not descriptive. List of Fossil Crustacea.

——— and **Ruedemann** (R.) Guelph fauna in the State of New York.

N. Y. State Museum, Mem. 5, 1903.
The authors describe and illustrate *Leperditia balthica* Hisinger var. *guelphica* Jones. *Calymmene niagarensis* Hall; also a species of Dalmanites and Proetus.

——— Percé: A brief sketch of its geology.

Bull. New York Mus., No. 80, pp. 134-171, 1905.
Represents an incomplete cephalon of *Dicranurus limenarcha*, on p. 153.

——— some new Devonic Fossils.

Bull. 107, N. Y. State Mus. Geological Papers, 1907, pp. 153-291.
Trilobites: *Dalmanites griffoni* n. sp., fig., *D. coxius* n. sp., fig., *D. dolbeli* n. sp., fig., *D. Lowi* n. sp., fig., *D. perceensis* n. sp., fig., *D. Veiti* n. sp., fig., *D. Whiteavesi* n. sp., fig., *D. Gaveyi* n. sp., fig., *D. ploratus* n. sp., fig., *D. (Probolium) Bairdi* n. sp. fig., *D. (Probelium) Esnoufi* n. sp., fig. *Phacops Logani* var. *gaspensis* n. sp., fig., *P. (Fhacopidella) Mylanderi* n. sp., fig. *Bronteus Barrandii*, Hall, var. *major*, fig. *Lichas (Gaspelichas) forillonia* n. sp., fig., *L. bellamicus* n. sp., fig. *Ceratocephala robinia* n. sp., fig. *Cordania gasepiou* n. sp., fig.

——— The Eurypterus shales of the Shawangunk Mountains in Eastern New York.

Bull. 107, N. Y. State Mus. Geological Papers, 1907, pp. 295-310, 8 plates.
Eurypterida: *Eurypterus maria* n. sp., *E. myops* n. sp., *E. ? cicerops* n. sp., *E. ? cestrotus* n. sp.
Genus Hughmilleria *H. shawangunk* n. sp.
Genus Pterygotus *P. ? otisius* n. sp. *Stylonurus* sp. Phyllocardia.

——— Early Devonic History of New York and Eastern North America.

N. Y. State Mus., Men. 9, pt. 1, 366 pp., 48 plates, 1908.
Fauna of the St. Alban beds; *Phacops logani* Hall. *Dalmanites griffoni* nov., *D. coxius* nov. *Bronteus barrandii* Hall. *Cordania cyclurus* Hall and Clarke.

CLARKE (J. M.)—Continued.

Fauna of the Grade Greve Limestones. *Phacops logani* Hall and var. *gaspensis* nov. *Dalmanites micrurus* Green, *D. dolbeli* nov., *D. lowi* nov., *D. veiti* nov., *D. Whiteavesi* nov., *D. perceensis* nov., *D. emarginatus* Hall, *D. gaveyi* nov., *D. (Probolium) bairdi* nov., *D. (P.) esnoufi* nov., *D. phacoptyx* H. & C.

Proetus phocion Billings. *Cordania becraftensis* Clarke, *C. gasepion* nov. *Lichas bellamicus* nov. *Lichas (Gaspelichas) forillonia* nov. *Ceratocephala robinia* nov. *Aparchites* nov. *Bythocypris* sp. nov. *Phacops (Phacopidella) correlator* Clarke.

——— Early Devonic History of New York and Eastern North America.

N. Y. State Mus., Mem. 9, part 2.

The author illustrates *Dalmanites micrurus* Green Proetus sp. *Bronteus Barrandii* Hall. *Pterygotus* sp. from the Dalhouse Beds.

From the Moose River sandstone the following Crustacea:

Homalonotus cf. *vanuxemi* Hall. *Dalmanites pleuroptyx* Green, *D. ploratus* Clarke Dalmanites sp.

From the Chapman sandstone: *Phacops (Phacopidella) mylanderi* Clarke. *Homalonotus vanuxemi* Hall. *Dalmanites* cf. *micrurus* Green.

New York Oriskany *Dalmanites emarginatus* Hall.

——— and **Ruedemann** (Rudolf). Mode of life of the Eurypteridae.

Science, new ser., vol. 32, p. 224, Aug. 12, 1910.

——— and **Ruedemann** (Rudolf). The Eurypterida of New York.

Memoir 14, New York State Museum, vol. 1, Text vol. 2, plates, 1912, 638 pp., 88 plates, 121 text figures.

Reviewed in Am. Jour. Sci., vol. 35, No. 208, 1913, p. 458.

The reviewer remarks (Schuchert): "It is truly a monumental work and a model for all palæontologists to follow."

In this work one can study Eurypterida from any view point permitted the palæontologist. Here we find their chronology, their development from baby stages, prophetic of unknown ancestors, to adults; and their relations to scorpions, horseshoe crabs, Trilobites and even to hypothetic annelids.

The authors illustrate in text and plates the following species:

Strabops thacheri Beecher.

Eurypterus.

The American species of Eurypterus readily fall into three subdivisions:

(A) Those that groups themselves around *E. remipes.*

(B) Those that vary in different directions from this group, but are approximately contemporary—E. Dekayi, etc.

(C) The later Carbonic species.

Under this genus the authors describe:

Eurypterus remipes DeKay, *E. lacustris* Harlan, *E. lacustris* Hall var. *pachychirus* Hall, *E. DeKayi* Hall, *E. maria* Clark. This species differs from American congeners, due to the terete form of the body that apparently is without preabdominal expansion.

Eurypterus pygmaceus Salter differ but slightly. *Eurypterus megalops* nov., *E. microphthalmus* Hall. The authors refer *E. eriensis* Whitfield, to this species. *Eurypterus pittsfordensis* Sarle, *E. (Dolichopterus ?) prominens* Hall, *E. pustulosus* Hall. Authors refer *E. giganteus* Pohlman and *E. globicaudatus* Pohlman to this species. *Eurypterus pristinus* nov., *E. ranllarva* nov., *E. ? (Dolichopterus ?) stellatus* nov., *E.*

CLARKE (J. M.) and RUEDEMANN (R.)—Continued

(Onychopterus) Kokomoensis Miller and Gurley. This is subgenus proposed for this species.

The authors classify *Eurypterus Boylei* Whiteaves under a new subgenus *Tylopterus.*

Eurypterus (Anthraconectes) mazonensis Meek and Worthen. *Eusarcus* Grote and Pitt. *Eusarcus scorpionis* Grote and Pitt. The authors refer *E. grandis* G. & P. to this species. *Eusarcus newlini* Claypole. The authors refer *Eurysoma newlini* and *Carcinosoma newlini* Claypole to this species. *Eusarcus ? cicerops* Clarke, *E. ? longiceps* nov., *E. triangulatus* nov. *Dolichopterus macrochirus* Hall, *D. frankfortensis* nov., *D. latifrons* nov., *D. otisius* Clarke, originally described under the genus pterygotus; *D. siluriceps* nov., the *Eusarcus scorpionis* Pohlman, 1886, *D. testudineus* nov., *D. stylonuroides* nov.

Genus *Stylonurus* Page. The authors illustrate *S. elegans* Laurie and *S. logani* Woodward, also *S. macrophthalmus Laurie.* They divided the genus into subgenera.

(A) Stylonurus type *S. logani* Woodward, etc.

(B) Ctenopterus type *Stylonurus cestrotus* Clarke, etc.

(C) Tarsopterus type *S. scoticus* Woodward.

Stylonurus (Ctenopterus) excelsior Hall. .....

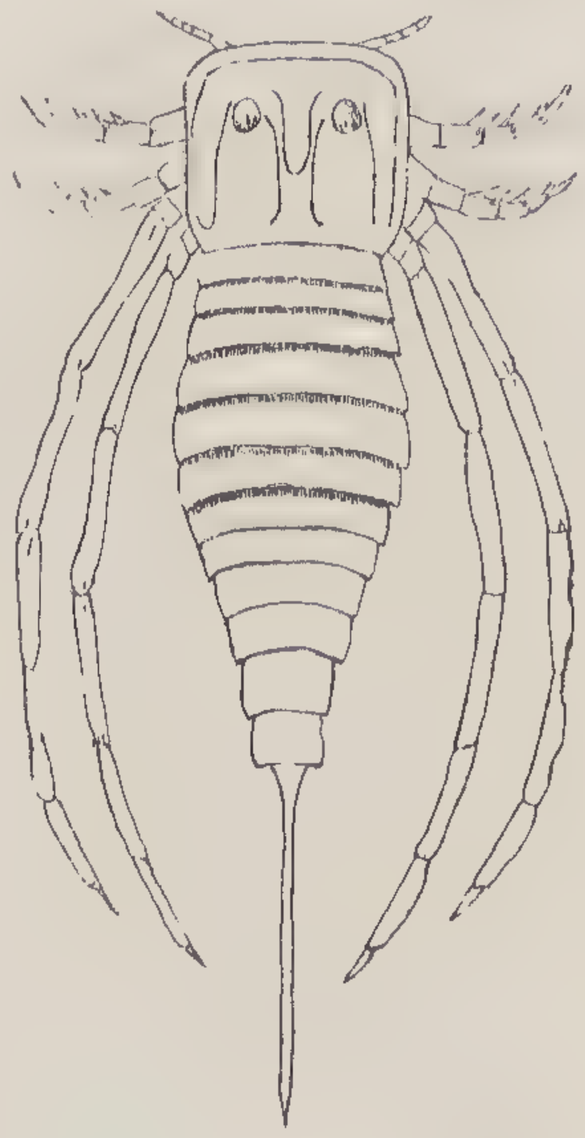
The author refers *Dolichocephala lacoana* Claypole, 1883, and *S. lacoanus* Beecher, 1900, to this species.

(Drepanopterus) type *S. lobatus* Laurie.

Stylonurus limbatus nov., *S. (Ctenopterus) multispinosus* nov., *S. myops* Clarke. *Stylonurus beecheri* Hall, described as *Eurypterus beecheri,* Hall, 1884; *S. wrightianus* Dawson, described as *Equisetides wrightiana* Dawson, 1881. Subgenus *Drepanopterus* Laurie. The authors figure *D. pentlandicus* Laurie, *D. longigaudatus* nov.

Echinognathus Walcott, *E. clevelandi* Walcott.

Megalograptus Miller, *M. welchi* S. A. Miller. This was described as a Graptolite by Miller, 1874.



Stylonurus Logani Woodward

Family Pterygotidae:

Genus *Hughmilleria* Sarle, 1902, *H. socialis Sarle* and var. *robusta, H. magna* nov., *H. shawangunk* Clarke.

Pterygotus Agassiz:

The authors figure a restoration of *Stylonurus poweiei* and *Pterygotus angelicus,* fig. 70. Describe and illustrate *Pterygotus macrophthalmus* Hall, to which they refer *P. osborni* Hall, *P. atlanticus* nov., *P. buffaloensis,* Pohlman emend. The authors refer *P. cummingsi* Grote and Pitt, 1877, *P. acuticaudatus* Pohlman, 1881, *P. quadraticaudatus* Pohlman, *P. macrophthalmus* Pohlman, 1881, and *P. bilobus* (Huxley and Salter) Pohlman, 1881, to this species. *Pterygotus cobbi* Hall, *P. (Erettopterus) globiceps* nov., *P. (Erettopterus) gandis* Pohlman emend.

This is the *Ceratiocaris grandis* Pohlman, 1883, *P. monroensis* Sarle, *P. (Eusarcus) nasutus* nov., *P. prolificus* nov.

Remarks on *Beltina danai* Walcott.

The authors are not convinced that the fragments of this genus described are those of merostomatus.

Note on *Proscorpius osborni* Whitfield.

CLARKE (J. M.) and RUEDEMANN (R.)—Continued

The authors remark that Eusarcus and the Siluric scorpions are so much alike in their body form, they may be assumed to have had similar habits.

The genus *Hastimima* White, 1909.

This genus was established for a few carbonic plants from Brazil. Seward, 1909, and Woodward refer similar fragments to the Eurypteridae. The authors give figures of *Hastimima whitei.*

Note on *Sidneyia inexpectans* Walcott.

The authors remark that the suborder Limulava differs from the Eurypteridae, to which it is most nearly related, in having a large epistoma similar to that of the Trilobita.

Eurypterids from the Normanskill shale of New York.

Eurypterus chadwicki nov. *Eusarcus linguatus* nov. *Dolichopterus breviceps* nov. *Stylonurus modestus* nov. *Pterygotus (Eusarcus) nasutus* nov., *P. normanskillensis* nov.

The authors give notes on the Eurypterids from the Shawangunk grit of the Delaware Water Gap, Pennsylvania, and describe as new *Eusarcus vaningeni* from the Salina formation.

Notes on Anthraconectes.

The authors investigated the types of C. E. Hall and James Hall, Pennsylvania Carbonic species, now in Chicago Univ., and make some notes on *Eurypterus (Anthraconectes) mansfield* C. E. Hall, *E. pennsylvanicus* C. E. Hall.

The volume closes with a note and figure on the ventral surface of the cephalothorax of Hughmilleria, and a note on *Pterygotus Cobbi* var. *juvenis* nov.

——— A notable Trilobite from the Percé rock.

New York State Museum Bull. 164, 1913, p. 138.

The author illustrates Plate *A. Homalonotus perceensis.*

——— Illustrations of the Devonian fossils of Southern Brazil and the Falkland Islands.

New York State Museum Bull. No. 164, 1913, p. 140.

The author illustrates the following Trilobites:

Homalonotus noticus Clarke, *H. (Schizopyge) parana* Clarke, *H. herscheli* Murch. *Dalmanites acacia* Schwarz.

Calmonia new genus, *C. ocellus* Lake, *C. subseciva* Clarke, *C. signifer* and variation, *micrischia* Clarke. Proboloides new genus, *P. cuspidatus* Clarke and *P. pessulus* Clarke.

Pennaia new genus, *P. pauliana* Clarke. *Cryphaeus allardyceae* Clarke, *C. australis* Clarke. *Dalmanites falklandicus* Clarke, *D. accola* Clarke. *Homalonotus perceensis* Clarke.

——— Fosseis Devonianos do Paranä.

Service Geol. E. Mineralogico do Brazil, vol. 1, 1913.

The author illustrates and describes the following Trilobites:

Homalonotus noticus nov. (a Falkland Island species), *H. Herscheli* Murchison, *H. (Schzopyge) parana* nov. *Dalmanites accola* nov., *D. Falklandicus* nov., D. sp. *Cryphaeus australis* nov., *C. allardyceae* nov., C. sp.

Group Mesembria—*Dalmanites acacia* Schwartz.

This is the *Phacops crista galli* Lake, 1904, which Schwartz Record, Albany Mus., 1906, refers to *Phacops acacia. Dalmanites africanus* (Salter) Lake.

Calmonia gen. nov. type, *C. signifer* nov.

In 1889 Oehlert introduced the name of Cryphina as a generic name for a Devonic species for a triangular, highly convex dalmanitid pygidium, having a series of five or more broad, closely appressed small spines on each side. Similar forms described for

CLARKE (J. M.)—Continued.

New York Devonic as *Dalmanites concinna* var. *serrula* in 1888, and referred to *Cryphina serulla.*

The author in view of the known variation between Cryphaeus and Hausmannia places the new genus with a caudal extension in his new genus. The head differs from that of Cryphaeus. The author describes in addition to the type *Calmonia signifer* var. *micrischia* nov., *C. subseciva* nov. and *C. ocellus* Lake, described by Lake under the genus Phacops from South Africa. *C. ? gonzana* Clarke.

Pennaia new genus type, *P. pauliana* nov.

A very distinct variation of the Mesembria type of Dalmanites is expressed by *Pennaia pauliana.* In general aspect it is distinctly more Phacopidean than Calmonia, in respect: first, to the head, in which all parts are more compact and condensed; second, in the thorax, where the axis is relatively much broader than the side lobes, while the ends of the anterior segments are rounded rather than lanceolate; third, in the pygidium, which is phacopidean in its small size and sparse segmentation. The margin of the pygidium is fimbriate, bearing three flattened spinules on each side.

Proboloides gen. nov. type. *P. cuspidatus* and *P. pessulus* nov.

In the possession of a frontal snout on the head this species is a Probolium after the type of snouted Dalmanitids, but in respect to the character of the snout, the form of the cephalon, its style of lobation and smoothness of surface, it departs from the type and is an expression of the Mesembria structure.

The author proposed the term Phacopina in place of Phacopidella, which Reed uses for Acaste, a preoccupied term.

——— and **Swartz** (Charles K.) Trilobita.

Geol. Sur. Maryland Upper Devonia, Baltimore, 1913, p. 699.

Phacops rana Green, 1832.

——— Report of Director, 1913.

New York State Mus. Bull. 173, 1914.

Restoration of *Pterygotus buffaloensis,* also of Eusacus and that of *Stylonurus excelsior.*

Cleland (Herdman F.) Further notes on the Calciferous (Beekmantown) formation of the Mohawk Valley, with descriptions of new species.

Bull. Am. Palæontology IV, No. 18, 1903, pp. 37-50, plates.

Bathyurus ellipticus nov. sp. *Harrisia parabola* nov. sp.

Crossmann Rev. Crit. Palæont., replaces the preoccupied named of Harrisia to that of Clelandia.

———The fossils and stratigraphy of the Middle Devonic of Wisconsin.

Wisconsin Geol. and Nat. Hist. Sur. Bull. 21, 1911. Chapter X, Crustacea.

The Middle Devonic formation in Wisconsin has yielded very few crustacean remains. The most widespread trilobite is *Phacops rana.*

The author describes and illustrates *Proetus Rowi* Green. *Phacops rana* Green. *Proetus crassimarginatus* Hall.

Ostracoda: *Bollia ungula* Jones. *Barychilina walcotti* Jones. *Kirkbya subquadrata* Ulrich. *Ulrichia conradi* Jones.

Phillopocarida: *Echinocaris punctata* Hall, and Tropidocaris sp.?

——— A study of the fauna of the Hamilton formation of Cayuga Lake section in central New York.

Bull. U. S. Geol. Sur., No. 206, 1903, 112 pp., 5 plates.

The author gives a list of Crustacea on pp. 79-81, with notes on their occurrence.

Cobbold (E. S.) On some small Trilobites from the Cambrian Rocks of Comley, Shropshire.

Quart. Jour. Geol. Soc., vol. 66, No. 261, pp. 19-50, plates 3-8.

Microdiscus comleyensis n. sp.

This species appears to be somewhat intermediate between *M. speciosus* Ford and *M. punctatus* Salter, but only has 7 annulations in the axis of the pygidium.

Microdiscus lobatus Hall, *M. Helena* Walcott, *M. speciosus* Ford. *Ptychoparia ? Attleboroughensis* Sh. and F., *P.? annio* n. sp. *Micmacca ? ellipsocephaloides* n. sp. cf., *M. recurva* Matthew. *M. ellipsocephaloides* var. Spinora and var. *strenuelloides* and var. *senior, M. ? parvula* n. sp. *Agraulos (Strenuella) salopiensis* n. sp. *Anomacare platycephalum* n. sp., *A. parvum* n. sp., *A. ? pustulatum* n. sp. *Protolenus latouchei* n. sp., *P. morpheus* n. sp. *Mohicana* n. gen.

This new genus has characters very similar to those of *Micmacca ? plana* Matthew, which that author referred provisionally to his genus.

Mohicana lata n. sp., *M. clavata* n. sp.

The author remarks these two species have many points of resemblance with *Micmacca ? plana* Matthew, also with *Avalonia manuelensis* Walcott; but the peculiar groove on the line of the ocular ridge are absent, and the frontal limb is more extended.

——— Report of the Geological Excavation Committee of the British Association, read at the Dublin Meeting, 1908.

Rep. Brit. Assoc., 1908, Dublin, 1909, pp. 241-42.

Microdiscus sp. *Anomocare* cf. *Agraulos strenuus* var. *nasutus* Walc. *Anomocare* sp. 1 and 2, also 3, *Anomocare* vel: *Agraulos* sp. *Protolenus* sp.

——— Trilobites from the Paradoxides beds of Comley, Shropshire.

Quart. Jour. Geol. Soc. London, vol. 67, No. 267, 1911, pp. 282-311, plates 23-26.

The author describes *Paradoxides Groomi* Lapworth from the type specimen, and figures it for the first time; also *Paradoxides* sp. indet., *P. Davidis* Salter, *P. rugulosus* Corda. *Conocoryphe emarginata* Linnarsson var. *longifrons* nov. *Dorypyge Lakei* sp. nov. This species is nearly allied to the pygidae of *Dorypyge oriens* Grönwall.

The species might be compared with *Dikellocephalus Marcoui* (Whitfield) from Georgia, Vermont; see, also, Walcott's figures of this species.

Agnostus fallax Linnarsson, *Microdiscus* sp. cf., *M. punctatus* Salter. *Agraulos holocephalus* Matth., *A.* sp. cf., *A. quadrangularis* Whitf.

The author follows Reed's classification of the genus *Ptychoparia* Corda, and places the genera *Ptychoparia Liostracus* and *Conocephalites*, under subgenera to *Ptychoparia*.

The author describes *Ptychoparia (Liostracus) pulchella* sp. nov., nearly related to *Liostracus validus* Matth. and *L. Linnarssoni* Brögger, but differ from both in the relative length of the glabella. *Ptychoparia (Liostracus)* sp. ident. two forms and *P. (Liostracus) dubia* sp. nov.

——— The Trilobite fauna of the Comley Breccia-Bed, Shropshire.

Quart. Jour. Geol. Soc., vol. 59, No. 273, pp. 27-50, plates 2 and 3.

The author describes and illustrates *Paradoxides intermedius* nov.

The species differs but slightly from *P. Hicksii*, its var. *palpebrosus* Linnarsson and *P. Sjögreni* in the course of the facial suture and general form.

Agraulos sp. cf., *A. Quadrangularis* Whitfield. Subgenus *Strenuella (Agraulos)* sp. indet. *Conocoryphe aequalis* Linnrs., *C. bufo* Hicks. subgenus *Liocephalus impressa* Linnrs. *Dorypyge reticulata* nov.

The cranidia of *D. Lakei* is very much like the new species, but the thorax and pygidia are different, and the reticulate character of the test very distinctive.

Microdiscus punctatus Salter. *Ptychoparia (Liostracus) lata* nov.
The species is related to *P. valida* Matthew and *P. Linnarssoni* Brögger. *Ptychoparia (Liostracus) dubia* Cobbold.

Cole (A. J.) On *Belinurus kiltorkenis* Bailey.
Geol. Mag., Decade 4, vol. 4, 1901, pp. 52-54, figures.

Collie (George). Lower Ordovician section, near Bellefront.
Bull. Geol. Soc. Am., vol. 14, 1903, pp. 407-420, plate 59.
Brongniartia Trentonensis Simpson.
The generic name of Brongniartia was used as a subgenus to Homalonotus by Salter in 1865; also by Green Mong. Tril., 1832, for a species of Homalonotus; and by Eaton, Am. Jour. Sci., vol. 22, 1832, p. 165, for what is now known as *Triarthrus Beckii* Green.
The author also describes *Encrinurus tuberculosis* nov. sp.

Crosfield and **Skeat.** On the Geology of the neighborhood of Carmathen.
Quart. Jour. Geol. Soc. London, vol. 52, 1896, p. 523.
Peltura punctata nov. sp. *Parabolinella* sp. and *Ogygia marginata* nov. sp.

Crossman (M.) Revue Critique Paléontologie, 1902, sixieme Ann., p. 52.
Redlichia nov. gen.
The author uses this term to replace Haeferia, Redlich, Tril., 1899, non Bittner Moll., 1895.

Cumings (E. R.) The Stratigraphy and Palæontology of the Cincinnati series in Indiana.
32 Ann. Report Geol. and Natural Resources of Indiana, 1908, pp. 605, 1188, 55 plates. The Ostracoda and Trilobites are figured on pls. 53-55.
Ostracoda: *Bollia pumila* Ulrich. *Ceratopsis Chambersi* Miller and var. *robusta* Ulrich, *C. oculifera* Hall. *Ctenobolina ciliata* var. *Hammeli* M. & F. *Entomis Madisonensis* Ulrich, *Eurychilina striatonarginata* Miller. *Leperditia caecigena* Miller. *Primitia cincinnatiensis* Miller, *P. impressa* Ulrich. *Tetradella quadrilirata* H. & W., also var. *simplex* Ulrich. *Lepidcoleus Jamesi* H. & W.
Trilobites: *Acidaspis ceralepta* Anthony, *A. cincinnatiensis* Meek, *A. crosotus* Locke. *Calymmene calicephala* Green. *Ceraurus pleurexanthemus* Green, *C. icarus* Billings. *Dalmanites breviceps* Hall. *Isotelus maximus* Locke. *Proetus spurlocki* Meek. *Trinucleus concentricus* Eaton.
Referred to *Cryptolithus tessellatus* Foerste, Bull. Sci. Denison Univ., 1910, vol. X, p. 78.

Dahmer (G.) Ein Hautungsplatz von Homalontus gigas A. Roemer im linksrheinischen Unterdevon.
Jahrb. des nass. Vereins für Naturkunde 67, 1914, plates 2 and 3.
Homalonotus gigas.

Delgado (J. F. N.) Fauna Cambrienne du Haut Alemtejo.
Geol. du Portugal, vol. V, 1904, 6 plates.
In the description of fossils, p. 318, the author describes *Paradoxides Choffati* nov.; also P. aff. *abenacus* Matth. var., ? P. aff. *spinosus* Boeck, *P. costae nov.* and *P.* aff. *Tessini* Brong. Olenopsis sp. Hypostoma of Olenollus?

The new genus Hicksia, founded on a group of species resembling Conocoryphe humerosa Salter.

It has the tumid cheek and galbella of Solenopleura, with the smooth test of Liostracus, but the glabella narrows in rear and the pygidium is smaller.

He includes 9 new species under the genus: *Hicksia elvensis, H. sphaerica, H. Transtanensis, H. Walcotti, H. Castroi, H. Hughesi, H. Barroisi, H. Dewalquei* and *H.* minuta.

Metadoxides Bornemanni, Olenellus ? Macphersoni nov. *Microdiscus caudatus* nov., *M. subcaudatus* nov., *M. Wenceslasi* nov., *M. Souzai* nov. and *M. Woodwardi* nov.

I would suggest the generic name of Delgadoia for these species, with eyes and three thorax segments, also with caudal spines.

Drevermann (Fritz). Die Fauna der oberdevonischen Tuffbraccie von Langenaubach bie Haiger.

Jarhrbuch d. K. preuss Geol. Landesanstalt für, 1900, pp. 99-207, 9 plates.

The author describes and illustrates:

Phacops cryptophthalmus Emm., *P. granulaus* Münster, *P. caecus* Gurich, *P. sulcatus* nov., *P. brevissimus* nov., P. cf. *mastophthalmus* Richter, *P. (Trimerocephalus) anophthalmus* Frech, *P. (T.) Lotzi* nov., *P. (Trim.) miserrimus* nov. *Proetus carintiacus* nov., *P. dillensis* nov. *Dechenella* sp. ? *Bronteus* cf. *granulatus* Goldf.

——— Ueber eine Vertrelung der Etroeungt-Stufe auf der rechten Rheinseite.

Zeitschr. d. Deutsch Geol. Ges. 54, pp. 480-524, pl. 14, 1904.

Brachymetopus sp. and Phillipsia sp.?

Diener (Carl). The Permocarboniferous Fauna of Chitichun, No. 1.

Memoirs Geol. Sur. of India, Palæontologia Indica, Ser. xv, vol. 1, pt. 3, 1897, p. 105, plate 13.

Cheiropyge nov. gen., *C. Himalayensis* nov. sp.

The genus was proposed for certain Trilobites from the Carboniferous or Permian rocks in which the 6 pleural ridges and 15 axial rings of the pygidium extended beyond the border, such as *Philippsia lodiensis* Meek and *Dalmanites Cuyahogae* Claypole.

A similar fossil to Cheiropyge was made into a new genus by Girty under the term of Anitopyge.

This author does not compare *Phaethonides spinosus* Herrick, Bull. Denison Univ., vol. 4, pl. 1, fig. 4, with 14 axial lobes and 9 pleurae.

The author also describes *Phillipsia Middlemissi* nov. sp., which the author compares with certain British Trilobites such as *P. Cliffordi,* etc.

Diener (Carl). Anthracolithic Fossils of Kashmir and Spiti.

Memoirs Geol. Sur. India, Palæontologia Indica, Ser. xv, vol. 1, pt. 2, 1899.

Phillipsia sp. ind. aff. *seminifera* Phillips.

This species which was figured by Lydekker, Mem. Geol. Sur. of India, vol. 22, pl. 2, figs. 5, 5a, may be congeneric with the European species, but the state of preservation of the latter is too indifferent to warrant an exact determination. An Australian species, *Griffithides dubius* Etheridge, is closely allied to the present one.

Dowling (D. B.) Report on a Survey of the Ekwan River and of the Route through Sutton Mill Lake Northward.

Geol. Sur. Canada, Ann. Report, n. ser., vol. 14, 1901, F.

Crustacea, p. 57 F: *Calymene Niagarensis* Hall, Illaenus sp. *Bronteus Ekwanensis* nov. sp., *B. aquilonaris* nov. sp., *B. Niagarensis* Hall. *Ceraurus Tarquinis* Billings.

The Appendix I to this paper was edited by J. F. Whiteaves, pp. 38-60, therefore the new species of Bronteus described from the pygidia should be credited to Whiteaves.

Dufet (Henri). Notes sur les déformation des fossiles contenus dans les roches schisteuses et sur la détermenative de quelque especes du genre Ogygia.

Ann. de L'ecole Normale supérieure, 1875, pp. 183-190, 2 figures.

Ogygia Edwardsi Rouault, *O. Brongniarti* Rouault, *O. Guetardi* Rouault, *O. Delesii* nov. sp. figures the pygidium.

The new species has 5 axial rings, 8 side ribs and a pointed tail.

Eastman (Charles R.) Text book of Palæontology, adopted from the German of Karl A. von Zittel.

Second edition, vol. 1, 1913, 839 pp., 1594 figures.

Edgell-Wyatt (H. A.) On a new Lichas and other new forms from the Llandelio Flags.

Geol. Mag., Decade 1, vol. 3, 1866, pp. 160-163.

Lichas partriarchus nov. sp.

Most of the Swedish Lichadæ are distinguished from it by the incompleteness of the first pair of glabella furrows.

Ellis (G. L.) and **Salter** (I. I.) The highest Silurian rocks of the Ludlow Dist.

Quart. Jour. Geol. Soc. London, vol. 62, 1906, pp. 195-227, Geol. Map.

List of Ludlow fossils.

Etheridge (Robert, Jr.) The largest Australian Trilobite discovered.

Proc. Roy. Soc. Victoria, vol. 6, 1894, new ser., pp. 187-194, plate.

Bronteus enornis nov. sp.

——— Evidence of the existence of the Cambrian fauna in Victoria.

Roy. Soc. Victoria, 1895, pp. 52-64, plate.

Dinesus Ida n. gen. et sp.

The glabella has pyriform basal lobes; the bifurcating grooves near the anterior portion outline triangular lobes, on each side of the glabella. Pygidium ending in 5 or 6 short spines.

——— Official Contributions to the Palæontology of South Australia, No. 9.

On the occurrence of Olenellus in the Northern Territory.

South Austr. Parl. Papers, 1897, No. 1353, pp. 13-16, plate 1, fig. 1.

The author describes *Olenellus Brownii* n. sp., which agrees with the Swedish *O. Kjerulfi* Linnrs. He doubts the presence of facial sutures in the genus.

Peach lays great stress on the non-detection of the facial suture in Olenellus as proving that the Olenelli had no free cheek, and should therefore be separated from the Trilobita.

Quart. Jour. Geol. Soc., vol. 48, 1892, p. 242.

——— Additions to the Cambrian fauna of South Australia.

Trans. Roy. Soc. S. Australia, vol. 29, pp. 246-251, 1905.

Olenellus sp.

ETHERIDGE (Robert, Jr.)—Continued

——— A further Cambrian Trilobite from York Peninsula.

Trans. Roy. Soc. S. Australia, vol. 22, 1898, pt. 3, plate IV.

Ptychoparia Howchini n. sp.

Woodward in 1884 described two Cambrian Trilobites from the Yorke Peninsula as *Dolichometopus Tatei* and *Conocephalites australis*. Tate has also described from the same District *Olenellus Prichardi* and *Microdiscus subsagittatus*, in Trans. R. Soc. S. Austr., 1892, XV, pl. 2, p. 187.

——— Additional Notes on the Palæontology of Queensland. Part 1, Palæozoic.

Proc. Linn. Soc. New South Wales, vol. 9, 1894, p. 528, pl. 39, fig. 3.

Griffithides Sweeti Eth. fil. MS.

This is an abnormal form departing both from Phillipsia and Griffithides in possessing 10 instead of 9 thoracic segments, and in the presence of the supplementary basal lobes on the glabella. The supplementary lobe to the glabella is present in some Proeti, such as *Proetus bohemicus* Corda. Burmeister has classed such species under Æonia, but McCoy's Forbesia had anticipated him by a few months.

——— The Trilobite Illaenus in the Silurian rocks of New South Wales.

Records Geol. Sur. N. S. Wales, vol. 8, p. 319, figs. 1-2.

Illaenus Johnstoni Eth. fil.

The original description. Tasmania Report Sec. for Mines for 1895-96, pl. fig. 3, page XLIII.

Two species of Illaenus have been recorded from the Silurian rocks of Australia. DeKoninck refers one to *Illaenus Wahlenbergianus* Barr., and the other from Tasmania was referred to this new species.

——— Trilobite remains collected on the Florentine Valley, West Tasmania, by Mr. T. Stephens.

Records of the Austr. Mus., vol. 5, part 2, 1904.

The author describes and figures the pygidium of Niobe sp. ind.; also that of *Dicelocephalus Florentinensis* Eth. fil., plate 10, figs. Walcott refers this to the genus Dikelokephalina Brögger.

——— Additions to the Cambrian fauna of South Australia.

Trans. and Proc. Roy. Soc. of South Australia, vol. 29, 1905, pp. 246-251.

The Olenellus described, p. 247, pl. 25, fig. 1, is referred by Walcott Cambrian fauna of China to the genus Redlichia.

——— The existence of a Cambrian fauna in Victoria.

Proc. Roy. Soc. of Victoria, for 1895, new ser., vol. 8, 1896, pp. 52-64.

——— and **Mitchell** (John). The Silurian Trilobites of New South Wales, with reference to those of other parts of Australia, Part 4.

The Odontopleuridae.

The authors use the term Odontopleuridae in preference to Acidaspidae, because they believe it to have precedence. Burmeister used the term in 1843 (Organization of Trilobites) for eight-jointed Trilobites with a short articulated caudal axis, incapable of enrollment. Division B, Subdivision A.

Proc. Linnean Soc. New South Wales, vol. 21, 1897, pp. 694-721, 6 plates.

ETHERIDGE (Robert, Jr.) and MITCHELL (John)—Continued

The authors describe:

Odontopleura Bowningensis n. sp., *O. Rattei* n. sp., *O. parvissina* n. sp., *O. Jenkinsi* n. sp., (The *Acidaspis Brightii* Jenkins mon. Murchison). *Ceratocephala Vogdesi* n. sp. (*Acidaspis Verneuili* Ratte non. Barrande), *C. Jackii* n. sp., *C. impedita* n. sp., *C. longispina* Mitchell.

——— The Silurian Trilobites of New South Wales with references to those of other parts of Australia.

Proceedings Linn. Soc. N. S. Wales, 1915, vol. 40, part 4, 1916.

Part V, The Encrinuridae, plates 54-57, pp. 646-680.

The authors describe and illustrate the following species:

Encrinurus Mitchelli Foerste, referring *Cromus Murchisoni* DeKoninck, pl. 1, fig. 9 (exclude figs. 9a and 9b) to the species.

Encrinurus Bowningensis Foerste.

The following are described as new species:

Encrinurus silverdalensis, a robust species, about 2 inches long; the head approaches *E. variolarlis,* but its enormous tail separates it from the European species.

Encrinurus Etheridgei, the largest Australian form known, has a length of 2½ inches, of which the tail occupies one inch.

Encrinurus Rothwellae.

The subrectangular and steep-sided thorax, very prominent thorax and pygidial axis, a circular end of the tail—axis, 11 pleural segments in the pygidium, widely expanded and tumid glabella, anteriorly forward eye-lobes, and strong drooping of the pygidium posteriorly, separate this species from *E. Mitchelli.*

Encrinurus ? duntroonensis.

The authors illustrate only the head, which differs from all other species referred to Encrinurus.

1. In the transversely elongated elliptical form of the cephalon, with its nearly straight anterior border.
2. The closeness of the anterior branches of the facial sutures and the perpendicularity of the posterior branches of these, with the axial furrows, or central axial line.
3. The long, narrow and straight-sided glabella.
4. The anteriorly situated free cheek.
5. The sparse tuberlation.
6. The backward and inward situation of the eyes.
7. The manner in which the axial furrows bifurcate outward and inward on reaching the frontal borders of the free cheeks.

The authors suggest a new genus without naming it. Why not that of *Mitchellia* after this well-known author on the fossil Crustacea.

Fearnsides (W. G.), **Elles** (G. L.) and **Smith** (Bernard). The Lower Palæozoic Rocks of Pomeroy.

Proc. Royal Irish Acad., vol. 26, sec. B, No. 9, 1907, pp. 97-128, map and plate.

Trilobites: *Trinucleus concentricus* Eaton; also var. *Portlockii* Salter and var. *elongatus Portl.* and var. *arcuatus.*

Trinucleus seticornis His. *Dionide* cfr. *euglyptus* Ang. *Æglina rediviva* Barr. *Phacops mucronatus* Brong.

The other Trilobites collected from Pomeroy have been described by Portlock in his Londonderry report.

Field (R. M.) Use of the Roentgen Ray in Palæontology Skiagraphy of Fossils.

Am. Jour. Sci., vol. 39, 1915, p. 543.

The author illustrates *Triarthrus Becki* in text and plate 8, fig. 9. The figure brings out the outline of the trilobite and several appendages which are buried in the matrix.

Finch (Grant E.) Notes on the position of the individuals in a group of *Nileus vigilans* found at Elgin, Iowa.

Iowa Acad. Sci. Proc., vol. 11, pp. 179-181, plate, 1904.

Foerste (A. F.) Notes on Clinton Group Fossils, with special reference to collection from Indiana, Tennessee and Georgia.

Proc. Boston Soc. Nat. Hist., vol. 24, 1889, p. 261.

The author notes *Calymmene Blumenbachii* var. *Vogdesi* n. var., *C. rostrata* Vogdes.

Dr. Ulrich describes from the Niagara formation at Osgood, Ind., under the name of *Calymmene nasuta* n. sp., a snouted trilobite of a very large size, which resembles *Calymmene Niagarensis* Hall. This specimen was published in the Jour. Cincinnati Soc. Nat. Hist., vol. 2, No. 3, October, 1879, p. 131, figs. 1, 2 and 3. The Harvard Library did not receive this number until Feb. 19th, 1880, or about the time of its probable publication. About this time, in the Amer. Jour. Sci. for December, 1879, a species was described by Vogdes as *Calymmene rostrata* from the Clinton Group of Georgia Catoosa Station. These forms are very closely related to New York specimens, which are not quite so large, and the end of the snout is not so pointed as the published figures would indicate.

Dr. Berjoron, Bull. Soc. Geol. de France, 3d ser., vol. xviii, 1890, p. 365, pl. v, places similar species under a new genus. Describing under it *Calymmenella Boisseli* n. sp. and n. genus. The glabella is short and rounded in front, having three furrows, of which the last two are well marked. The specimen is somewhat like *Calymmene mammillata* Hall, from the Niagara group in Wisconsin.

The author also notes *Illaenus ambiguus* Foerste, *I. ioxus* Hall. *Phacops pulchellus* Foerste. *Encrinurus punctatus* Wahl. *Lichas Boltoni* var. *occidentalis* ? Hall and *Cyphaspis clintoni* n. sp.

The author, on p. 272, places *Encrinurus ornatus* Hall with *E. Theschi* Foerste. He was in doubt regarding the Ohio specimen referred by Hall and Whitfield to *E. ornatus*, on account of its larger size and its higher geological position.

——— A description of the Trilobites, Mollusks and Brachiopods of the Clinton Group of Ohio and Indiana.

Geology of Ohio, vol. vii, 1893, pp. 522-601, plates 25-37a.

The author notes *Acidaspis Ortoni* Foerste, *A. brevispinosa* n. sp. *Proetus determinatus* Foerste. *Cyphaspis clintonensis* Foerste. *Illaenus daytonensis* H. and W., *I. ambiguus* Foerste, *I. insignis* Hall, *I. madisonensis* Whitf. *Calymmene Vogdesi* Foerste. *Ceraurus (Pseudosphaerxochus) clintoni* n. sp. *Sphaerexochus pisum* n. sp. *Lichas breviceps* Hall. *Phacops trisulcatus* Hall. *Dalmanites Wertheri*. *Encrinurus punctatus* Wald. *Elpe Ulrichi* n. sp.

——— Characteristic Silurian Fossils from East Central Kentucky.

Geol. Sur. Kentucky Bulletin, No. 7, 1906, Part 3.

The author describes *Isochilina panolensis, Beyrichia lata-triplicata.* He also remarks that Prof. Hall, in Palæontology of New York, vol. 2, p. 301, published descriptions of a species of Bollia and of a species of Beyrichia under the same name *Beyrichia lata*, erroneously regarding these distinct species as opposite valves of the same species. Beyrichia is described first, but on Plate A 66 the Bollia is figured first.

The author refers to *Bollia lata* Hall's fig. 10b, and to *Beyrichia lata* Hall's figs. 10, c, d, e, pl. A 66.

FOERSTE (A. F.)—Continued

——— Silurian Fossils from the Kokomo West Union and Alger horizons of Indiana, Ohio and Kentucky.

Jour. Cincinnati Soc., vol. xxi, No. 1, 1909.

The author describes and illustrates *Isochilina panolensis* Foerste, *I. musculosa* n. sp. *Beyrichia lata—triplicata* Foerste. *Kloedenia kokomoensis* n. sp. *Illaenus depressus* Foerste. *Calymmene Clintoni* Vanuxem, *C. niagarensis* Hall. *Homolanotus delpinocephalus* Green. *Dalmanites limulurus brevicaudus* var. nov.

——— Preliminary note on Cincinnatian Fossils.

Bull. Denison Univ., June, 1909, vol. 14.

The author describes *Ceraurus miseneri* nov. sp. from Richmond, Ind.

——— Preliminary note on Cincinnatian and Lexington Fossils of Ohio, Indiana, Kentucky and Tennessee.

Bull. Denison University, June, 1910

The author favors the use of Cryptolithus Green, for the genus Trinucleus, a generic term used by Bronn, Goldfuss, Emmrich, Angelin and Vogdes; although the generic name of Nuttainia was used by Eaton in 1832, in his Geological Text Book, 1832, p. 33, for a similar species to *Trinucleus tessellatus* Green.

The original description of this genus by Green, The Monthly American Journal of Geology, June, 1832, p. 560, pl. fig. 4, is as follows:

Genus Cryptolithus, *C. Tessellatus Green*, fig. 4.

"Clypeo rotundato, fronte valde convexo, capite antice semicirculari, margine tessellato, ornato."

Green Mon. Trilobites, p. 88, remarks Cryptolithus was proposed before the publication of Nuttainia Eaton.

Rafinesque in his paper dated Philadelphia, May, 1832, Atlantic Journal and Friend to Knowledge, vol. 1, No. 2, 1832, article on "The Genera of fossil Trilobites or Glomerites of N. America," mentioned Cryptolithes Green, on p. 72, and remarks that Dr. Green issued in April a first series of eight cast and species, accompanied with a synoptical table, among which a new genus Dipleura, and four new species of Asaphus and Calymmene.

Vogdes, in Bib. Palæozoic Crustacea, 1893, p. 359, remarks that Trinucleus Lhwyd, 1698, Lithophyacii Brittannici Ichnographia, Epistola 1, also Murchison Silurian System, 1839, p. 659, was a revived old name. Dr. Lhwyd's description meant no more than the general name of Trilobite of the more modern writers and could not, except by courtesy, set aside Dr. Jacob Green's gen. *Cryptolithus*. This generic name has been advocated by Foerste, also by Raymond, in a later publication.

The author also describes *Calymmene platycephala* sp. nov., *C. senaria* Conrad, *C. abbreviata* sp. nov., *C. callicephala* Green, *C. Meeki* sp. nov., *C. Meeki—retrorsa* and *Dalmanites Carleyi—rogersensis.*

Calymmene Meeki Foerste, Bull. Denison Univ., vol. 16, 1910, p. 84, pl. 3, fig. 18. This is the Calymmene senaria described by Meek from the Cincinnati Rocks. As types the larger specimens from Fairmont bed are selected. They have a rather extended posterior outline of the cephalon, resulting in acute genal angles.

Frech (Fritz). Die Karnischen Alpen, 1894.

The author refers *Phacops (Trimerocephalus) cryptophthalmus* (Emm.) Trestze to the new species of *anophthalmus.*

——— Palæozoica, 1897, Bd. 2, Theil 1.

The author describes as new *Phacops (Trimerocephalus) anophthalmus,* p. 278, plate 35, fig. 18.

——— Lethæa geognostica, part 1, Lethæa palæozoica, Bd. 2, p. 66, 1902.

The author proposes the genus Proampyx for *Anomocare acuminatum* Angelin. This species, with its pointed glabella, seems to be the forerunner of Ampyx, and differs from the typical Anomocare with rounded, cephalic shield, very greatly.

Fritsch (Dr. Ant.) Preliminary notes on *Prolimulus Woodwardi* from the Permian Gaskohle als Nyran Bohemia.

Geol. Mag. London, Decade iv, vol. 6, 1899, pp. 57-59.

The author gives a figure of *Prolimulus Woodwardi* on p. 58, and remarks that Prolimulus very closely resembles one of the embryonic stages of the living North American *Limulus polyphaemus.* The earliest known Limuloid Crustacean named *Neolimulus falcatus,* Woodward Geol. Mag., vol. 5, p. 1, pl. 1, figs. 1, 1a, 1868, was from the Silurian of Lesmahagow, Scotland. Bailey described *Bellinurus Kiltorkensis* from the Upper Old Red Sandstone Kiltorcan, Ireland, in 1869.

The genus Bellinurus was established by Konig in 1825, for certain small king crabs, under the specific name of *B. bellulus*, without a description of the genus or species. It is now known as *Bellinurus lumatus* Martin Petrefacata Derbiensia, pl. 45, fig. 4.

Bailey in 1863 described *B. arcuatus* and *B. reginae,* from the Coal Measures of Queens County, Ireland. In 1872 Woodward described *B. Koenigianus* Coal Measures, Dudley.

Meek and Worthen from the Coal Measures of Illinois, describes *Prestwichia (Limulus) anthrax* Prest. and *P. rotundata* Prest.

In 1872 Woodward described *P. Birtwelli* from Coal Measures, Padiham, Lancashire.

These Crustaceans have been described from the Muschelkalk, Jurassic, Cretaceous and Tertiaries, and are now living in the seas of Eastern North America and of Japan. A remarkable persistent type of the Xiphosura from the Silurian to the present time.

Frood (A. H.) Description of fossils from Kimberley District, Western Australia.

Geol. Mag. London, Decade 3, 1890, vol. 7, p. 98.

Olenellus ? Forresti n. sp., pl. 4, figs. 2 a-b.

Walcott, 1913, p. 104, refers this to the genus Redlichia.

Gaudry (A.) Les enchainements du monde animal dans les temps Géologiques Fossils Primaires, Chapter X, 1877.

The author illustrates many species of Palæozoic Crustacea with figures of *Asaphus platycephalus* and *Calymmene senaria* exhibiting the ventral side and structure of the feet and antennae.

Geinitz (H. B.) Die Versteinerungen der Steinkohlen formation in Sachsen, Leipzig, 1855.

The author describes as *Halonia irregularis* several fragments of Arthropleura, p. 38, pl. 4, fig. 5.

Gemmellaro (G. G.) Crostacei dei calcari con fusulina della Valle del fiume sosio nella Prov. di Palermo in Sicilia.

Mem. Soc. Ital. Sci., vol. 8, 1890, 3d ser., 40 pp., with 5 plates.

Trilobiti—*Proetus postcarbonarius*, n. sp., *P. ? Salomonensis* n. sp. *Phillipsia sicula* n. sp., *P. Oehlerti* n. sp., *P. Sosiensis* n. sp., *P. pulchella* n. sp. *Griffithides verrucosus* n. sp. *Pseudophillipsia elegans* n. gen. et sp.

The type of the new genus is *Pseudophillipsia Sumatrensis* Roemer.

Macruros Crustaceans—*Palaeopemphix* n. gen., *P. Sosiensis* n. sp., *P. affinis* n. sp., *P. Meyeri* n. sp.

Brachyurous Crustaceans—*Paraprosopon* n. gen., *P. Reussi* n. sp. *Oonocarcinus* n. gen., *O. insignis* n. sp., *O. anceps* n. sp., *O. Geintzi.*

Ostracoda—*Cypridinella rostrata* n. sp., *C. inflata* n. sp., *C. cypridellopsis* n. sp., *Cypridella Jonesi* n. sp., *C. granulifora* n. sp. *Cypridina Adrianensis* n. sp., *C. elliptica* n. sp., *C. marginata* n. sp., C. aff., *C. primaevae* McCoy. *Philomedes acanthoides* n. sp. *Entomoconchus elongatus* n. sp. *Entomis polita* n. sp., *E. aequilobatus* n. sp. *Beyrichia* sp.?

Girty (George H.) Devonian and Carboniferous Fossils.

U. S. Geol. Survey, Monograph No. 32, 1899; part 2, pp. 476-581.

Proetus peroccidens H. and W., *P. Loganensis* H. and W.

The author is inclined to include both of these species under one, but leaves it an open question.

——— Notes on the Carboniferous Fossils, Geology and ore deposits Bisbee Quadrangle, Arizona.

U. S. Geol. Survey, Professional Papers No. 21, 1904, pp. 46-53, 2 plates.

Phillipsia peroccidens H. and W. figured the pygidium, pl. X, fig. 22. The species is rather characteristic of the Escabrosa Limestone.

——— The Guadalupian fauna.

Professional Paper U. S. Geol. Sur., No. 58, Washington, 1908.

The author uses *Anitopyge* new genus for *Phillipsia peranulata* Shumard.

The genus Phillipsia has 9 thoracic segments, and the new genus, as far as known, has but 7. In the pygidium the axis contains about 30 joints.

Anitopyge is similar to *Cheiropyge* (a new genus described by Diener of Himalayan fossils) in the unequal segmentation of the axial and lateral portions of the pygidium—in Anisopyge the pygidium is surrounded by a broad, smooth band, while in Cheiropyge the lobes are extended so as to give this member a denticulate outline.

The author describes *Anisopyge antiqua* n. sp. *Cythere* ? sp. *Bairdia* aff., *B. plebeia* Ruess, *Argilloecia* sp.

——— The fauna of the phosphate beds of the Park City formation in Idaho, Wyoming and Utah.

Bull. U. S. Geol. Sur., No. 436, Washington, 1910.

The author describes and figures *Hollina emaciata* var. *occidentalis* n. var. *Jonesiana carbonifera* n. sp., which closely resembles the English species *J. arcuta,* but differs in a more equilateral form with a much narrower sulcus.

Cytherella benniei J. and B.

——— The fauna of the Moorefield shale of Arkansas.

Bull. U. S. Geol. Sur. No. 439, 1911.

The author records an undetermined Griffithides and three Ostracoda. *Paraparchites nicklesi* Ulrich, *Primitia moorefieldana* n. sp. and *Bairdia attenuata* Girty.

——— On some new genera and species of Pennsylvania fossils, from the Wewoka formation of Oklahoma.

Ann. N. Y. Acad. Sci., vol. 21, pp. 119-156, 1911.

Describes *Griffithides parvulus* n. sp. Differs from *G. ornatus* in the configuration of the basal portion of the glabella.

GIRTY (George H.)—Continued

——— A report on the upper Palæozoic fossils collected in China in 1903-04.

Carnegie Inst. Washington, Research in China, vol. 3, 1913, pp. 297-328, pls. 27-29.

The author illustrates an imperfect pygidium of Phillipsia, somewhat like *P. scitula* of the American Coal Measures.

——— New genera and species of Carboniferous fossils from the Fayetteville shales of Arkansas.

Annals New York Acad. Sci., vol. 21, 1910, pp. 189-238.

Griffithides parvulus nov., *G. mucronatus* nov.

——— Fauna of the Wewoka formation of Oklahoma.

Bull. U. S. Geol. Sur., No. 544, 1915.

The author refers *Phillipsia (Griffithides ?) Sangamonensis* M. and W. to the genus Phillipsia. *Griffithides parvulus* Girty. The surface is marked by granules of small nodes.

The author compares it with *G. ornatus,* but is much smaller and differs in the configuration of the basal portions of the glabella.

——— Fauna of the Batesville sandstone of Northern Arkansas.

Bull. No. 593, U. S. Geol. Sur., 1915.

The author describes *Griffithides mucronatus* nov. The same name was used by Traquair in 1862, for an Irish species of the genus, which Woodward, 1883, referred to *Phillipsia Eichwaldi* var. *mucronatus.*

Goldenberg (Fr.) Fauna Sarepontana Fossilis Die fossilen Thiere aus Steinkohlenformation von Saarbücken Hefts 1 and 2, 1875 and 1877.

Arthropleura affinis sp. nov., pl. 1, figs. 11-12.

Gorham (Frederic P.) The Cambrian deposits of North Attleboro.

Bull. No. 9, Roger Williams Park Mus., Providence, R. I., 1905.

The author illustrates from Shaler and Foerste's Bull. Mus. Comp. Zool. of Harvard Univ., 1888.

Olenellus Walcotti Shaler and Foerste may be identical with *Elliptocephala asaphoides* Emmons. *Microdiscus lobatus* Hall. *Ptychoparia attleborensis* S. and F. Aristozoe *Microdiscus belli-marginatus* S. and F. *Ptychoparia mucronata* S. and F. This may be *Atops trilineatus* Emmons. *Microdiscus speciosus.*

Grabau (A. W.) Guide to the Geology and Palæontology of the Niagara Falls and vicinity.

Bull. N. Y. State Mus., No. 45, vol. 9, 1891.

The author illustrates the Palæozoic crustacea of the New York Niagara Group with original figure of *Eurypterus remipes.*

——— Palæontology of the Cambrian Terraines of the Boston Basin.

Occasional Papers Boston Soc. Nat. Hist., vol. 4, part 3, 1901, pp. 601-694, plates 31-39.

Trilobita: *Olenellus (Holmia) Bröggeri* Walc. O. sp., *O. (Mesonacis) asaphoides* (Emm.), *O. Walcotti* S. and F. *Metadoxides magnificus* Matth. *Microdiscus belli-marginatus* S. & F., *M. lobatus* Hall, *M.* sp. *Strenuella strenura* (Bill.). *Argulos quadrangularis* Whitf.

The author represents a restored figure on p. 676, with 16 ? thorax segments, with measurements of the head, which varies in length, exclusive of the occipital ring, from

GRABAU (A. W.)—Continued

7 to 20 mm. *Ptychoparia Rogersi* Walc., *P.? attleborensis* S. and F. *Paradoxides Harlani* Green.

The author remarks that among the American relative of *Paradoxides Harlani* the most nearly related to the broad form is *P. regini* Matthew, from St. John Group; also *P. Bennetti* Salt.

The nearest relative of the narrow form is the *Paradoxides spinosus* the Bohemian species. Many years ago Linne Mus. Tessiniaum, 1753, p. 98, pl. 3, described under the name of *Entomolithus paradoxus* a trilobite of a wide form, about 6¾ inches long. Brongniart describes it as *Paradoxides Tessini,* using the narrow form of Wahlenberg's pl. 1, fig. 1, which he has copied.

The original, quoted from Dimbo, Sweden, by Linné, has never been again found in Sweden, the specimen may be one from Boston, Mass., obtained from the Boston Wharves by some Swedish naturalist in early days, the stones from the Braintree quarries were used in the Boston Harbor.

——— Guide to the Geology and Palæontology of the Niagara Falls and vicinity.

Bull. No. 45, vol. 9, 1901, New York State Museum.

The following Foss crustacea are described and illustrated:

Iscochilina cylindrica (Hall). *Leperditia scalaris* Jones, fig. 150. *Bollia symmetrica* (Hall), fig. 151. *Æhmina spinosa* (Hall), fig. 152.

Trilobita—*Homalonotus delphinocephalus* (Green), fig. 153. *Illaenus ioxus* Hall, fig. 154. *Dalmanites linulurus,* fig. 155. *Calymmene Blumenbachi Niagarensis* Hall, fig. 156. *Lichas Boltoni,* plate 17. *Encrinurus ormata* H. and W., fig. 157. *Bronteus Niagarensis* Hall, fig. 158. *Ceratiocaris acuminata* Hall, fig., *C. Physganocaris? Deweyi* Hall, fig. 160. *Eurypterus lacustris* Harland, *E. remipes* DeKay, fig., pl. 18, *E. pustulosus* Hall, *E. robustus* Hall, *E. pachychirus* Hall, *E. Dekayi* Hall. *Dolichopterus macrochirus* Hall. *Eusarcus grandis* G. and P. *Pterygotus macrophthalmus* Hall, *P. Cobbi* Hall, *P. globicaudatus* Pohl.

——— The Palæontology of Eighteen Mile Creek and Lake Shore sections of Erie County, New York.

Bull. Buffalo Soc. Nat. Sci., vol. 6, 1901, in four parts.

Ceratocaris Deweyi Hall, *C. acuminata* Hall.

——— Guide to the Geology and Palæontology of the Niagara Falls and vicinity.

Bull. Buffalo Soc. Nat. Sci., vol. 9, 1902.

——— and **Sherzer** (W. H.) The Monroe formation of southern Michigan and adjoining regions.

Michigan Geol. and Biological Sur. Geol., ser. 1, 1910.

Ostracoda—*Leperditia scalaris* Jones, *L. angulifer* Whitf., *L. attoides* nov., *L. alta Con. Kloedenia Monroensis* nov.

Trilobitae—*Proetus crassimarginatus* Hall.

Merostomata—*Eurypterus Eriensis* Whitf.

——— North American index Fossil Invertebrates.

Two volumes, New York, 1910, 909 pp., 726 figures.

Gives brief descriptions of genera and species. Appendices give tables of geological formation and a faunal summary showing distribution, also a classified bibliography.

Gronwall (Karl A.) Bornholm Paradoxideslag og deres Fauna Darnarks.

Geol. Under. II Rackke, No. 13, Kjobenhavavn, 1892.

Thirty-five species or varieties of the genus Agnostus are figured and described:

Agnostus aculeatus Ang., *A. altus* n. sp., *A. atavus* Tbg., *A. bibullatus* Barr., *A. bidens* Meek, *A. bituberculatus* Ang., *A. brevifrons* Ang., *A. cambrensis* Hicks, *A. cicer* Tbg. and var. *forfex* n. var., *A. elegans* Tbg., *A. Eskriggei* Hicks, *A. exaratus* n. sp., *A. exsculptus* Ang. ex parte cf. *integra* Walc. and cf. *sulcifera* Walc. *Agnostus fallax* Lnrs. cf. *ferox* Tbg. and var. *insignis* Walc., *A. fissus* Lng. MS. and var. *perrugatan* var. and var. *trifissa* Matth. *Agnostus gibbus* Lnrs. and var. *hydrida* Br. *Agnostus gladiformis* Ang. and var. *resecta* n. var. *Agnostus incertus* Barr., *A. insularis* n. sp., *A. integer* Barr. and var. *spinosa* Pomp., *A. intermedius* Tbg., *A. Kjerulfi* Br., *A. laevigatus* Dalm., also var. *ciceroides* Matth., var. *forfex* Br., var. *mammilla* Matth., var. *similis Br.* and var. *terranovica* Matth. *Agnostus lens* n. sp. and var. *frontosa* n. var., *A. lingula* n. sp., *A. Lundgreni* Tbg. and var. *nana* n. var., *A. Nathorsti* Br. and var. conflens Matth. *Agnostus nudus* Beyr., also var. *marginata* Br. and *scanica* Tbg. *Agnostus parvifrons* Linrs., also var. *mammillata* Br. and *nepos* Br. *Agnostus planicauda* Ang. and var. *vestgothica* Wall., *A. punctuosus* Ang., also var. *affinis* Br. and *bipunctata* Br. *Agnostus pusillus* Tbg., *A. quadratus* Tbg., *A. rex* Barr., *A. rotundus* n. sp., *A. stenorrhachis* n. sp., *A. tessela* Matth., *A. truncatus* Br. and *A. umbo* Matth. *Agralos ceticephalus* Barr., *A. depressa* n. sp., *A. difformis Ang., also var. aculeate* (Ang.) Br. and *acuminata* (Ang.) Br., *A. longicephalus* Hicks. *Anomocare Angelini* n. sp., *A. angustifrons* Tbg., MS., *A. excavatum* Ang., *A. laeve* Ang., *A. latelimbatum* Dames, *A. limbatum* Ang. *Anopolenus* Salter. *Apatocephalus* Br. *Arionellus* Ang. *Atops* Emmons. *Beyrichia Angelini* Barr. and var. *armata* n. var.

Cainatops Matth. *Carausia Meneviensis* Hicks. *Centropleura Henrici* Salt., *C. impar* Hicks, *C. Loveni* Ang., *C. Salteri* Hicks, *C. Steenstrupi* Ang., *C. venusta* Bill. *Conocephalina ornata* Br. The author uses Brögger's generic name, but does not define the genus. *Conocoryphe aequalis* Linrs., *C. Baileyi* Matth., *C. bufo* Hicks, *C. Dalmanni* Ang., *C. elegans* Walc., *C. emarginata* Lnrs., *C. glabrata* Ang., *C. Heberti* Berg., *C. Levyi* Berg., *C. pustulosa* Matt., *C. reticulata* Walc., *C. Sulzeri* v. Schloth., *C. tenuicincta* Lnrs., *C. trilineata* Emm., *C. (Erinnys) breviceps* Ang., *C. (Erinnys) venulosa* Salt., *C. (Ctenocephalus) coronata* Barr., *C. (Ctenocephalus) exsulans* Lnrs., *C. (Ctenocephalus) laticeps, C. (Ctenocephalus) Matthewi* Hartt, *C. (Ctenocephalus) Solvensis* Hicks, *C. (Ctenocephalus) tumida* n. sp., *C. (Liocephalus) impressa* Lnrs., *C. (Liocephalus) Linnarssoni* n. sp., *C. (Liocephalus) Lyelli* Hicks, *C. (Liocephalus) teres* n. sp. *Corynexochus bornholmiensis* n. sp., *C. Romingeri* Matt., *C. spinulosus* Ang., *C. umbonatus* Ang. *Dorypyge Curticei* Walc., *D. danica* n. sp., *D. desiderata* Walc., *D. Ellsi* Walc., *D. gothica* H. and W., also var. *acadica* Matth., *D. horrida* Matth., *D. oriens* n. sp., *D. quadriceps* H. and W., also var. *valida* Matth., *D. Richthofeni* Dames, *D. Slatkowskii* Fr. Schm. *Holocephalina inflata* Hicks, *H. primordialis* Salt. *Leperditia primordialis* Lnrs. *Liocephalus* n. subgen.

The new subgenus Liocephalus has as type species *C. impressa* Lnrs. and *C. Lyelli* Salt., and it is also probable that Salter's genus Holocephalina is to be referred hither.

Liostracus globiceps n. sp., *L. Linnarssoni* Br., *L. Maydelli* Fr. Schm., *L. microphthalmus* Ang., *L. platyrrhinus* n. sp. *Microdiscus pulchellus* Hartt, *M. punctatus* Salt., *M. scanicus* Lnrs., also cf. *cucentra* Lnrs. *Neolenus granulatus* Matth., *N. serratus* Rom. *Olenoides Fordi* Walc., *O. Marcoui* Whitf., *O. nevadensis* Meek.

Paradoxides Abenacus Hartt, *P. bohemicus* Boeck, *P. brachyrrhachis* Lnrs., *P. Davidis*

GRONWALL (Karl A.)—Continued

Salt., *P. eteminicus* Matth., *P. Forchhammeri* Ang., *P. Harknessi* Hicks, *P. Hicksii* Salt., also var. *palpebrosa* Lnrs., *P. lamellatus* Hartt, *P. mediterraneus* Pomp., *P. Pingelii* (nov. Beck MS.).

Grönwall, p. 107, refers *Paradoxides Davidis* Salt., to *P. Pingelli* Beck MS. The author refers to an unpublished plate 43 of Angelin's fasc, on which *P. Davidis* Salt. is reproduced under the name of *P. Pingelii* Beck MS.

Paradoxides pradoanus Barr., *P. rugulosus* Corda, *P. Sjögreni* Lnrs. and var. *nepos* n. var., *P. spinosus* Boeck, *P. Tessini* Brong., *P. tumidus* Ang., *P. Ölandicus* Sjögr., *P.* sp. indet. Nos. 1-3.

Ptychoparia Johnstrupi n. sp., *P. striata* Emmr. *Solenopleura acadica* Whiteave's MS. and var. *elongata* Matth. *Solenopleura brachymetopa* Ang. and var. *alutacea* Br., also *nuntia* n. var., *S. bucculenta* n. sp., *S. canaliculata* Ang., *S. holometopa* Ang., *S. parva* Lnrs. *Zacanthoides Eatoni* Walc., *Z. flagricaudus* White, *Z. humerosus* Salt., *Z. levis* Walc., *Z. spinosus* Walc., *Z. typicalis* Walc.

Gortani (Michele). Contribuzioni allo studio del Palæozoico Carnico Le Fauna a Climenie del Monte Primosio.

Mem. R. Acad. Sci. Bologna, ser. 6, vol. 6, 1907, pp. 201-243, plates 1-2.

The author divides the genus Trimerocephalus McCoy into the subgenus *Eutrimerocephalus.* In which he places *T. laevis* Münster, *Phacops (Trim.) anophthalmus* Frech, *P.(Trim.) carithiacus* Frech, and a new species under the title of *Trimerocephalus (Eutrimerocephalus) carnicus.* This series without eyes.

2—Subg. Microphthalmus with small eyes slightly faceted. The author places under this: *Trimerocephalus (Microphthalmus) cryptophthalmus* Emm., *T. (M.) pseudogranulatus sp.* nov., *T. (M.) mastophthalmus Richter* sp., *T. (M.) Roemeri* Gortani, *T. (M.) macrocephalus Richter* sp., *T. (M.) incisus* Roemer sp., *T. (M.) acuticeps* Kayser.

Under the genus Proetus the author records one species. *Proetus* cf. *Phocion* Billings, 1874; a small tail only. Under Dechenella the author records two species. Fragments of the head so far only figured. *Dechenella Vinassasi* n. sp., Rudf. Richter refers this to *Cyrtosymbole vinassai* (Gortani), also the other species *Dechenella italica.*

Gortani (M.) and **Regny** (P. Vinassa). de Fossili neosilurici del Pizzo di Timau e dei Pal Nell'alta Carnia.

Memoria Acad. Sci. Bologna, ser. 6, 1909, p. 87-119, plate 1.

The fossil Crustacea indicated by the authors are Ostracoda Aparchites indt. compared with *A. mitis* Jones and *Lindströmi* Jones.

Trilobites: *Encrinurus Beaumonti* Barr. var. *Noväki* Frech, *Proetus* n. f. *(foveolatus* n. sp.) The authors illustrate moveable cheek of this species comparing it with *Proetus crassiimargo* Hall.

Harpes crassifrons Barr. var. *forojuliensis* n. sp. The authors illustrate a fragment of the head of this species.

Groom (T. T.) On a new Trilobite from the Dictyomena shales of Malvern Hills.

Geol. Mag. London, Dec. IV, vol. 9, 1902, pp. 70-73, 4 figures.

Acanthopleurella Grindrodi n. gen. et sp.

The conformation of the head suggest Trinucleoid affinites, but there is no marginal rim, and the rest of the body appears to show Olinid characters. Shumardia is possibly an ally, but the new genus differs in the extension of the glabella to the front margin of the head, in the absence of glabella furrows, and in the spinous prolongation of the thoracic pleurae.

Gümbel (C. W.) Geognostische Beschreibung des Fichtegebirges, 1879.

The author refigures the original of *Trinucleus laevis* Münster with eyes, together with granulations over the surface of the head shield. He identifies *Trinucleus laevis* Münster with *phacops cryptophthalmus.*

Gortani, 1909, p. 229, refers Münster's species to *Trimerocephalus. (Eutrimerocephalus) laevis* v. Münster.

Gunther (A. F.) Ueber die Trilobiten u Rudisten.

Sitzber, d. Ges Isis, Dresden, Jhg., 1869 (1870), pp. 12-15.

Sao hirsuta Barr.

Gürich (Georg). Das Palaeozoicum des Polnischen Mittelgebirges.

Verhandl d Russ Kaiseri Mineralog Ges, vol. 32, 1896.

Arthropoda, pp. 353-373, plates 10 and 15.

The work contains descriptions and illustrations.

Agnostidae: *Agnostus fallax* Linnr. *A. gibbus* Linnr.

Olenidae: Paradoxides of Tessini Brong.

Concephalidae: *Liostracus Linnarsoni* Brögger.

Broteidae: Bronteus sp., *B. Kielcensis* n. sp.

The author refers *B. flabellifer* var. F. Roemer Z. D. Geol. Ges., 1866, p. 671, pl. 15, fig. 1a-c 6 to this new species.

Phacopidae: *Trimerocephalus typhlops* sp. nov.

Frech gives the name of *Phacops anophthalmus* for *Phacops cryptophthalmus* Emmr. (F. Roemer Z. D. Geol. Ges, 1866, pl. 13, figs. 6-7.)

Gürich refers it to his new species.

Trimerocephalus sp.

Phacops caecus n. sp. (a species without eyes), *P. Posidoniae* n. sp., *P. Schlotheimi* Bronn. and *P. latifrons* Br. *Cryphaeus lacinatus* F. Roemer.

The author refers *C. Grootei Beushausen,* 1884, to this species.

The author gives the name of *Cryphaeus Kayseri* for Kayser's Cryphaeus Lethaeae Faunades Hauptquarzites der Wiedaer Schiefer, p. 86.

Acidaspidae: Two species.

Proetidae: *Cyphaspis ceratophthalmus* Goldf., *C.* sp. *Proetus* cf., *cornutum* Goldf., *P. margaritaceus* n. sp. *Dechenella Dombrowiensis* n. sp. Richter refers this to his new subgenus Basidechenella. *Dechenella polonica* n. sp. Ritcher refers this to his new subgenus Eudechenella. *Dechenella pusilla* n. sp. Richter refers this to the new genus Cyrtosymbole.

Ostracoda: pp. 374-391.

Entomidae: *Entomis migratoria* n. sp., *E. serratostriata* Sandb., *E.* sp., *E. tenera* n. sp., *E. angulosa* n. sp., *E. vittata* n. sp., *E. scabra* n. sp., *E.* cf. *gyratan* Richter, 1869.

Entomis sp. (cf. *nitidan* F. A. Roemer, Beit, pl. 4, fig. 20).

Leperditidae: *Leperditia phaseolus* His. Silurian.

Leperditia Amphiporae n. sp. Devonian. *Bolbozoe polonica* n. sp.

New genus Antitomis, type *A. bisulcata* n. sp.

Trigonocaris dubia n. sp.

Primitia humiliformis n. sp., *P. obliqua* n. sp., *P. ornatissima* n. sp., *P. plana* n. sp., *P. lentiformis* n. sp., *P. fabaeformis* n. sp., *P. Calceolae* n. sp. *Primitia* sp., *P. entomidella* n. sp. *Primitiopsis piciformis* n. sp.

Aparchites sp.

Beyrichia Kloedeni McCoy, *B.* cf. *Buchianan* R. J., *B.* cf. *Salterianam* R. J. *Kloedenia* cf. *Wilkensianam* R. J.

GURICH (Georg)—Continued

Bollia sp.
New genus Polyzgia, type *P. symmetrica.*
New genus Poloniella, type *P. devonica.*
Bythocypris polaris n. sp. *Bairdia devonica* n. sp.

——— Nachtrage zum Palæozoicum des Polnisschen Mittlegebirges.
Neuen Jahrb. für Mineral Geol. and Palaeont. Beilarge, Band XIII, 1900, pp. 331-388, plates 14 and 15.

The author describes several new species of Trilobites, which he illustrates as *Illaenus polonicus* nov. sp., which he compares with *I. parvulus* Holm and *Panderia minima* Volborth. *Aeglina Kontkiewiczi* nov. sp., figure of the pygidium. *Proetus margaritaceous* Gür., fig. in text, *P. pyriformis* sp. nov., fig. of glabella, *P. Michalskii* Gür. *Dechenella pusilla* Gür. *Beyrichia trigonata* Gür.

——— Jura und Devon Fossilien von White Cliff, Australien.
Neuen Jahrbuch für Min. Geol. and Palaeont. Beilage, Band xiv, pp. 484-539, plates 18-20, 1901.

The author describes a new genus of Lichas as Craspedarges including under it one species, *C. Wilcanniae* Gürich. He also gives figures of *Euarges meridionalis* Frech and *E. granulosus* F. A. Roemer. The author uses as subgenera to Lichas the following subgenera:

Ceratages for the preoccupied term Arges Goldf., with *L. armatus Goldf.* for its type.

Plusiages for Corydocephalus Corda, owing to the uncertainty attached to Corda's types, Type *L. palmatus* Barr.

Liparges substituted for Corda's Dicranoymus, type *L. simplex* Barr.

Trachylichas name proposed in place of Dicranopeltis Corda, type *Lichasscarba* Beyr.

Echinolichas Gurich type *L. eriopis* Hall.

Metopolichas used for preoccupied name Metopias Eichw., type *L. Hubneri* Eichw.

Platopolichas Gurich, type *L. avus* Barr.

Platylichas, type *Lichas margaritifera* Nieszk.

Dr. Gurich takes *Platymetopus Holmi* Schmidt as the type of this genus, but it should be abandoned for the group, as it was used by Dejean in 1829 for a genus of insects.

Pterolichas for *Arctinurus Boltoni.*

Platynotus was used by Conrad in 1838 for the same species.

Euages for preoccupied term Acanthopyge Corda, type *L. Haureri* Barr.

Leiolichas Schmidt, type *L. illaenoides* Nieszk.

Homolichas Schmidt, type *L. depressus* Ang.

Hoplolichas Dames, type *L. tricuspidata* Beyr.

Ceratolichas Hall and Clarke, type *L. gryps* Hall.

Conolichas Dames, type *L. aequiloba* Steinhardt.

Hemiarges Gurich, type *L. Wesenbergensis* Schmidt.

Platymetopus Ang., type *L. planifrons* Ang. (Amphilichas Raymond).

Oncholichas Schmidt, type *L. ornatus* Ang.

Hall (James). Relations of the genus Eurypterus.
Proc. Am. Acad. Arts and Sci., vol. 4, 1860, p. 353.

——— On the genus Eurypterus.
Trans. Albany Inst., vol. 4, 1860, p. 280.

HALL (James)—Continued

——— Preliminary notice of the Fauna of the Potsdam sandstone, with remarks upon previously known species of fossils and descriptions of some new ones from the sandstone of the Upper Mississippi Valley.

Trans. Albany Institute, vol. 5, 1867, pp. 93-195, with six plates.

A notice of this paper was read before the Albany Institute April 29, 1862, and by an arrangement between the Publishing Committee and the Regents of the University, it was published in the 16th Report on the State Cabinet, pp. 119-226. The starred pages 135 and 136 were not issued in the Trans. Albany Inst.

On page 193 of the Trans. Albany Inst., the text contains figures of *Pemphigaspis bullata,* also figures of *Amphion ? matutina, Conocephalites (Arionellus) dorsalis* and *C. optatus,* not republished in the text of the 16th Report N. Y. State Cabinet, but included in Plate V. A. except *C. dorsalis.*

For list of fossil Crustacea, see 16th Report N. Y. State Cabinet, 1863; also Contributions to Palæontology from investigations made during the years 1861-1862.

Harbort (E.) Ueber mitteldevonische Trilobitenarten im Iberger Kalk bei Grund im Harz.

Zeitschr. Deutsch. Geol. Ges Bd., 55 Jahrg, 1903, pp. 474-485, 2 plates.

Acidaspis pigra Barr. *Cyphaspis ceratophthalma* Goldf., *C. convexa* Barr. *Bronteus granulatus* Goldf., *B. flabellifer* Goldf. *Harpes* cf. *socialis* Barr., *H. convexus* Trenkn.

Haynes (Winthrop P.) Discovery of bivalve Crustacea in the coal measures near Pawtucket, R. I.

Science N. S., vol. 37, No. 944, pp. 191-192, 1913.

The author records the discovery of the carapaces of bivalve Crustacea of the genus Leaia and Estheria from the Narragansett Basin coal measures, which the author compares with *Leaia tricarinata* Meek and Estheria not sufficiently well preserved to determine.

Henderson (John). Short notices of three species of Trilobites from Silurian Beds of the Pentland Hills.

Trans. Edinburgh Geol. Soc., vol. 1, pt. 1, 1868, pp. 21-23.

The author mentions *Phacops Stokesii* and *Calymmene Blumenbachii.* He remarks that the species described as *Encrinurus expansus* by Haswell, in his Geology of the Pentland Hills, must not have been perfect, as he omitted any description of the free cheeks or facial suture. The author refers the *Zethus Pageii* Haswell to the free cheek of *Encrinurus expansus.* This species is broadly ovate, length about one and one-fourth of an inch; breadth two-thirds of the length, cephalic shield, semi-circular tuberculated posterior angles rounded; the glabella pear-shaped, convex, and covered with tubercles, and punctured between the tubercles; large tubercles, occupying the place of lateral lobes; cheeks triangular convex and embracing the front of the glabella; eyes pedunculated and placed between the centre of the cheek; and the glabella obovate and covered with a fine net work of facets.

——— Notice of *Silimonia acuminata* from the Silurian of the Pentland Hills.

Trans. Edinburgh Geol. Soc., vol. 1, 1870, pp. 18-19.

——— On some recently discovered fossiliferis beds in the Silurian rocks of the Pentland Hills.

Trans. Edinburgh Geol. Soc., vol. 3, 1880, pp. 353-356.

Herrick (C. L.) Observations upon the so-called Waverly Group of Ohio.

Geol. Ohio, vol. 7, 1893, pp. 495-515, plates 14-24, Chapter IV.

Proetus praecursor Herrick. *Phaethonides spinosus* Herrick. *Phillipsia meramecensis* Shumard. *Proetus minutus* Herrick. *Phillipsia serraticaudata* Herrick. *Phaethonides immaturus* Herrick, *P. occidentalis* Herrick. *Proetus* sp. ?, *P. auriculatus* Hall.

This chapter is a summary of the results of observations published in the Bulletins of Denison University, the American Geologist, and the Bulletins of the American Geological Society.

The plates are from the Bull. Denison University.

Hind (G. J.) and **Fox** (H.) On Radiolarian rocks in the Lower Culm.

Quart. Jour. Geol. Soc., vol. 51, p. 609.

Trilobites by Dr. Henry Woodward, pp. 646-649.

Phillipsia Leei Woodw., *P. minor* Woodw. *Phillipsia* larval form.

Griffithides acanthiceps Woodw., *G. longispinus* Portl. *Proetus species* A-B.

Hitchcock (C. H.) Notice of a new species of Acidaspis from a boulder of Marcellus shale found in drift at West Bloomfield, New Jersey.

Bull. Am. Mus. Nat. Hist., vol. 19, 1903, pp. 97-98, plate 6.

The author describes *Acidaspis Whitfieldi* n. sp., which he compares with *Acidaspis mira* Barr., but the new species is rather more complicated in the distribution of the spines.

Hochsteetter (F.) Silursuiten (12 Gypsabgüssen seltener Trilobiten).

Verh. d. k. k. Geol. Reichsanst, Wien Jhg., 1877, p. 74.

Hoek (P. P. C.) Neues Jahrb für Min. Geol. and Pal., 1912.

Hoenes (R.) Die Trilobiten Gattung Phacops und Dalmanites.

Jahrb. k. k. Geol. Reich., 1880, vol. 30, part 4, pp. 657-686.

Ordovician: *Dalmanites Angelini* Barr., *D. atavus* Barr., *D. Deshayesi* Barr., *D. Hawlei* Barr., *D. Morrisiana* Barr., *D. orba* Barr., *D. Phillipsi* Barr., *D. socialis* Barr. and var. *proaeva* Emm., also var. *grandis*.

Silurian: *Dalmanites auriculata* Dalm., *D. cristata* Corda, *D. Fletcheri* Barr., *D. Hausmanni* Brongn., *D. McCoyi* Barr., *D. Reussi* Barr., *D. spinifera* Barr. *Phacops rugosa* Corda, *P. spinifera* Barr., *P. Glockeri* Barr., *P. Boecki* Corda, *P. breviceps* Barr., *P. Bronni* Barr., *P. bulliceps* Barr., *P. cephalotes* Corda, *P. emarginatus* Barr., *P. fecundus* Barr., *P. Hoeninghausi* Barr., *P. intermedius* Barr., *P. miser* Barr., *P. Signatus* Corda, *P. Sternburgi* Corda, *P. trapeziceps* Barr., *P. Volberthi* Barr.

The author discusses:

1. Characteristic of the genera *Phacops* and *Dalmanites;* similar and dissimilar features.

2. The group of *Dalmanites socialis* and their relationship to those of the *Dalmanites Hausmanni;* also to the genus *Phacops*.

3. The group of *Phacops Glockeri* as connecting link between *Phacops* and *Dalmanites*.

4. The probable evolution between the genera *Phacops* and *Dalmanites*.

Holm (G.) Ueber eine neue Bearbeitung des *Eurypterus Fischeri* Eichw.

Acad. Imp. Sci. Bull., St. Petersburg, ser. 5, vol. 4, p. 369.

——— Om förekomsten af en Pterygotus i Dalarnes öfversilur.

Geol. För. i Stockholm Förhandl, vol. 19, 1897, p. 475.

Holm (Gerhard). Palaeontologiska Notiser 1-10.

Sveriges Gel. Unders. Afh., ser. C, No. 176, 1902.

Olenellus skifern vid Tomten Ringsaker's socken.

4. Om *Bohemilla ? denticulata* Linrs. och *Remopleurides microphthalmus* Linrs. This forms the type of *Robergia,* a new genus by Moberg, 1907.

6. Om forekomsten af en *Pterygotus* i Dalarnes Oversilur.

7. Om Angelin's *Bronteus ? nudus Illaenus (Bumastus) nudus.*

8. Om kinden hos *Illaenus punctillosus* Tornq.

9. On ett fullständigt examplar af *Pseudo-sphaerexochus laticeps* Linrs.

Illustrations of *Illaenus punctillosus* Tornq. *Pseudo-sphaerexochus laticeps* Linrs.

——— Palaeontologiska Notiser.

Geol. Foren. i Stockholm Forhandl, Bd. 19, p. 169, 1897.

Ueber Dikellocephalus and Olenellus Mickwitzi.

——— Palaeontologiska Notiser 13.

Geol. Foren. i Stockholm Forhandl, Bd. 21, Häft 1, 1899.

Om den yttre anatomien hos *Eurypterus Fischeri,* 4 plates.

——— Ueber die organisation des *Eurypterus Fischeri* Eichwald.

Mem. Acad. Petersburg, ser. 3, vol. 8, 1899, pp. 1-57, plates 1-10.

Eurypterus Fischeri Eichwald. *Dolichopterus laticeps* Fr. Schm.

The close similarity approaching identity of *Eurypterus Fischeri* to *E. remipes* and *E. lacustris,* American forms, suggested to Dr. Schmidt that the difference between the Baltic and American forms were only geographical variations arising through migration. With this idea Clarke and Ruedemann have concurred.

Holzapfel (E.) Das obere Mitteldevon in Rheinischen Gebirge, Berlin, 1895.

Proetus Cuvieri Stein, *P. Holzapfeli* Burhenne. Richter refers this to *P. cornutus* Goldf.

Cyphaspis ceratophthalma Goldf.

Houding (Van). Trilobieten und Limulus.

Album der Natuur, 1899, p. 24.

Hussak (E.) Ueber Trilobiten.

Jahresber d'Acad. Naturwiss ver Graz. Jahrg., 1875, pp. 35-36.

Illés von (A.) Magyarországon talált elsö Trilobita.

Foldtani Kozlony, vol. 22, 1902, pp. 351-354.

Griffithides Dobsinensis n. sp., figs a-b.

The author illustrated part of the thorax and pygidium; compares *Griffithides verrucosus* Gemmellaro, 1890.

——— Die erste in ungarn gefundene Trilobite.

Foldtani Kozlony, vol. 22, 1902, pp. 408-411, figs. a-b.

The same in the German language.

Illing (V. C.) Notes on certain Trilobites found in the Stockingford Shales.

Brit. Assoc. Adv. Science, 83 Ann. Meeting, Sec. C, 1913.

Abstract in Geol. Mag., Dec. V, vol. 10, p. 452, 1913.

The author remarks that among the fossils found at Hartshill Hayes, numerous forms occur, representing young stages in the development of certain Trilobites. Among these are the following:

1. Liostracus sp., similar to one described by G. F. Matthew.
2. Holocephalina sp. The early stages of this genus possess a well-marked glabella, widening anteriorly.
3. *Paradoxides Hicksii.*
4. Certain new forms of Agnostus.

Jackel (O.) Ueber die Organisation der Trilobiten.

Zeitschr. Deutsch Geol., Ges. 53, 1901, pp. 133-171, plates 4-6.

——— Ueber verschhiedene Wege Phylogonetischer Entwickelung.

Verhandl. des V. Internationalen Zoologen Congresses zu Berlin, 1901, pp. 1058-1117, 28 figures in text.

Evolution of Trilobites, pp. 1086.

The author illustrates Phacops, Agnostus and Olenus, fig. Nos. 20-24.

On the evolution of Gigantostraca, p. 1105.

——— über die Agnostiden.

Zeit. d. Deutsch Geol. Ges., vol. 61, 1909, pp. 380-401, figures 1-23.

The author proposed Paragnostus with *Agnostus rex* as its type. This was the type of Corda's Condylopyge. He further proposed Dichagnostus with *Agnostus granulatus* as the type duplicating Corda's Pleuroctenium. The author gives the name of Mesagnostus for *A. integer* Beyr., which was used for Corda's genus Peronopsis.

Miagnostus Jackel has the same type species, *A. laevigatus* Dalm., as Lejopyge Corda. The new genus Leiagnostus, which has the same generic characters as Phalocroma Corda.

Metagnostus erraticus and *A. glabratus* have the same short glabella with faint basal lobes as *Agnostus tardus* Barr., which was the type of Corda's Arthrorhachis.

Vogdes, in Am. Geol., vol. 9, 1892, p. 395, in his paper on North American species of the genus Agnostus, uses this term for section IV.

The author arranges the families as follows:

1. Fam. Paragnostidae. Paragnostus n. gen., type *A. rex* Barr.

Dichagnostus n. gen., type *A. granulatus* Barr.

Diplagnostus, type *A. planicauda* Ang.

Mesagnostus n. gen., type *A. integer* Barr.

2. Fam. Metagnostidae.

Metagnostus n. gen., type *M. erraticus* n. sp.

Hypagnotus n. gen., type *A. parvifrons* Linnrs.

3. Fam. Agnostidae sensu stricto.

Agnostus sensu stricto, type *A. pisiformis* Linné.

Pseudagnotus n. gen., type *A. cyclopyge* Tullberg.

4. Fam. Leiagnostidae.

Ptychagnostus n. gen., type *A. reticulatus* Ang.

Miagnostus n. gen., type *A. laevigatus* Dalman.

Leiagnostus n. gen., type *L. erraticus* n. sp.

Jahn (J. J.) Ueber das Tejrovicer Cambrium, Bohmen.

Verhandl. k. k. Geol. Reichs, 1893, p. 271.

Arionellus spinosus n. sp.

This species is illustrated by Pompeckj Die Fauna des Cambrium von Tejrovic, p. 548, pl. 17, figs. 14-20.

Jarosz (J.) Fauna des Kohlenkalk in der Umgebung von Krakau I Teil. Trilobiten.

Acad. d. Wissensch. in Krakau Math. Naturw., Kl., fur 1909, 2 Semester, Krakau, 1910.

Jones (T. R.) and **Woodward** (Henry). On some Scandinavian Phyllocardae, Part 2.

Geol. Mag., Dec. 3, vol. 5, 1888, p. 145.

Ceratiocaris Scharyi Barr., *C. pectinata* J. & W. *Phasganocaris pugio* Barr. var. *serrata* J. & W. *Ceratiocaris Angelini* J. & W.

——— Notes on Dr. G. F. Matthew's Cambrian Ostracoda from North-eastern America.

Geol. Mag., Dec. IV, vol. 9, 1902, pp. 401-403.

Outline figures of the genera—Indiana, Bradorona, Beyrichona, Hipponicharion, Bradoria and Escasona.

——— Note on a Palæozoic Cypridina from Canada.

Geol. Mag., Dec. V, vol. 1, 1904, pp. 438-439, fig.

Cypridina antiqua n. sp.

——— On some Isochilinae from Canada and elsewhere in North America.

Geol. Mag., new ser., Dec 4, vol. 10, 1903, pp. 300-304.

Isochilina gregraria (Whitf.), var. *Ulrichiana* nov. Tetradella. sp.

——— Some Palæozoic Ostracods from Maryland.

Johns Hopkins Univ., Circ., 1905, No. 3, pp. 20-33.

——— and **Kirby** (J. W.) Sur une Leperditia (Primitia) nouvelle du calcarire carbonifere de la Belgique.

Ann. Soc. Geol. de Belgique, vol. 20, 1893, plate.

The species described as *Leperditia Dewalquei* is now referred by authors to the genus *Primitia*.

——— Notes on Palæozoic Bivalved Entomostraca No. xxxii.

Ann. Mag. Nat. Hist., ser. VI, vol. 16, 1895, pp. 452-460, plate.

Bairdia Hisingeri Munster. *Bythocypris cornigera* J. & K. *Phreatura concinna* J. & K. *Cytherella intercalaris* n. sp. *Youngiella rectidorsalis* J. & K. *Bairdia plebeia* Reuss var. *alta* n. var., *B. Hisingeri* var. *contracta* n. var. *Argillaecia (Bythocypris) aequilis* J. & K. *Bythocypris breviata* n. sp.

——— Quelques Ostracodes fossiles de la Belgique.

Traduit par G. Dewalque, Liege, 1896, plate.

Leperditia Okeni Munster, *L. Okeni* var. *gracillis* n. var., *L. obtusa* n. sp., *L. consorbrina* n. sp., *L. Briarti* Dewalque. *Schmidtella belgica* n. sp. *Primitia Dewalquei* n. sp.

See also Ann. Soc. Geol. de Belgique, vol. 23, 1896.

JONES (T. R.)—Continued

——— On the fossil Cypridinidae and some allied Ostracoda.

Ann. Mag. Nat. Hist., 7th ser., vol. 1, 1898, pp. 333-344, plate.

List of fossil Cypridinidae with illustrations of—

Cypridina primaeva McCoy. *Bradycinetus Rankianus* J. & K. *Philomedes ? Bairdiana* J. & K. *Cyprosina Whidbornei* Jones. *Cypridinella MacCoyiana* J. & K., *C. Burrovii* J. & K. *Cypridinella Koninckiana* Jones. *Cyprella annulata* DeKon. *Cypridina ? (Leperditia ?* von Toll.) Silurian, *C. ? polonica (Bolbozoe* Gurich), Upper Silurian, *C. Grayae* Jones, Lower Silurian, *C. Raisiniae* Jones, Lower Silurian.

——— Contributions to Fossil Crustacea.

Geol. Mag., Dec. IV, vol. 6, 1899, pp. 388-395.

Bellinurus grandaevus n. sp. *Leaia Leidyi* Jones. *Hibbertia orbicularis* gen. et sp. nov.

The genus is placed by the authors along with and nearer to those forms referred to the genus Cyclus than with any other group.

Anthrapalaemon glaber J. & W. *Echinocaris Whidbornei* J. &. W. *Estherina extuberata* n. sp.

——— The Eurypterus bearing rocks of the Pentland Hills.

Report Brit. Assoc., 1900, pp. 557-558.

——— **Bather** (R. A.), and **Chapman** (F.) On some fossils of Wenlock age from Mulde near Klinteberg, Gotland. With notes by Prof. Jones and Dr. Bather.

Ann. Mag. Nat. Hist., 7th ser., vol. 7, 1901, pp. 141-160, plate.

Family Leperditiidae: *Primitia valida* J. & H., also var. *breviata* J. & H. and var. *angustata* J. & H., *P. fabulina* J. & H., *P. elongata* Krause, *P. punctata* Jones, *P. humilis* J. & H., *P. ornata* J. & H., *P. reticristata* Jones, *P. mundula* Jones.

Sub-family Beyrichiinae: *Kloedenia apiculata* Jones, *K. gotlandia* n. sp.

Bollia auricularis Jones. *Beyrichia concinna* J. & H., *B. muldensis* n. sp., *B. Jonesii* Boll., *B. Kloedeni* McCoy, var. *tuberculata* Salter, *B. tuberculata* (Kloeden) var. *lineato-tuberculata* n. var., *B. Bolliana umbonata* Reuter, *B. clavata* Kolmodin.

Family Cytheridae?: *Cythere Vinei* Jones ?. *Cythere subquadrata* Jones. *Thlipsura plicata* var. *unipunctata* Jones, *T. v-scripta* J. & H. *Æchmina bovina* Jones and var. *punctata* Krause. *Primitiopsis planifrons* Jones.

Family Cypprididae: *Pontocypris Mawii* Jones., *P. Mawii* var. *proxima* Jones.

Family Bairdiidae: *Macrocypris siliquoides* Jones. *Bythocypris symmetrica* Jones, *B. symmetrica* var. *obesa* Jones, *B. phaseolus* Jones, *B. Hollii* Jones, *B. Hollii* var. *oblonga* Jones.

Family Cytherellidae: *Cytherella Smithii* Jones.

Trilobita: *Phacops (Dalmanites) limulurus Hall* (Green's sp.).

The authors illustrate *Beyrichia Muldensis, B. tuberculata* var. *lineato-tuberculata Kloedenia Gotlandica* n. sp.

Jonker (H. G.) Bijdragen tot de kennis der Sedimentaire Zwerfsteenen in Nederland. Contributions to a knowledge of the sedimentary erratic blocks in the Netherlands.

Amsterdam Verh. K. Akad., Wet. 2, part 12, No. 3, 1906, pp. 1-33, pl. 1.

Kayser (E.) Die Fauna des Hauptquartzits und zorger Schiefer des Unter-Harzes.

Abhandl. K. Preussischen Geol. Land., vol. 10, 1889, part 1.

KAYSER (E.)—Continued

Phacops Potieri Bayle. *Homalonotus (Dipleura)* sp., *H. multicostatus* Koch?. *Cryphaeus Lethaeae* n. sp. *Cryphaeus* sp. *Phacops* aff. *fecundus* Barr.

——— Ueber einige neue order venig gekannte Versteinerungen des rheinischen Devon.

Zeitschr. Deutsch. Geol. Ges., vol —, 1889, pp. 288-926, plate.

Phacops (Trimerocephalus) acuticeps n. sp.

——— Die Fauna des Dalmanitensandsteins von Kleinlinden bei.

Giessen, Marburg, 1896, 42 pp., 5 plates.

Odontochile hassiaca n. sp., *O.* sp. *Phacops Frechi* Kays. *Cheirurus gibbus* Beyr. *Cyphaspis ceratophthalma* Goldf. *Bronteus (Thysanopeltis) laciniatus* Sandb.? *Phacops* cf. *Sternbergi* Corda.

——— Beitrage zur Kenntnis einiger Palæozoischer Faunen Sud Americas.

Zeitschr. Deutsch. Geol. Ges., vol. 49, 1897, pp. 274-317, plates.

Liostracus Steimanni n. sp., *L. Ulrichi* n. sp. *Agnostus irugensis* n. sp. *Olenus argentinus* n. sp. *Conocoryphe* (subgen.) *Crepicephalus.*

——— Weiterer Beitrage zur Kenntnis der älteren Palæozoischen Faunen Sud Amerikas.

Zeitscher. Deutsch. Geol. Ges., vol. 59, 1898, pp. 423-429, plate 16.

Megalaspis sp., *M. Brackebuschi* n. sp., *M. planilimbata* Ang. *Pterygometopus saltaensis* n. sp.

Thysanopyge argentina n. sp. et n. gen.

The new genus was established on a pygidium, similar to that of *Dalmanites caudata* and certain species of *Megalaspis.*

The main peculiarity of this new type consists of the tooth-edged limb of the pygidium, in other features it corresponds with the genus *Megalaspis.*

Keyes (Charles R.) Missouri Geol. Survey, vol. 4, part 1, 1894, Palaeont. Missouri Crustaceans, Chap. X, p. 226.

Lichas Boltoni Bigsby. *Illaenus Graftonensis* M. & W., *I. insignis ?* Hall. *Acidaspis hamata ?* Conrad. *Cyphaspis Girardeauensis* Shumard. *Encrinurus deltoides* Shumard. *Dalmanites tridentifera* Shumard. *Acidaspis Halli* Shumard. *Calymmene senaria* Conrad, *C. rugosa* Shumard. *Ptychoparia conica ?* Billings. *Proetus Missouriensis* Shumard, *P. Swallovi* Shumard. *Phillipsia Sedaliensis* Vogd., *P. Sampsoni* Vogd., *P. tuberculata* M. & W., *P. Missouriensis* Shumard, *P. Meramecansis* Shumard, *P. Portlocki* M. & W., *P. major* Shumard, *P. ? immaturus* Herrick. *Leperditia sublaevis* Shumard. *Solenocaris Sancti-Ludovici* Worthen. *Colpocaris Chesterensis* Worthen.

Plate 32 illustrates *Illaenus insignis, Cyphaspis Girardeauensis, Dalmanites tridentifera Acidaspis Halli, Calymmene niagarensis Phillipsia tuberculata, P. Portlocki* and *P. major.*

Kindle (E. M.) and **Breger** (C. L.) The Stratigraphy and Palæontology of the Niagara of Northern Indiana. Geol. Sur. Indiana, 28 Ann. Report, 1903, p. 397.

Under the title of Trilobita the authors describe and illustrate (plate XXII-XXIV): *Illaenus armatus* Hall, *I. insignis* Hall, *I. ioxus* Hall. *Ceratocephala goniata* Warder. *Odontopleura ortoni* Foerste. *Encrinurus indianensis* n. sp. *Calymmene Vogdesi* Foerste. *Ceraurus (Crotalocephalus) niagarensis* Hall. *Sphaerexochus romingeri* Hall. *Phacops* cf. *pulchellus* Foerste. *Dalmanites (Synphoria) vigilans* Hall.

The new species *Encrinurus Indianensis* of the Niagara Group has a semi-circular cephalon, test tuberculated. Glabella with 3 strong tubercles on each side, anterior to the occipital groove; fixed cheeks separated from the glabella by deep dorsal grooves; genal angles spined; pygidium elongated, triangular, convex; axis 15 joints; lateral ribs 10. Each ring of the axis has 3-5 tubercles, the median one being the strongest.

Compares *E. variolaris.*

Kindle (E. M.) The Onondaga Fauna of the Alleghany Region.

Bull. 508, U. S. Geol. Sur., 1912, 144 pp. with 13 plates.

The author notes and illustrates the following Crustacea:

Phacops rana Green, *P. cristata* Hall, with var. *pipa* Hall. *Cryphaeus* cf. *Boothi* var. *calliteles* (Kayser). *Dalmanites (Coronura) aspectans* Conrad. *Odontocephalus selenurus* (Eaton), *O. aegeria* Hall. *Phaethonides gemmaeus* H. & C. *Conolichas* cf. *hispidus* H. & C. *Cyphaspis* cf. *stephanophora* H. & C. *Lichas (Arges) contusus* H. & C. var. *Acidaspis callicera* H. & C. *Dalmanites* sp. undet.

Ostracoda: *Bollia ungula* Jones, *B. obesa* Ulrich. *Bythocypris favulosa* Jones. *Ulrichia conrandi* Jones. *Octonaria stigmata* Ulrich. *Leperditia* cf. *subrotunda* Ulrich.

The above list of 13 species contains three trilobites known in the Hamilton fauna. One, *Phaethonides gemmaeus*, is common to the Onondaga and Hamilton faunas in New York. The doubtful species *(Cryphaeus* cf. *boothi* var. *callites)* has an occurrence at a horizon, earlier than the Hamilton now first reported. The third *Phacops rana* is one of the very few Devonian trilobites having a wide range.

Kingsley (J. S.) The systematic position of Trilobites.

Amer. Geol., vol. 20, 1897, pp. 33-40.

The author remarks, on p. 34: "Not a single homology can be drawn with any degree of certainty between Limulus and any trilobite. The regional divisions are different; the appendages are built upon a different plan, while the larvae of the two groups present but the slightest and most superficial resemblance to each other."

Kliver (M.) Über einige neue Blattinarien, zwei Dictyoneura und zwei Arthropleura Arten aus der Saarbrücker Steinkohlenformation.

Palæontographica N. F. IX, pp. 251-265, pl. 34-36, 1883.

Arthropleura armata Jord.

Koenen (A. von). Ueber die Organisation der Trilobiten.

Marburger Sitzber, 1872, pp. 77-78.

Verhandl. d. Naturhist. Ver. d. Preuss. Rheinl. and Westphal. 29 Jhg. (3F. 9 Jhg.). 1872, pp. 93-95.

——— Ueber die Underseite der Trilobiten.

Neues Jahrb. für Mineral, Jhg., 1880, vol. 1, pp. 430-431.

Koninck (L. G.) de Description of the Palæozoic Fossils of New South Wales (Australia). Translated by Prof. T. W. Edgeworth David, Mrs. David and W. S. Dunn.

Memoirs Geol. Survey N. S. Wales Palæontology, No. 6, xii, 298 p., 24 plates, 1898.

For list of Crustacea see Mem. Sci. Liége, vol. vii, 1878; also Bibliography of the Palæozoic Crustacae, Vogdes, p. 128.

Krause (A.) Ueber die Ostrakodenfauna eines holländischen Silurgeschietes.

Zeitschr. Deutsch. Geol. Ges., vol. 48, Jahg., 1896, p. 932, plate XXV.

Isochilina cf. *canaliculata* Krause. *Primitia distans* Krause, *P.* cf. *bursa* Krause. *P. Schmidtii* Krause, *P. elongata* Krause, *P. elongata* var. *obliqua* Steusloff, *P. binodis* n. sp., *P.* cf. *canaliculata* Steusloff. *Entomis* cf. *sigma* Krause, *E.* cf. *obliqua* Krause, *E. oblonga* Steusloff, *E. imperfecta* n. sp. *Placentula Jonesii* n. sp. *Bollia minor* Krause var. *ornata* n. var. *Tetradella harpa* Krause. *Ctenobolina rostratae* Krause, *C. rostrata* var. *cornuta* n. var. *Bythocypris* cf. *symmetrica* Jones.

Krejci (J.) O trilobitech.

Ziva 11, 1854, pp. 83-89, plate 3.

Dalmanites socialis Barr. *Trinucleus ornatus, Acidaspis mira.*

Kutgen (Carl). Die Trilobiten des K. G. H. naturhistorischen Museums.

Publicat de 1, Instit. Roy. grand-ducal Luxembourg, Sec. Sci. Nat. vol. 16, 1877, pp. 127-142.

Proetus Cuvieri Steininger. *Phacops latifrons* Bronn. *Dalmanites caudata* Emm. *Homalonotus platynotus* Dalm., *H. delphinocephalus* Murch., *H. laticauda, H. Knightii* Koenig, *H. obtusus* Sandb., *H. crassicauda* Sandb. *Calymmene Blumenbachii* Brong.

Lake (Philip). On the British species of Acidaspis.

Quart. Jour. Geol. Soc. London, vol. 52, pp. 235-245, plates 7-8.

The author describes and illustrates the following species:

Acidaspis Brighti Murch., *A. coronata* Salter, *A. deflexa* n. sp., *A. crenata* Emm., *A. quinquespinosa* Salt. MS., *A. Barrandei* Fletcher & Salter non Angelin, *A. Hughesi* Salt. MS., *A. erinaceous* Marr & Nicholson, *A. callipareos* Wyv. Thomson.

The author remarks the British species which have been described have in many cases been imperfectly figured, and the result is endless confusion.

The common English trilobite *Acidaspis coronata* has received abroad no less than three names, all of them different from ours. In England the foreign name *Acidaspis crenata* is often applied to a species which is quite distinct from the original *Acidaspis crenata.*

The author remarks in regard to the synonymy of *Acidaspis coronata* that it is known in England by the name of *A. coronata,* as *A. Marklini* in Sweden, and *A. mutica* in Germany; Murchison's term *quadrimucronatus* is older than any of them.

Even the name of the genus itself is matter of controversy. Murchison's Silurian System, p. 653, employed the term Acidaspis, and in the same year Emmrich, De Tril. Diss. inaug., p. 53, proposed the name Odontopleura. This controversy depends on the publication of Murchison's and Emmrich's terms Acidaspis and Odontopleura.

A copy of Murchison's Silurian System was presented to the Geological Society London, Jan. 9, 1839. This would indicate that the book was published early in January, 1839. Captain Portlock, in his address delivered at the 8th annual meeting, Geological Society of Dublin, Feb. 14, 1839, remarks he had been favored with a copy of the work in sheets, prior to its general publication. Jour. Geol. Soc. Dublin, vol. 2, pt. 1, 1839, p. 29.

Emmrich's paper bears the date, April, 1839.

There is, however, an earlier name still, the use of which has been advocated by Vogdes (Proc. Nat. Sci. Phila., 1877, p. 138); also afterwards by Clarke (10th Rep. N. Y. State Geologist, 1891, p. 61). This name is Ceratocephala Warder (Am. Jour. Sci., vol. 34, 1838, p. 377). Dr. Lake remarks that "even if its rival be eligible, Acidaspis has been so widely used for so long a time that here at least I do not propose to adopt any other."

LAKE (Philip)—Continued

Warder's species *Ceratocephala goniata* belongs to the same group as *Acidaspis vesiculosa* Barrande.

Beyrich's *Odontopleura Brightii* is identical with *A. quinquespinosa* Salter MS.

——— The Trilobites of the Bokkeveld Beds.

Ann. South African Mus., vol. 4, part 4, 1904, pp. 201-220, 5 plates.

Phacops pupillus n. sp., *P. arbuteus* n. sp., *P. crista-galli* Woodw., *P. africanus* Salter, *P. ocellus* n. sp., *P. impressus* n. sp., *P. (Cryphaeus) caffer* Salter. *Phacops* sp. *Dalmanites lumatus* n. sp. *Dalmanites* sp. *Proetus malacus* n. sp. *Typhoniscus Baini* Salter. *Homalonotus Herscheli* Murch., *H. quernus* n. sp., *H. colossus* n. sp. *Homalonotus* sp.

Several of these species were described by Salter, Trans. Geol. Soc., series 2, vol. vii, 1856; also by Henry Woodward, Quart. Jour. Geol. Soc., vol. xxix, 1873; and by Dr. Frech, who describes a *Homalonotus* which he believed to be new, in Lethaea Geognostica Th. 1, Bd. ii, Leif. 1, 1897, p. 218. *H. perarmatus* n. sp.

——— On Trilobites from Bolivia.

Quart. Jour. Geol. Soc. London, vol. 42, 1906, pp. 425-430, plate XL.

Peltura sp. *Symphysurus apolonista* n. sp. *Trinucleus boliviensis* n. sp. *Ogygia. Phacops* cf. *arbuteus* Lake. *Dalmanites Paituna* H. & R., *D. maecuruia* Clarke. *Dalmanites* sp.

The earlier genera show affinities with the contemperaneous European fauna.

The Devonian species are much more closely allied to those of South Africa and North America.

——— The Cambrian Trilobites.

A Monograph on the British Cambrian Trilobites. Palæontographical Society, 1906, part 1, pp. 1-28, plates 1-2.

Agnostus fissus Lundgren, *A. punctuosus* Ang. (The *Agnostus scarabaeoides* Salter, as described by Hicks, is clearly only a flattened and imperfect specimen of this species.) The *Agnostus scutalis* Hicks. Quart. Jour. Geol. Soc., vol. 28, pl. v, f. 9, is a beautiful tail of *A. punctuosus* Ang.

Agnostus Davidis Salt., *A. exaratus* Gronwall. (The *Agnostus scutalis* as described by Hicks, Quart. Jour. Geol. Soc., vol. 28, p. 175, pl. v, figs. 12 and 13, and probably figs. 11 and 14, not figs. 9 and 10, includes at least two distinct species. The descriptions of the heads corresponds with Gronwall's species, but the tail is apparently based on a specimen of *A. punctuosus.)*

Agnostus reticulatus Ang., *A. pisiformis* Linne, *A. pisiformis* var. *obesus* Belt, *A. trisectus* Salt., *A. altus* Gronwall, *A. Barrandei* Salt., *A. rotundus* Gronwall, *A. nudus* Beyr., *A. Eskriggei* Hicks, *A. Barlowi* Belt.

Section Limbati: (a) Regii *Agnostus cambrensis* Hicks. (b) Fallaces *Agnostus integer* Beyr., *A. securiger* n. sp., *A. fallax* Linnrs., *A. rudis* Salt., *A. sidenbladhi* Linnrs., *A. calvus* n. sp., *A. dux* Callaway, *A. Callavei* Raw MS., *A. cyclopyge* Tullberg, *A. obtusus* Belt.

Section Parvifrontes: *Agnostus truncatus* Brogger.

——— A Monograph of the British Trilobites.

Part 2, Palæontological Society, 1907, pp. 29-48, plates 3-4.

Agnostus incertus Brogg. *Microdiscus* Salter (non Emmons).

The genus *Microdiscus* was first established by Emmons Am. Geol., vol. 1, pt. 2, p. 116, pl. 1, fig. 8, for a small trilobite to which he gave the name of *Microdiscus quadricostatus,* which Dr. Lake refers to *Trinucleus* and takes Salter's *Microdiscus punctatus* for the type of the genus.

LAKE (Philip)—Continued

Microdiscus lobatus Hall, *M. speciosus* Ford, *M. punctatus* Salter, refers *M. scanicus* Linnrs., *M. eucentrus* Linnrs. to this species. *Microdiscus Sculptus* Hicks. *Shumardia pusilla* Sars (refers *Conophrys salopiensis* Callaway to this species). *Shumardia miqueli* Pompecki, *S. bottnica* Wiman. *(Acanthopleurella Grindroni* Groom, to this species.) *Shumardia pusilla* var. *morvensis* n. var. *Shumardia* sp. *Orometopus elatifrons* Ang. Refers this genus to the family Trinucleidae as a primitive form. *Orometopus praenuntius* Salter (Ampyx Salter, Mem. Geol. Sur., vol. 3, p. 321, pl. 8, fig. 5).

——— A Monograph of the British Trilobites.

Part III, Palæont. Soc. London, 1908, pp. 49-64, plates V-VI.

Olenus truncatus Brünnich, *O. gibbosus* Wahl., *O. micrurus* Salt., *O. cataractes* Salt., *O. mundus* n. sp., *O. longispinus* Belt. *Parabolina Spinulosa* Wahl. *Parabolinella Williamsoni* Belt.

——— A Monograph of the British Cambrian Trilobites.

Part 4, pp. 65-88, plates vii-x, Palæontographical Society, 1912.

The author describes and illustrates *Parabolinella caesa* nov.; compares it with *P. williamsoni,* to which it is closely allied.

Parabolinella rugosa Brögger var., *P. triarthra* Callaway, described by that author under the genus Olenus in 1877.

Triarthrus shinetonensis Raw. The species named by Raw, Rep. Brit. Assoc. for 1907, p. 512, without a description or figure.

The author compares it with *T. spinosus* Billings.

Dr. Ami, Trans. Ottawa Field Nat., vol. 1, No. 4, 1882-83, indicates that *Triarthrus spinosus* Billings, had spines on the 8th to 13th segment of the thorax. The English species has 14 segments in the thorax, with the 12th axis ring spined.

Genus Sphærephthalmus Angelin.

The author remarks that the genera Leptoplastus, Sphærophthalmus, Ctenopyge and Eurycare, form a natural group of the Olenidae, characterized by the fact, that the cheek spines do not spring from the posterior angles of the head, but from the middle of the external margin or even from the lateral angles.

Brögger considers that all these forms should be placed in a single genus, which he calls Leptoplastus, divided into four subgenera.

The author describes *Sphaerophthalmus alatus* Boeck. This species is the same as *Olenus humilis* Phillips, 1848, according to Linnarsson's investigations of original specimen.

Sphaerophthalmus major nov.

Ctenopyge: The author does not agree with Brögger and Moberg that only the axial rings are fused, while the pleurae are free. The pleurae seem to be closely connected and rarely show any signs of separation.

The author describes *Ctenopyge fusiformis* nov., *C. bisulcatus* Phillips. Salter, taking *Angelin's Sph. alatus* figure as his guide, indicating it with *Olenus bisulcatus* Phillips; therefore this species in English publications means *Ctenopyge bisulcata* or some similar form. *Ctenopyge falcifera* nov., *C. pecten* Salter, *C. expansa* Salter, *C. teretifrons* Angelin, described under the generic name of Sphaerophthalmus.

Lambert (A. E.) Description of *Dalmanites lunatus.*

Bull. Geol. Soc. America, vol. 15, p. 480, plate 44, 1904.

Lapparent (A.) De Note sur un gisement de Trilobites decouvert par M. Maurice Gourdon aux environs de Luchen.

Bull. Geol. Soc. France, 3rd ser., vol. 8, 1879-1880, pp. 47-48.

Lapworth (Charles). On the discovery of the Olenellus fauna in the Lower Cambrian Rocks of Britain.

Geol. Mag. Dec. 3, vol. 5, 1888, p. 484; also p.190, vol. 6, 1889.

The author remarks: "The remarkable fauna of the Olenellus or lowest Cambrian zone originally discovered in America by Dr. Emmons in 1844 (the Taconic system based on observations in New York, Massachusetts, Maine, Vermont and Rhode Island, Albany, 1844, p. 21, *Elliptocephala asaphoides,)* was first recognized in Europe by the late Dr. Linnarsson in 1871 (Ofversigt af Kongl. Vetenskaps Akad. Forhandl, No. 3, p. 790, *Paradoxides Kjerulfi),* in the basal zones of the Cambrian near Lake Mosen in Norway, but its typical genus Olenellus was then referred by him to the allied but more recent genus Paradoxides.

This reference was corrected by Prof. Brögger in 1875 (Geol. Förening Stockholm Förhandl., vol. 2, 1875, p. 573), and the various brilliant papers on the primoidilal formations by this author have given the Olenellus fauna a marked and peculiar interest.

In 1882 Linnarsson next made known the existence of the Olenellus fauna in Scania at the base of the Swedish Cambrian. In 1886 the same fauna was detected by Mickwitz in the Lower Cambrian of Russia (Esthonia) and this Russian fauna has been lately figured and described by Dr. Schmidt. Dr. Holm has signalized the existence of the Olenellus fauna in the Cambrian of Lapland, where it was detected by Morstell in 1885.

The original discovery of the Olenellus zone in Europe was made by Dr. A. G. Nathorst in 1868. This species, *Olenellus Kjerulfi,* was named *Paradoxides Wahlenbergi,* Torell Petrefacta Suecana from Cambrica, 1869-70, p. 4, but he did not describe or figure the new form; therefore, *O. Kjerulfi* must be retained for the name of the species.

Laurie (M.) The Embryology of the Scorpion.

Micr. Sci. Quart. Jour. ser., vol. 31, 1890, pt. 2, p. 105.

Euscorpitus italicus.

——— On some Eurypterid remains from the Silurian Rocks of Pentland Hills.

Trans. Roy. Soc. Edinb., vol. 37, 1892, p. 151.

Stylonurus ornatus nov., *S. macrophthalmus* nov. *Eurypterus Scorpiodes* Woodw., *E. conicus* nov., *E. cyclophthalmus* nov. *Drepanopterus pentlandicus.*

——— Recent additions to our knowledge of Eurypterida.

Nat. Sci., vol. 3, 1893, p. 124.

——— The Anatomy and Relations of the Eurypteridae.

Trans. Roy. Soc. Edinb., vol. 37, 1893, p. 509.

——— On some Eurypterid remains from Upper Silurian Rocks of the Pentland Hills.

This author has described in a paper before the British Association, 1892, p. 729, and the Royal Society of Edinburgh between the years 1892 and 1899, Trans, Roy. Soc. Edinb., vol. 38, pt. 1, p. 151, 1893, and vol. 39, 1890, p. 575, four new species to the genus Eurypterus, three to Stylonurus, and makes a new species of Silmonia. He is compelled to make two new genera to receive some more generalized forms. One of these, Drepanopterus, comprising three species, combines characters found in Stylonurus and Eurypterus; and for one species with very generalized characters he makes the genus Bembicosoma.

LAURIE (M.)—Continued

Stylonurus ornatus nov., *S. macrophthalmus* nov., *S. elegans, S. bembicoides. Eurypterus scorpoides* Woodw., *E. conicus* nov., *E. cyclophthalmus* nov., *E. dolichoschelus* nov., *E. minor* nov. *Drepanopterus pentlandicus* nov., *D. bembicoides, D. lobatus. Slimonia dubia* nov. *Bembicosoma pomphicus* nov.

——— On a Silurian Scorpion and some additional Eurypterid remains from the Pentland Hills.

Trans. Roy. Soc. Edinburgh, vol. 39, pt. 3, p. 575, 1899.

Clarke and Ruedemann remark on this genus that as Eusarcus and the Siluric scorpions are so much alike in their body form they may be assumed to have had similar habits.

Lee (G. W.) A Carboniferous fauna from Nowaja Semlja, collected by Dr. W. S. Bruce, with notes on Corals by R. G. Carruthers.

Trans. Roy. Soc. Edinburgh, vol. 47, pt. 1, 1909, pp. 143-186, 2 plates.

Carboniferous Ostracoda:

Phillipsia Eichwaldi ? *Leperditia okeni* Münster. *Bairdia curta* McCoy. *Cytherella* ? *inflata* Münster.

——— Note on Arctic Palæozoic fossils from the Heela and Fury collections.

Proc. Roy. Soc. Edinburgh, vol. 18, No. 4, 1912, pp. 244-264, text figs.

Ostracoda: *Leperiditia phaseolus, L.* aff. *balthica* var. *guelphica, L.* cf. *caeca.*

Leriche (Maurice). La faune du Gedinnien inferieur de l'Ardenne.

Mem. Mus. Belgique, Bruxelles, vol. 6, 1912, pp. 1-58, plates 1-3.

Ostracoda: *Beyrichia Kloedeni Primitia Jonesi. Homalonotus Roemeri* and *Acaste Downingiae.*

The author refers *H. Vialai* Gosselet, 1912, to this species.

Leyh (C. Fr.) Beiträge zur Kenntniss des Paläozoicum der Umgegend von Hof a Saale.

Zeitschr. Deutsch, Geol. Ges., 1897, Bd. 49, pp. 504-560, plates 17-18.

The author describes *Dechenella hofensis* n. sp. *Proetus angustgenatus* n. sp. *Phillipsia* cf. *aequalis* H. V. Meyer, *P. Glassi* n. sp., *P. pustulata* Schloth. *Griffithides longicornutus* n. sp., *G. articulatus* n. sp., *G. pupuloides* n. sp., *G. Moroffi* n. sp. *Phillipsia* sp.

Ostracoda: *Beyrichia* aff. *intermedia* J. & H. *Leperditia Okeni* Münst., *L. parallela* J. & K., *L. suborbiculata* Münst. *Cytherella* aff. *inflata.*

Lima (Wenceslau de). Note sur un nouvel Eurypterus du Rothliegendes de Busaco.

Comm. da Commissäo des Trablhos Geol. de Portugal, Tom. 2, 1890, pp. 153-157, plate.

Lindström (G.) Förteckning pä Gotlands Siluriska Crustacéer.

Öfversigt af Kongl. Vetenskaps-Akad Forhandlingar, 1885, No. 6, pp. 37-100, plates 12-16.

Reviewed Geol. Mag., Dec. 3, vol. 3, 1886, p. 33.

The author describes under Phacops subgenus Dalmanites:

Phacops vulgaris Salt., *P. imbricatula* Ang., *P. obtusa* nov. Subgenus Phacops. *Phacops Downingiae* Murch., *P. quadrilineata* Ang., *P. Musheni* Salt. *Chirurus speciosus* His., *C. conformis* Ang., *C. bimucronatus* Murch., *C. gotlandicus* nov. *Sphaerexochus*

LINDSTROM (G.)—Continued

scarbridus Ang., *S. latifrons* Ang., *S. lacinatus* nov., *S. Beyrichi* nov. Youngia new genus genotype *Cheirurus trispinous* Etheridge and Nicholson.

Cephalon semi-circular with long spines to the genal angles; glabella sub-circular convex truncated posteriorly by occipital furrow overhanging front 3 pairs of lateral furrows to the glabella; occipital ring with long spine; fixed cheeks, small, short, narrow. Pygidium not known.

The author describes as new *Youngia globiceps* and *Y. inermis Deiphon Forbesi* Barr. *Encrinurus punctatus* Wahlen., *E. laevis* Ang., *E. obtusus* Ang. *Acidaspis crenata* Emm., *A. Barrandei* Ang., *A. Marklini* Ang., *A. pectinata* Ang., *A. (Trapelocera) bicuspis* Anglin. *Lichas concinnus* Ang., *L. latifrons* Ang., *L. palifer* nov., *L. araneus* nov., *L. ornatus, L. marginatus* nov., *L. visbyensis* nov., *L. plicatus* nov., *L. triquetrus* nov., *L. rotundifrons* Ang., *L. gotlandicus* Ang. *Trochurus Salteri* Fletcher.

The generic name of Trochurus was used by Beyrich Böhm, Tril., 1845, p. 31, for a composite and artificial species consisting of the head of *Staurocephalus Murchisoni* and the tail of *Lichas palmata* Barr., which the author recognized in the Untersuch uber Tril., 1846, p. 10, and declared that the genus did not exist. The name was revived by Lindström in a wider and slightly different sense, giving *Lichas Salteri* as the type, including *Trochurus pusillus* Ang. *Harpes acuminatus* nov.

Calymmene tuberculata Brunnich, C. spectablis Ang., C. laevis nov., preoccupied by Munster of a species of Calymmene which is now referred to Phacops *(C. Lindströmi* nov.*) Calymmene frontosa* nov., *C. intermedia* nov., *C. excavata* nov., *C. papillata* nov. *Homalonotus Knighti* König. *Phaetonides Stokesi* Murch., *P. rugulosus* nov., *P. longifrons* nov. *Cyphaspis elegantula* Ang., *C. punctillosa* nov. *Proetus concinnus* Dalm., *P. obconicus* nov., *P. distans* nov., *P. acutus* nov., *P. conspersus* Ang., *P. signatus* nov., *P. granulatus* nov., *P. verrucosus* nov. *Illaenus* subgen. *Bumastus barriensis* Murch., *B. Holmi* nov., *B. sulcatus* nov. for *Illaenus insignis* Holm. *Bronteus platyactin* Ang., *B. Marklini* Ang., *B. polyactin* Ang., *B. irrandians* nov., *B. umbonatus* nov., *B. crebristriatus* nov.

Merostomer: *Eurypterus Fischeri* Eichw. *Pterygotus osiliensis* Schm.

——— Ueber die Schichtenfolge des Silur des Insel Gotland.

Neues Jahrb. Min. Geol. Pal., Bd. 1, 1888, pp. 147-164.

——— Researches on the visual organs of the Trilobites.

Kongl. Svenska Vetenskaps Akad. Handlingar Bandet 34, No. 8, 1901.

Dr. Lindstrom considers certain nodes on the hypostoma to be visual organs. This is based on the discovery of Dr. Liljevall from the hypostoma of *Bronteus polyactin* Ang. They are located on the inferior edge of the upper groove, close to the lateral margins. To these tubercles he gives the name of "maculae". They are oblong or ellipsoid; their inferior apices bluntly pointed or rounded, two-thirds of their surface is perfectly smooth or glossy, and the lower one-third covered with a compact accumulation of small granules, similar to the facets of the compound eyes of Trilobites. The author, therefore, assumes that they are a pair of small adventive eyes on the exterior side of the hypostoma, from the perfect structural agreement between them and the eyes of the head. The author sums up the literature on blind trilobites without facial ridge; also those with facial ridge, and illustrates the maculae on the hypostoma of 39 genera and 136 species.

The different genera are divided into six groups as follows:

Group 1—In the sectioned maculae there is no tract of any structure. The test of the maculae considerably thinner than that of the hypostoma. According to the affinites of the genera they may be subdivided as follows. a—*Bumastus, Dysplanus.* b—

LINDSTROM (G.)—Continued

Nileus, Symphysurus,? Ogygia. c—*Calymmene, Homalonotus.* d—*Cheirurus* pro parte.

Group 2—The whole maculae is of a spongious or irregularly polyhedric structure showing prisms in vertical sections. *Asaphus, Isotelus, Megalaspis, Ptychopyge, Niobe? Megalaspides? Barrandia, Illaenus Lichas, Trochurus? Platymetopus Encrinurus* also probably belongs to this group.

Group 3—Maculae with well-developed globular lens on the interior third of the maculae; the blank part of the maculae without any structure. In such species as *Cheirurus spinulosus* the whole maculae covered with lenses. *Bronteus, Cheirurus spinulosus.*

Group 4—The maculae form sunk pits, with smooth bottom. Structure unknown. *Dalmanites.*

Group 5—The elongate, straight maculae, carrying on their innermost point from 3 to 5 diminutive segregate ocelli, situated on a clear, white patch. *Proetus.* These ocelli have not been observed on the related genera Cyphaspis, *Phaetonides, Phillipsia* and *Griffithides,* but they may be preliminarly ranked here in consequence of their close conformity.

Group 6—The maculae have in this group been reduced to a pair of tiny ocelli, situated high up on the hypostoma, near its anterior margin. *Phacops, Acaste.*

Loomis (F. B.) The dwarf fauna of the pyrite layer at the horizon of the Tully limestone in Western New York.

Bull. New York Mus., No. 69, pp. 892-920, plates iv, 1903.

Cryphaeus Boothi var. *calliteles* Greene, *Beyrichia dagon* Clarke. *Entomis prosenhina* n. sp.

Lorenz (Th.) Beiträge zur Geologie und Palæontologie von Ostasien unter besonderer Berücksichtigung der Provinz Schantung, in China. 2 Palaeontologischer Teil.

Zeitschrift der Deutsch. Geol. Ges., 1906, pp. 67-122, with 3 plates and 55 figures in text.

The author attaches classificatory importance to the minute structure and superficial ornamentation of the test, which has led him to change the generic allocation of many well known species, and to institute many new genera.

Lorenz, on account of the different structure or ornamentation of the test, divides the group Conocephalites into two genera: Conocephalina and Concephalites, but the type *C. Emmrichi* Barr. of the latter he puts into the former, thereby making needless confusion. Conocephalina Brögger has as its type *C. ornata* Brögger, and the author has referred to it several English species placed by Salter in Conocephalites, such as *C. invita.*

The author illustrates *Ptychoparia striata* Em. and places the genus Solenopleura as a synonym to Ptychoparia, figuring *Solenopleura brachymetopus* Angelin.

The author remarks in regard to the new genus Lioparia, that it has medium-sized eyes, in common with both Ptychoparia and Liostracus; likewise the deep dorsal furrow of Ptychoparia. In relation to the shell structure and the flat selvage, it is on the side of Liostracus. On careful consideration one must admit that Liostracus is in closer relation to the species Lioparia, than that of the genus Ptychoparia.

He refers *Conocephalites minutus* Hall to the genus, and uses *Lioparia latelimbatum* Dames, with one new species, *L. blautoeides,,* as the type of the genus.

Trachyostracus new genus: Is distinguished by medium-sized wide-apart eyes, flat selvage and little or no dorsal furrows. In its outer form it is not to be distinguished from Liostracus. The difference in the genera lies alone in the different shell struc-

LORENZ (Th.)—Continued

ture. Trachyostracus has a thick, rough shell; Liostracus a smooth, finely porous shell. These two genera exhibit a rare case of convergence.

Examples of this species are the two following forms: *Solenopleura Howleyi* Walc. and *Ptychoparia limbata* Matt.

Under Liostracus Angelin, as emend. by Brögger, the author includes *Liostracus microphthalmus* Ang., fig. 4. *Ptychoparia Piochensis* Walcott. *Anomocare planum* Dames. *Liostracus Linnarssoni* Brögger, *L. aculeatus* Ang.

Macrotoxus n. gen.: The principal characteristics consist in the very long arch-shaped eyes, the deep dorsal furrows and the thick, rough shell. The author refers *Anomocare Angelini* Grönwall and *Conocephalites perseus* Hall to the genus.

Alokistocare new genus: This genus has in common with Macrotoxus the long, arch-shaped eyes, and the long dorsal furrow around the glabella. By its porous shell it is differentiated from the former. The author refers *Ptychoparia subcornata* H. & W. to this genus.

Megalophthalmus new genus: Also here are the long, arch-shaped eyes the principal element. The glabella does not lie deeply in the head shield, but comes out high over the cheeks. Even trace of dorsal furrows is lacking. The shell is thick, rough, not porous.

The author refers *Liostracus megalurus* Dames and *Anomocare minus* Dames to this new genus, remarking that it is not improbable that this group is also distributed in North America. In its external appearance it resembles throughout the old Swedish species of Anomocare. The last, however, has a highly porous shell.

Under the genus Anomocare the author includes *Anomocare latelimbatum* Dames, *A. excavatum* Ang., *A. limbatum* Ang. *Liostracus Maydelli* Schmidt, *Anomocare commune* n. sp. and *A. laeve* Ang.

The author places Conocephalina Brögger and Conocephalites Barrande, under two groups, on the difference of the ornamentation of the test, using *Ptychoparia Emmrichi* for the type of the first genus, with granulated shell; and *Concephalites ornatus* Brögger for the second genus, although Brögger used this for his type.

The author figures *Ptychoparia Emmrichi* Barr. also *Conocephalites ornatus* Brögger and *C. suecicus* Wallerius.

The author gives the following description of the new genus *Amphoton* with the species *A. Steinnanni* for its type:

Glabella narrow, highly cylindrical, with deep furrows. On both sides of the high glabella wing-shaped, similuna-shaped cushions, that resemble ears on a great elephant head. The eyes are long, box-shaped and stand upright. The anterior eye corners lie close to the glabella. The facial sutures follow the eye lobes, diverging slightly from the anterior eye corners to the frontal margin. From the rear eye corners it branched outwardly into a horizontal piece before it cuts through the rear margin; thereby forms a small band attached to the rear of the cheek. Close to the front end of the glabella is a narrow, flat, bent-up edge. The pygidium greatly resembles that of Anomocare, for in a slab of fossils from Laiwa, are found numerous head shields of this species, corresponding to head and tail shields of Anomocare.

On page 91, the author describes *Anomocare commune* n. sp. (referred by Walcott to *Anomocarella chinensis* Walcott); also *Anomocare ovatum* n. sp. and *A. speciosum* n. sp. (referred by Walcott to the genus Anomocarella).

The author includes a description of Olenus sp. Ptychoparia (Solenopleura) sp., and the description of a new genus Schantungia, with *S. Buchruckeri* for its type (this has been referred by Walcott to *Chuangia nitida).*

The other fossil crustacea described in this work are: *Schantungi Monkei* n. sp. *Liostracus latus* n. sp. *Agnostus fallax* Linrs. var. *Laiwuensis* n. var., *A. parvifrons*

LORENZ (Th.)—Continued

Linrs. var. *latelimbatus* n. var. *Asaphus Boehmi* n. sp. *Lioparia latelimbata* Dames (*Anomocare latelimbatum* Dames) *Teiniston* sp. *Drepanura* sp. and hypostoma of Anomocare.

Lucas (H.) Otarion et Paradoxide.

Articles du Dictionaire Universal d'Hist. Nat., dirigé par Ch. d'Orbigny, 1847.

Macconochie (A.) Discovery of Organic remains in the Old Red Sandstone of Lorne.

Summary of Progress for 1897, Mem. Geol. Sur. of Great Britain, pp. 82-83.

Macnair (P.) The geology of the Rouken Glen and its neighbourhood.

Glasgow Trans. Geol. Soc. 12, 1906, pp. 362-397, pl. ix-x.

Mailleux (Eugene). Quelques mots sur les Trilobites du Couvinien des environs de Couvin.

Bull. de la Soc. Belge de Geol., vol. 17, 1904, pp. 579-585.

The author describes a new species of *Proetus Barroisi* with figures; also gives a list of species occurring near Couvin.

Mansfield (J. F.) Note on Eurypterus from the Darlington Shales, Penn.

Am. Philos. Soc. Proc., vol. 19, 1881, p. 352.

This species is classified by Clarke and Ruedemann under the subgenus Anthraconectes.

Mansuy (H.) Etude géologique du Yun Nan oriental lle partie Palaeontolog.

Mem. service geol. l'Indo-Chine, vol. 1, 1912, pp. 1-146, pl. 1-25.

The author describes the following crustacae:

Ostracods: *Bradoria douvilleri* Mansuy. Aluta sp. Nothozoe.

Trilobites: *Redlichia chinensis* Walc., *R. nobilis* Walc., *R. Walcotti* Mansuy, *R. carinata* Mansuy, *R.* sp. *Palaeolenus douvilleri* n. sp. and gen., *P. lantenoisi* Mansuy, *P. deprati* Mansuy, *Ptychoparia yunnanensis* Mansuy. The new genus Palaeolinus is allied to Agraulos.

Matthew (G. F.) Traces of the Ordovician on the Atlantic coast.

Trans. Royal Soc. Canada, vol. 1, 1893, p. 253.

Holasaphus centropyge n. gen. et sp.

——— Organic remains of the Little River Group, No. IV.

Trans. Royal Soc. Canada, vol. 1, section iv, 1895, pp. 273-279, plate.

Amphipeltis paradoxus, Salter.

——— The Protolenus Fauna.

Trans. New York Acad. Sci., vol. 14, 1895, pp. 101-153, plates.

Ostracoda: *Hipponicharion eos* Matth., *H. cavatum* Matth., *H. minus* Matth. *Beyrichona papilio* Matth., *B. tinea* Matth., *B. planata* n. sp., *B. triangula* n. sp., *B. ovata* n. sp., *B. rotundata* n. sp. *Aparchites secunda* n. sp., *Primitia aurora* Matth., *P. oculata* n. sp., *P. ? fusiformis* n. sp. *Schmidtella cambrica* n. sp. *Leperditia ? ventricosa* Matth., *L. ? Steadi* Matth., *L. ? minor* n. sp., *L. ? primeava* n. sp.

Phyllopoda: *Leperditia sigillata*, Matth.

MATTHEW (G. F.)—Continued

Trilobita: *Protagraulos priscus* n. sp. *Ellipsocephalus galeatus* Matth., *E. grandis* Matth., *E.* sp. *Avalonia acadica* n. sp. *Micmacca Matthewi* n. gen. et sp., *M. Van Ingeni* n. sp., *M. recurva* n. sp., *M. ? plana* n. sp. *Protolenus paradoxides* Matth., *P. bi-tuberculatus* n. sp. *Bergeronia n.* subgen., *B. elegans* W. D. Matthew, *B. articephala* Matth.

——— Fauna of the Paradoxides beds in Eastern North America.

Trans. New York Acad. Sci., vol. 15, 1896, pp. 191-247, plates.

Phyllopoda: *Leperditia alata* Matth., *L. curta* Matth., *L. auriculata* Matth.

Ostracoda: *Primitia acadica* Matth. *Aluta flexilis* n. gen. et sp.

Cirripedia: *Plumulites Manuelensis* n. sp. *Stenotheca concentrica Matth.* and var. *radiata, S. triangularis* Matth., *S. nasuta* Matth., *S. Hicksiana* Matth. *Cirripodites cambrensis* n. gen. et sp.

Trilobita: *Agnostus regulus* Matth., *A. rex* Barr. var. *transectus* n. var, *A. fallax* Linrs.; also var. *vir* n. var. *concinnus* n. var. and *trilobatus* n. var., *A. Acadicus* Hartt var. *declivis* n. var., *A. parvifrons* Linrs. var. *tessella* n. var. *truncatus* n. var., *A. umbo* Matth., *A. obtusilobus* Matth., *A. Davidis* Salt., *A. gibbus* Linrs. var. *partitus* n. var. *acutilobus* n. var., *A. Nathorsti* Br. *confluens* n. var., *A. fissus* Lund. *trifissus* n. var. *A. punctuosus* Ang., *A. laevigatus* Dalm., *A. terranovicus* n. var. *ciceroides* n. var., *A. mamilla* n. var., *A. nudus* Beyr. *Microdiscus Schucherti* Matth., *M. precursor* Matth., *M. Dawsoni* Hartt, *M. pulchellus* Hartt, *M. punctatus* Salter.

——— On *Microdiscus.*

Amer. Geologist, vol. 18, 1896, p. 30.

Microdiscus Schucherti n. sp.

——— Studies on Cambrian Faunas (No. 1).

Trans. Royal Soc. Canada, vol. 3, Sec. iv, 1897, pp. 165-203, 4 plates.

Agnostus Nathorsti Br., *A. fissus* Lund., *A. punctuosus* Ang., *A. parvifrons* Linrs. cf. var. *nepos* Br., *A. umbo* Matth., *A. laevigatus* Dalm. *Microdiscus pulchellus* Hartt? *Conocoryphe pustulosa* n. sp.

Matthews in his division of this genus, Studies on Cambrian Faunas No. 3, p. 89, uses for dwarf species with large glabella and apical spine to the front margin, suture within the rim, the term *Cainatops,* with this species as the type.

Paradoxides abenacus Matth. *Agraulos ceticephalus* Barr. var. *carinatus* n. var., *A. holocephalus* Matth., *A. Roberti* n. sp., *A. ? nanus* n. sp., *A. pusillus* n. sp. *Liostracus validus* n. sp. *Ptychoparia limbata* n. sp., *P. Adamsi* Bill. *Solenopleura arenosa* Bill. var. *angilimbata* n. var., *S. Robbii* mut. *parva. Anomocare magnum* Br. *Dolichometopus Acadicus* n. sp. *Dorypyge Wasatchensis* H. & W., also var. *Acadicus* n. var., *D. quadriceps* H. & W. var. *valida* n. var., *D. horrida* n. sp.

——— Billing's Primordial Fossils of Vermont and Labrador.

Trans. Royal Soc. Canada, vol. 3, Sec. iv, 1897, pp. 194-200.

Bathyuriscus Meek, *B. senectus* Bill. *Dorypyge parvula* Bill. *Anomocare Tucer* Bill. *Ptychoparia Adamsi* Bill. *Solenopleura arenosa* Bill. *Conocephalites miser* Bill. *Dorypyge parvula* Bill. var. *angifrons* n. var.

——— What is the Olenellus fauna?

Am. Geol., vol. 18, 1897, p. 396.

Proposes the subgenus Callavia type *O. Bröggeri* Walc. and *O. callavii* Lapworth, because the glabella differs from *O. Kjerulfi.*

——— Some characteristic genera of the Cambrian.

Address Brit. Assoc., 1897, Geol. Mag. London, Decade iv, vol. 5, 1898, pp. 82-83.

The specie and genera have been described in other papers by this author.

MATTHEW (G. F.)—Continued

——— Recent discoveries in the St. John Group, No. 2.

Bull. Nat. Hist. Soc., New Brunswick, No. xvi, 1898, pp. 32-34, plate.

Protolenus elegans n. sp., *P. paradoxoides* n. sp., *P. articephalus* n. sp., *Ellipocephalus galeatus* n. sp. *Olenus Zoppii* Menigh.

——— Studies on Cambrian faunas, No. 2.

Trans. Royal Soc. Canada, vol. 4, Sec. iv, 1898, pp. 123-150, 2 plates.

Ostracoda: *Primitia pyriforms* n. sp. *Aparchites ? robustus* n. sp. *Beyrichia ? primaeva* n. sp.

Trilobita: *Protagraulos priscus* Matth. *Micmacca Van Ingeni* Matth. *Agnostus pisiformis* with variations. *Anomocare stenotoides* Matth. *Olenus* (subgen. *Acantholenus)* n. subgen. *Acantholenus spinger* Matth.

——— A new Cambrian Trilobite.

Bull. Soc. N. B., vol. 4, 1899, pp. 137-142, plate.

Metadoxides magniferus n. sp.

——— Studies on Cambrian faunas, No. 3. Upper Cambrian fauna of Mount Stephen, B. C.

Trans. Royal Soc. Canada, vol. 5, Sec. iv, 1899, pp. 39-66, 7 plates.

Agnostus montis n. sp. *Ptychoparia cordillerae* Roem. *Conocephalites (Conaspis?)* cf. *perseus* Hall. *Corynexochus Roemingeri* Matth. *Dolichometopus occidentalis* n. sp. *Bathyuriscus Howelli* Walc., *B. pupa* n. sp. *Neolenus serratus* n. gen. et sp., *N. granulatus* n. sp. *Dorypyge Dawsoni* Walc. *Zacanthoides spinosus* Walc. *Ogygia (Ogygopsis) Klotzi* Roem. *Oryctocephalus Walkeri* n. sp.

——— Studies on Cambrian faunas, No. 4. Fragments of the Cambrian faunas of Newfoundland.

Trans. Royal Soc. Canada, vol. 5, Sec. iv, 1899, pp. 67-96.

Microdoscus bellimarginatus S. & F. *Agraulos (Strenuella) strenua* Bill. mut. *robusta* n. mut., *S. Attleborensis* S. & F. mut. *vigilans* n. mut. *Micmacca Walcotti* n. sp., *M. angimargo* n. sp. *Avalonia plana* n. sp., *Protolenus Howleyi* Walc. *Metadoxides magnificus* Matth. *Atops trilineatus* Emm. *Erinnys breviceps* Angelin.

——— The Etcheminian fauna of Smith Sound, Newfoundland.

Trans. Royal Soc. Canada, vol. 5, Sec. iv, 1899, pp. 97-119, plates.

Aptychopsis terranovicus Matth. mut. *arcuta.*

——— Preliminary notice of the Etcheminian fauna of Newfoundland.

Bull. Nat. Hist. New Brunswick, No. 18, vol. 4, 1899, Article 1, pp. 189-197, plate 1-3.

Aptychopsis terranovicus.

——— Preliminary notice of the Etcheminian fauna of Cape Breton.

Bull. Nat. Hist. New Brunswick, No. 18, vol. 4, 1899, Art. 2, pp. 198-208, plates 1-4.

Bradoria n. gen., *B. scrutator* n. sp., *B. vigilans* n. sp., *B. rugulosa* n. sp. *Schmidtella ? pervetus* n. sp., *S. acuta* nov.

The peculiarities of this fauna as distinguished from the Cambrian are the following: 1—Great preponderance of Hyolithidae. 2—Absence or rarity of Trilobites. 3—Minuteness of the Gasteropods, except Capulidae. 4—Minuteness of the Brachiopods. 5—Minuteness of the Crustaceans.

——— Cambrian rocks and fossils of Cape Breton.

Geol. Sur. Canada, n. ser., vol. 14, 1901, pp. 223-224.

Gives the leading genera of the several groups.

MATTHEW (G. F.)—Continued

— — Additional notes on the Cambrian rocks of Cape Breton.

Bull. Nat. Hist. Soc. New Brunswick, No. 20, vol. 4, 1902.

Parabolinella quadrata n. sp. *Triarthrus belli* n. sp. *Angelina ?* sp. *Asaphellus Homfrayi* var. a, *A. ? planus.*

——— Ostracoda of the basil Cambrian rocks in Cape Breton.

Canadian Record of Science, vol. 8, No. 7, 1902, pp. 437-468, 2 p. with 2 plates.

Leperditia rugosa n. sp. *Bradorona n.* sub. gen., *B. perspicator* n. sp. mutation *maxima, magna, major, B. spectator* n. sp., also var. *acuta,* mutation *spinosa, aequata, B. observator* n. sp. and var. *benepuncta, laevis, ligata. Bradoria scrutator* Matth., *B. vigilans* Matth. mut. *obesa, B. rugulosa* Matth., *B. ? ornata* n. sp. *Escasona* n. gen., *E. rutellum* n. sp., *E. ? vetus* n. sp., *E. ? ingens* n. sp. *Indiana* n. gen., *I. ovalis* n. sp. mut. *prima, I. lippa* n. sp. *Schmidtella ? pervetus* Matth. mut. *concinna, S. acuta* Matth.

The author remarks that the *Bradoria* do not have the medium pit or sulcus of *Primitia,* the shallow median depression of *Primitella,* or the smooth valve of the *Aparchites.* Their most marked character is a prominence or tubercle just at the front of the hinge line.

——— Report on the Cambrian rocks of Cape Breton.

Geol. Survey of Canada, 1903, 246 pp., 18 plates.

Ostracoda of the basal Cambrian rocks in Cape Breton:

Leperdita ? rugosa Matth. *Bradorona perspicator* Matth. mutations *maxima, magna, Major B. spectator* Matth. mutations *acuta, spinosa, aequata B. observator* Matth. also var. *benepuncta* mutations *laevis, ligata. Bradoria scrutator* Matth., *B. vigilans* Matth. *obesa, B. ruglosa* Matth., *B. ? ornata* Matth. *Escasona rutellum* Matth., *E. ? vetus* Matth., *E. ? ingens* Matth. *Indiana ovalis* Matth. mutation *prima, I. lippa* Matth. *Schmidtella ? pervetus* Matth. mutation *concinna, S. ? acuta* Matth.

Trilobita: *Holasaphus centropyge* Matth. Paradoxidoid trilobite. *Solenopleura Bretonensis* n. sp. Eurypteroid crustacean?

Faunas of the St. John terrane.

Ostracoda: *Beyrichia triceps* n. sp.

Trilobita: *Agnostus trisectus* Salt. mut. *ponepunctus* Matth. mut. *germanus, A.* cf. *cyclopyge* Tullb., *A.* cf. var. *declivis* Matth. *Parabolina Dawsoni* Matth., *P. ? quadrata* Matth., *P.* cf. *limitis,* Br. *Spaerophthalmus Fletcheri* Matth., *S. alatus* Boeck. *Ctenopyge pecten* Salt. *Peltura scaraboeoides* Wahl. *Triarthrus Belli* Matth. *Angelina ? Asaphellus Homfrayi* Salt., *A. ? planus* Matth.

——— Remarkable forms of the Little River Group.

Trans. Roy. Soc. Canada, ser. 3, vol. 3, 1909, Sec. iv, pp. 115-125, plates 1-4.

Leaia silurica n. sp.

This species is allied to *L. Leidyi* of the Coal Measures of Pennsylvania, but has fewer concentric ridges.

Belinuropsis Wigudensis n. sp. et gen.

This crustacean is of the general type of Belinurus, but differs in its peculiar notched posterior border, the intergenal spine or flap, and the very narrow axis to the thorax, with seven instead of five segments as in Belinurus.

Maurer (F.) Nathrage zur Fauna und Stratigraphie der Orthocerasschiefer der Rupbachthales.

Neues Jahrb. für Mineral Geol. Beil., vol. 10, pp. 613-756, plates.

Phacops fecundus Barr. *Cryphaeus acutifrons* Schluter. *Acidaspis pigra* Barr. *Bronteus* sp. and *Leperditia rhenana* n. sp.

——— Der Quartzit von Neuweilnau.

Ber. d. Senckenb. Naturf. Ges. in Frankfurt, 1902, pp. 27-82, plates 3-5.

Gives figures of the head and tail of Homalonotus striatus nov. Head of H. ornatus Koch and tail of Homalonotus nulticostatus Koch.

McCoy (F.) Note on a new Australian Pterygotus.

Geol. Mag., Decade iv, vol. 6, 1899, pp. 193-194.

Pterygotus australis n. sp.

The species resembles *Pterygotus bilobus* Salter.

Meyer von (H.) *Jonotus reflexus* ein Trilobit aus der Grauwacke der Eifel.

Dunker and Meyer Palæontologica, vol. 1, p. 182, pl. 26, fig. 1a-b, 1848.

This new generic name given for *Harpes reflexus*, Hoeninghaus, 1847. Dr. Von Meyer copies Hoeninghaus' figures.

Michleborough (John). Locomotory appendages of Trilobites.

Geol. Mag., Decade 3, vol. 1, 1884, pp. 80-84, woodcuts on p. 162, figs. 1-3.

Asaphus megistos.

Miller (S. A.) and **Gurley** (W. F. E.) New species of Echinodermata and a new Crustacean from the Palæozoic Rocks.

Illinois State Museum Bull. No. 10, 1896.

The authors describe *Eurypterus kokomoensis* n. sp.

Clarke & Ruedemann Mem. N. Y. State Mus., No. 14, p. 212, place this under a new subgenus Onychopterus.

Moberg (J. C.) Anteckningar om Olands orthocerkalk.

Sver. Geol. Under. Ser. C, No. 109, 1890.

Asaphus platyurus maximus n. var.

——— Om en afdelning inon Olands dictyonemaskiffer säsom motsvarighet till ceratopygeskiffern i Norge.

Sver. Geol. Under. Ser. C, No. 109, 1890.

Shumardia pusilla Sars.

——— Om den af Trinucleus coscinorrhinus Karakteriserade kalken geologiska älder.

Sver. Geol. Unders., Ser. C, No. 125, Geol. Foren. Forh., 14-5, 1892.

Nileus armadillo var. *cornutus* n. var.

——— Till fragan om pygidiets byggnad hos *Ctenopyge pecten* Salter.

Geol. Fören. Förhandl, vol. 14, 1892, pp. 351-355, figures.

— · — Silurisk Posidonomyaskiffer en egendomlig utbildning af Skänes oversilur med I tafla.

Sver. Geol. Unders., ser. C, No. 156, 1895.

Eoconchoecia n. gen., *E. mucronata* n. sp., *E. ? imbecils* n. sp. *Cypridina Tosterupi* n. sp., *C. ? obtusa* n. sp., *Colpos insignis* n. sp. et gen. *Primitia mundula* Jones var. *Beyrichia Steusloffi* Krausi, *B. Salterina* Jones.

MOBERG (J. C.)—Continued

——— Supplement till Om Acerocarezonen.

Geol. Fören. i Stockholm Förh., Bd. 20, No. 5, 1898.

Acerocare claudican n. sp., figured.

——— En trilobit från Skänes Dictyograptusskiffer.

Geol. Fören. Förh., Bd. 20, No. 6, 1898, plate XVII, pp. 317-324.

Hysterolenus Tornquisti n. sp. et gen.

——— En trilobit fran Skanes Dictyograptusskiffer Meddel, No. 5.

Fr. L. G. F. Geol. Fören., i Sthlm. Förh., Bd. 20, 1898.

Shumardia oelandica n. sp., p. 357, pl. 14, figs. 4-6.

Hysterolinus Tornquisti n. sp., p. 318, pl. 17, figs. 1-9.

———Sveriges älasta kända Trilobiter.

Geol. Fören. Förhandl., vol. 21, 1899, pp. 309-348, plates 13-15.

Georgiellus (Elliptocephala) asaphoides Emmons. *Olenellus Thompsoni* Hall. *Holmia Kjerulfi* Linrs. *Holmia Lundgreni* Moberg. *Mesonacis Vermontana* Hall. *Schmidtia Mickwitzi* Schmidt. *Schmidtia ? Torelli* Moberg. *Olenelloides armatus* Peach.

The original discovery of the Olenellus zone in Europe was made by Dr. A. G. Nathorst in 1868, Öfvers Kongl Vetens. Akad Förhandl, 1869, p. 64, in which he described a new and distinct horizon below the Paradoxides beds at Andrarum, Scania, containing trails and Lingula. The species now known as Olenellus Kjerulfi Linrs. was named Paradoxides Wahlenbergi by Torell in his Petrefacta Suecana Formationis Cambricae, 1869-70, p. 4, but he did not describe or figure the new species.

——— Nya bidrag till utredning af frägan om gränsen mellan undersilur och kambrium.

Geol. Fören. i Stockholm Förh., Bd. 22, 1900.

Dicellocephalina dicraeura Ang. *Shumardia oelandica* Mbg.

——— Bidrag till kännedomen om Trilobiternas byggnad.

Fören. Förhandl, vol. 24, 1902, pp. 295-302, plate 3.

Nileus armadillo Dalm.

From an example of *Nileus armadillo* Moberg shows the point of attachment of the muscles of the antennae, hypostoma epistome and several limbs of his species; eyes with 3,000 to 4,000 facets. He takes exception to Lindström, that the maculæ on the hypostome carry organs of vision and that of the earlier Olenidæ were blind.

——— *Schmalenseeia Amphionura* en ny Trilobit typ Meddelanden.

Lund. Geol. Mineral Inst., No. 5, Stockholm, 1903.

——— Om Robergia microphthalma Lnrs.

Geol. Fören. Förhandl., Bd. 28, Haft 2, p. 83, 1907.

——— Ett par bidrag till kännedomen om Skänes dicellograptus skiffer.

Geol. Fören. Förhandl., Bd. 29, Häft 2, Feb., 1907. p. 75.

Robergia microphthalma Linrs.

This new genus was founded on *Remopleurides microphthalmus* Linrs.

Geol. Fören. Förhandl., 1875, No. 26, Bd. 2, No. 12, p. 494, pl. 1, f. 3.

——— Om ett gätfullt fossil från Sveriges olenidskiffer samt en kort ofversigt af viktigase data rorande trilobiternas ventrala skelettdelar.

Geol. Fören. i Stockholm Förh., Bd., 29, 1907, No. 5.

MOBERG (J. C.)—Continued

——— *Aeglina umbonata* Angelin.

Lund's Geologiska Fältkubb., No. 12, 1907, Bd. 29, pp. 257-264, pl. 3.

The author refers *Corynexochus ? umbonatus* Ang. Palæont. Scand., p. 60, pl. 33, fig. 10, to this species; also *Æglina rediviva* Barrande. Syst. silur. Bohm, vol. 1, Suppl., p. 64, pl. 14, fig. 11.

——— Historical Stratigraphical Review of the Silurian of Sweden.

Sveriges Geol. Undersöknung, Sec. C, Nos. 229-202, pp. and map.

——— and **Gronwall** (K. A.) Om Fyledalens Gottlandium.

Lund Geologiska Fältkubb, Ser. B, No. 3, 1909, 84 pp., with 6 plates.

The authors describe and illustrate the following fossil Crustacea: *Leperditia inaequalis* Grönw. referring to it the following species: *L. Angelini* (Fr. Schmidt).

Lundgren Lund's Univ. Arsskr., Bd. 10, p. 9.

L. tyraica (Fr. Schmidt) Linnarsson, *L. phoseolus* (Hisinger).

Schmidt Misc. Silurica, No. 3, p. 9, as syn.

Aparchites obsoletus Jones and Holl. *Primitia mundula* Jones.

Beyrichia Buchiana Jones, *B. cuspidata* Gronw., *B. Kochi.* Boll; *B. Maccoyiana* Jones, referring *B. cincta* and *B. elegans* Boll, 1862, to this species.

Beyrichia nodulosa Boll, referring *B. spinulosa* and *nodulosa* Boll; also *B. dubia* Reuter, 1885,. and *B. Lindstromi* cum var. *expansa* Kiesow, 1888, as syn. to the species.

Beyrichia obsoleta Gronw., 1897, *B. Salteriana* Jones, *B. scanensis* Kolmodin, referring *Beyrichia hians* Boll, 1856, to this species. *Beyrichia Steusloffi* Krause, 1891. *Kloedenia Kiesowi* Krause. This is the unnamed sp. of Angelin's, pl. A, figs. 16 and 17.

Beyrichia Wilckensiana Jones and var. *plicata* Jones. *Thlipsura tetragona* Krause, 1891. *Cytherellina siliqua* Jones. *Bythocypris triangularis* Gronw., 1897. *Phacops Downingiae* Murch. *Calymmene intermedia Lindstr.*, 1885. *Homalonotus Knighti* var. *rhinotropis* Ang. *Ceratiocaris* sp. and *Pterygotus* sp.

——— and **Moller** (H.) Om Acerocarezonen ett bidrag till Kännedomen om Skänes olenidskiffrar.

Geol. Fören. Förhandl., vol. 20, 1898, pp. 197-290, plates 10-14.

Acerocare ecorne Ang., *A. micropygum* Linrs., *A. granulatum* n. sp., *A. paradoxum* n. sp., *A. Tulbergi* n. sp., *A. claudicans* n. sp. *Parabolina acanthura* Ang., *P. heres* Br., *P. megalops* n. sp. *Acerocare norvegium* n. sp.

——— and **Segerberg** (Carl O.) Bidrag till Kännedomen om Ceratopygeregionen med särskild hänsyn till dess utveckling i Fogelsäng strakten.

Kongl. Fysiogr. Sällsk. Handl., Bd. 17, No. 7, 1906.

Crustacea: *Eremos bryograptorum* Wgd., mscr. n. gen. et n. sp. *Primitia ostrogothica* n. sp. *Beyrichia nana* Brogg., *B. nanella* Mbg. n. sp. *Ceratiocaris scanicus* n. sp. *Agnostus Sidenbladhi* var. *urceolatus* Sbg. mscr. n. var., *A. trinodus* Salt., *A. fossulatus* n. sp. *Shumardia oelandica* Mbg., *S. pusilla* Sars., *S. bottnica* Wiman, *S. Dicksoni* n. sp. *Parabolinella limitis* Brogg., *P. rugosa* Brogg. *Bocckia Mobergi* Wiman. *Acerocare norvegicum* Mbg. and Moller. *Triarthrus Angelini* Linrs. *Hysterolenus Tornquisti* Mbg., *H. ? laevicauda* n. sp. *Euloma ornatum* Ang. *Harpides rugosus* S. & B. *Ceratopyge forficula* Sars., *C. latelimbata* n. sp. *Dicellocephalus Broggeri* n. sp. *Apatocephalus serratus* S. & B., also var. *dubius* n. var. *Dicellocephalina dicraeura* Ang. *Symphysurus angustatus* S. & B., *S. incipiens* Brögg., *S. breviceps* Ang., *S. elongatus*

MOBERG (J. C.) and SEGERBERG (Carl O.)—Continued

n. sp. *Nileus armadillo* Dalm., *N. limbatus* Brögg. *Niobe insignis* Linrs., *N. insignis* var. *angustifrons* Sbg. n. var., *N. obsoleta* Linrs., *N. laeviceps* Dalm. *Megalaspis intacta* n. sp., *M. stenorhachis* Ang., *M. planilimbata* Ang. *Illaenus oriens* n. sp. *Orometopus elatifrons* Ang., *Holometopus Tornquisti* n. sp. *Ampyx domatus* Ang., *A. obtusus* n. sp. *Cyrtometopus primigenus Ang., C. foveolatus* Ang., *Cyrtometopus speciosus* Dalm. *Harpina (Harpes) excavata* Linrs. *Crossoura parvula* n. gen. et n. sp., *C. lata* n. sp.

Monke (H.) Beiträge zur Geologie von Schantung I—Obercambrianbrische Trilobiten von Yentsy-yai.

Jahrb. d. Preuss. Landesanstalt und Bergakad. zu Berlin, 23, pt. 1, 1903, pp. 103-151, plates.

An abstract of this paper was published by Woodward in Geol. Mag., Dec. v, vol. 2, 1905, pp. 211 and 251, with a plate.

The author remarks: *Drepanura Ketteleri* Monke (like *D. Premesnili* Berg.) is founded upon detached pygidia, and separate and imperfect head shields; it also has elongated cheek-spines, which remind one of the very long lateral cheek and caudal spines of *Bathynotus holopyga* Hall, from the Lower Cambrian of Vermont.

Woodward refers *Stephanocare Richthofeni* Monke to Meek's genus *Olenoides.*

The following species and genera are described by Monke: *Agnostus Koerferi* n. sp. *Liostracina Krausei* n. gen. et n. sp. *Teinistion Lansi* n. gen. et sp., *T. Sodeni* nov. *Drepanura Premesnilli* Berg., *D. Ketteleri* n. sp. *Stephanocare Gichthofeni* n. gen. et sp. *Stephanocare Sinense* Berg.

The following species, described by Walcott, Proc. Natl. Mus., vol. 29, 1905, are synonyms: *Ptychopariaceus* Walc. syn. of *Liostracina Krausei* Monke. *Dorypygella typicalis* Walc. syn. of *Teinistion Lansi Monke. Damesella chione* Walc., syn. of *Stephanocare Richthofeni* Monke. *Teinistion Lansi* Monke is similar to *Shantungia spinifera* Walc., but differs in the presence of an incurved frontal margin and the absence of the long frontal spine.

Moysey (Lewis). On some Arthropod remains from Nottinghamshire and Derbyshire Coal Field.

Geol. Mag., Decade V, vol. 8, 1911, pp. 497-507, text figures.

The author illustrates *Leaia trigoniodes* sp. nov.; also the glabellar region Prestwichia and the terminal segments of air-breathing Arthropod. It shows a thick and possibly calcareous integument. *Anthracosiro fritschii* Pocock, and other crustacea.

Narraway (J. E.) List of Trilobites found at Ottawa and immediate vicinity.

Ottawa Naturalist, vol. 26, No. 8, pp. 98-100, November, 1912.

Nason (Frank S.) The Geological relations and age of the St. Joseph and Potosi Limestone of St. Francis County, Missouri.

Am. Jour. Sci., 4th ser., vol. 12, 1901, pp. 358-361.

Nifantof (A.) Beitrage zum Studium der Fauna des Devons der Berge von Mugodjary.

Tomsk. Izv. Technol. Inst., vol. 21, 1911, p. 26, pl. 3, figs. 29-33.

Dithyrocaris sp.

Norton (Wm. H.) Variations in the position of the nodes on the axial segments of pygidium of a species of Encrinurus.

Proc. Iowa Acad. Sci., vol. 3, 1896, pp. 79-81.

The author remarks that in defining the different species of the genus Encrinurus, use has frequently been made of the disposition of the nodes on the joints of the axis of the pygidium. Foerste distinguishes *E. thresheri* from *E. ornatus* on this characteristic. The author gives the axial annulations of some 43 specimens from the Quarry at Mount Vernon, Iowa.

O'Connell (Marjorie). Summary of the distribution and occurrence of Eurypterids.

Geol. Soc. Am. Bull., vol. 24, pp. 498-515, 1913.

——— Description of some new Siluric Gastropods.

Bull. Buffalo Soc. Nat. Sci., vol. XI, 1914, pp. 93-101, plates 1-6.

Eurypterus Ruedemanni nov.

——— The habitat of the Eurypterida.

Bull. Buffalo Soc. of Nat. Hist., vol. XI, 1916.

The author gives a systematic review of the occurrence of the Eurypterida in each period from the Cambrian through the Permic.

Chapter 2. Résumé of the opinions on the habitat of the Eurypterida.

Chapter 3. The bionomy of the Eurypterid faunas.

Chapter 4. The Lithogenesis of the Eurypterid bearing beds.

Chapter 5. The geological and geographical distributions of the Eurypterids, with bibliography.

The conclusion reached by the author, after the study of all the available data, is that the Eurypterids throughout their entire phylogenetic history lived in the rivers. Schuchert in the earliest fresh water Arthropods, 1916, remarks that Eurypterids were marine animals previous to the Devonian, and that towards the close of the Silurian they became Eurhaline, or able to live in both salt and brackish water, and after Silurian time they probably became wholly restricted to the fresh water. Proc. Natl. Acad. Sci., vol. 2, 1916, p. 728.

Oehlert (D. P.) Sur les Trinucleus de l'ouest de la France.

Bull. Soc. Geol. France, 3rd ser., vol. 23, 1896, p. 299, plate.

Trinucleus Bureaui n. sp. The species is remarkable for the large tail. The author compares it with *T. ornatus,* the Bohemian form.

T. Grenieri Berg., *T. pongerardi* Roualt.

——— Fossiles Devonian Santa Lucia (Espagne). Primiere partie.

Bull. Soc. Geol. France, 3rd ser., vol. 23, 1896, p. 299, plates.

The author describes *Cryphaeus sublandiniatus* DeVern.

Cryphaeus (Malladaia) Luciae nov. sp. The author gives a figure in the text of this new subgenus, and compares it with Dalmanites and Phacops.

Cryphaeus Munieri Oehlert, and *Phacops Portieri* Bayle.

Cytherella cf. *subfusiformis* Sandberger.

——— *Uralichas Ribeiroi* des schistis d'Angers.

Mem. Soc. Geol. France, Palaeontologie, vol. 6, Fas., 1896.

——— Résumé des derniers travaux sur l'organisation et le developement des Trilobites.

Bull. Soc. Geol. France, ser. 3, vol. 24, 1896, p. 97.

Triarthrus Beckii Green.

Ohern (D. W.) and **Maynard** (T. P.) Trilobites.

Maryland Geol. Sur. Lower Devonian, Baltimore, 1913, pp. 489-512, pl. 89-94.

The authors describe and illustrate the following species:

Proetus pachydermatus Weller, *P.* cf. *protuberans* Hall. *Cordania cyclurus* Hall and Clarke. *Cyphaspis Australis* n. sp. Ohern. *Calymmene camerata* Conrad. *Homalonotus Swartzi* n. sp. Ohern, *H. Vanuxemi* Hall. *Phacops Logani* Hall. *Dalmanites aspinosa* Weller, *D. Keyserensis* n. sp. Swartz, *D. multiannulatus* n. sp. Ohern, *D. latus* n. sp. Ohern, *Dalmanites (Synphoria) stemmatus* Clarke, *D. (Corycephalus) dentatus* Barrett, *D. micrurus* Green, *D. (Chasmops) anchiops* Green, *D. (Hausmannia) pleuroptyx* Green, *D. berkleyensis* n. sp. Swartz.

Olin (E.) Om de Chasmopskalken och Trinucleusskiffern motsvarande bildningarne i Skane.

Lund Geologiska Fältklubb, Ser. B, No. 1, 1906, 79 pp., with 4 plates.

Acidaspis Törnquisti n. sp. *Æglina rediviva* Barr. *Agnostus cingulatus* n. sp., *A. trinodus* Salt. *Ampyx globifrons* n. sp., *A. gratus* Barr., *A. Portlocki* Barr., *A. rostratus* Sars., *A. tenellus* Barr. *Areia suecica* n. sp. *Asaphus ingens* Barr. *Calymmene dilatata* Tulb., *C. incerta* Barr., *C. pulchra* Beyr., *C. trinucleina* Linrs. *Chirurus insignis* Beyr., *C. pectinifer* Barr., *C. subulatus* Linrs. *Cybele* cf. *Grewingki* F. Schmidt. *Dindymene cornuta* n. sp., *D. pulchra* n. sp., *D.* sp., *D. spinulosa* n. sp., *D. venusta* n. sp. *Dionide euglypta* Ang. *Holometopus* cf. *aciculatus* Ang. *Illaenus Angelini* Holm., *I. longifrons* n. sp., *I. megalopthalmus* Linrs. *Lichas laxatus* McCoy, *L. quadrispinus* Ang. *Phacops ecclesiatica* n. sp., *P. eucentra* Ang., *P. macroura* Sjogr., *P. recurva* Linrs., *P. sandbyensis* n. sp. *Phillipsia parabola* Barr. *Proetus scanicus* n. sp. *Pseudosphaerexochus laticeps* Linrs., *P. Ravini* n. sp. *Ptychopyge glabrata* Ang. *Remopleurides latus* n. sp., *R. radians* Barr., *R. sexlineatus* Ang. *Sphaerexochus* sp. *Staurocephalus clavifrons* Ang. *Stygina latifrons* Port. *Symphysurus superstes* n. sp. *Trinucleus Bucklandi* Barr., *T. ceriodes* Ang., *T. elliptifrons* n. sp., *T. latilimbus* Linrs.

Pack (Fred J.) Cambrian fossils from the Pioche Mountains, Nevada.

Jour. Geol., vol. 14, pp. 290-302, plates 1-3, 1906.

Bathyuriscus howelli Walcott, *B. productus* H. & W. *Ptychoparia piochensis* Walcott, *P. Kempi* n. sp. This species is an allied form of *P. subcoronata,* but has a peculiar boss in front of the glabella.

Zacanthoides typicalis Walc., *Z. grabaui* n. sp., differs from *Z. typicalis* in general shape of the head, the frontal margin and the genal spines.

Packard (A. S.) The Palæontological History of Trilobites, etc., as opposed by Barrande to the evolution theory.

Amer. Naturalist, vol. 8, 1874, p. 439.

——— On the systematic position of the Trilobites.

Proc. Amer. Assoc., 1893, p. 365.

Refers the Trilobites to a separate class, and regards them as being an older, more primitive group than the Crustacea. Hence, the Trilobites probably were the first to originate from the annelid worms, while the crustacea arose by a separate line of descent.

Partridge (E. M. Miss). Echinocaris Whidbornes (Jones & Woodward) and *Echinocaris sloliensis* n. sp.

Geol. Mag., Dec. 4, vol. 9, 1912, pp. 307-308, plate 17.

The last species much resembles *E. socialcs* (Beecher) by the carapace and is much longer in proportion to its width.

Parker (William A.) The fossil Arthropoda and Pices of Sparth, Rochdale.

Lancashire Naturalist Darwin, new ser., vol. 2, 1909, pp. 2-8.
Pygocephalus.

Parkinson (Harold). Ueber eine neue Culmfauna von Königsberg unweit Giessen and ihre Bedeutung fur die Gliederung des rheinischen Culm.

Inaugural Dissertation, Marburg, 1903, 46 pp., plates.
Trilobites: pp. 336-340, Zeitschr Deutsch Geol. Ges., 1902.
Griffithides seminifer Phillips. *Phillipsia Eichwaldi* Fischer nov. var. *hassiaca, P. gemmulifera* Phillips.

Perner (Jaroslav). Miscellanea Silurica Bohemiae.

Acad. Cisare Franktiska, Josefa, 1900.
The author describes *Cheirurus Hofmani* n. sp. pl. 1, figs 1-5.
Compares *Ch. pater* and *Ch. globosus.*

Perkins (G. H.) Geology of the Burlington Quadrangle.

7th Report Geology of Vermont, Bellows Falls, Vt., 1910, pp. 249-313, plates 53-62.
The author illustrates in the text *Triarthrus becki* Green, and in the plates without description the following species:
Harpes cassinensis Whitf. *Nileus stratus* Whitf. *Bathyurus perkinsi* Whitf. *Bolbocephalus seelyi* Whitf. *Bathyurus conicus* Whitf., *B. seelyi* Whitf. *Asaphus canalis* Conrad. *Isochilina cristata* Whitf., *I. gregaria* Whitf., *I. seelyi* Whitf.

Peach (B. N.) The Trilobites of the Silurian rocks of Southwest Scotland. Fauna, Flora and Geology of the Clyde area. Edited by C. F. Elliot, Malcolm, Laurie and J. Barclay Murdoch.

Brit. Assoc. Handbook, Glasgow, 1901, pp. 445-447.
List of Arthropoda of Scotland, pp. 450-455.

——— Scottish Palæontology during the last twenty years.

Proc. Phys. Soc. Edinb., vol. 14, 1902, pp. 361-394.
The author remarks under Schizopoda, that Pseudogathea agrees with Anthrapalaemon and must find a place with it. Both appear to me to be ancient forms of Lophogastrid schizopods. Huxley's Pygocephalus should be classed with the same group.

——— Monograph on the higher Crustacea of the Carboniferous rocks of Scotland.

Memoirs of the Geol. Sur. of Great Britain Palæontology, 1908, 822 pp. and 12 plates.
The author describes 34 species of fossil Schizopods.
The classification followed is chiefly based upon that adopted by G. O. Sars, arranged in two great groups, viz.:
1. The Mysid Group, including the families Lophogastridae, Perimecturidae, Anaspidae and Mysidae.
2. The Euphausiid Group has only one family, Euphausiidae.
Family Lophogastridae, Group No. 1.
Genus Tealliocaris gen. nov.
Body moderately long and slightly applanated; integuments firm and chitinous pitted or grained; carapace large, nearly one-half length of the body; seven trunk segments and externally more or less provided with longitudinal keels; rostrum spear-shaped,

PEACH (B. N.)—Continued

three-edged and denticulated; hinder part of carapace not produced into backwardly directed spines; caudal segments wide, single-lobed epimera; eyes large with papilla issuing from the pedicle; antennular peduncle long, slender, the flagella being short and of nearly equal length. First pair of legs much more massive than the succeeding ones, which are slender; branchiae given off from the base of all the seven pairs of legs with lobate sternal branches; telson large.

The author includes under this genus:

Tealliocaris loudonensis sp. nov., *T. woodwardi,* Etheridge, Jr.; described under the genus Anthrapalaemon in 1877; also a variety *Tealliocaris etheridgei* Peach (originally described under the genus Anthrapalaemon in 1882) with the var. *lata* Peach, *T. robusta* sp. nov. and var., *T. tarrasiana* sp. nov., *T. formosa* Peach (originally described as an Anthrapalaemon in 1882).

Genus Pseudo-Galathea Peach, 1883:

P. macconochiei Etheridge, Jr. (described in 1879 as an Anthrapalaemon), *P. rotuda* Peach, *P. ornatissima* Peach (described in 1882 as *Anthrapalaemon ornatissimus.)*

Genus Anthrapalaemon Salter, 1861:

The author restricts this generic name to such applanted forms as the type *A. grossarti* Salter. *Anthrapalaemon russellianus* Salter (originally described under Palaeocarabus in 1863), also var. *spinulosus* and var. nov.

Family Perimecturus gen. nov.:

The characteristic feature of this genus is the enormous development of the tail.

The author includes under this genus: *P. parki* and var. *duplicicarinatus, P. stocki* sp. nov., *P. elegans* sp. nov., *P. communis* sp. nov., *P. ensifer* sp. nov., *P. pattoni* Peach *(Palaesquilla pattoni* Peach 1888).

Family Anaspidae:

Genus Palaeocaris Meek & Worthen, 1868.

Palaeocaris scotica Peach, *P. landsboroughti* sp. nov.

Family Mysidae:

Genus Palaemysis gen. nov.

Trunk unknown; tails long and fusiform, and segments supplied with well-developed epimera and well-developed pleopods. External branches of the uropods much longer than the forked telson; internal branches of uropods short so that the tail fan is deeply forked.

The author included in the genus:

Palaemysis dunlopi sp. nov., *P. couttsi* sp. nov. and *P. tenuis* sp. nov.

Family Euphausidae:

Genus Anthracophausia gen. nov.

Elongated laterally compressed, prawn-like forms, with thin, smooth chitinous integuments; carapace one-third the length of the body; peduncle on antenules long and massive, with last 2 joints extending beyond the rostrum; antenna, with basal scale and with flagellum longer than those of antennule; 7 pairs of legs, uniform; tail segments with deep epimera, all directed downwards and backwards; first 2 pairs of appendages of tail in the males very massive and specially modified for sexual purposes; telson as long as the uropods, and furnished near its ends with 2 articulated plates, one on each side.

The author describes *Anthracophausia dunsiana* sp. nov. with var. *obesa* and *A. traquairi* Peach.

Genus Crangopsis Salter, 1863; syn. the Palæocrangon and Uronectes Salter, 1861. *Crangopsis socialis* Salter, *C. rhodesi* sp. nov., *C. magna* sp. nov., *C. couttsi* sp. nov., *C. robusta* sp. nov., *C. eskdalensis* Peach (originally described under the genus Palæocrangon in 1882), *C. elegans* Peach (described in 1883 under the genus Palæocrangon), and *C. hastata* sp. nov., also *C. minuta* nov.

Persson (Emil). Till kännedonen om Oleniderna i Zone n med Eurycare Och Leptoplastus vid Andrarum 1.

Meddel No. 11, fr. L. G. F. Geol. Fören. i Sthlm. Förhandl., Bd. 26, 1904.

Pocock (T.) The geology of the country around Macclesfield, Congle, Crewe and Middlewich.

Mem. Geol. Sur. Eng. London, 1906, p. 110.

Pompeckj (J. F.) Die Fauna des Cambrium von Tejrovic and Skrej in Bohmen.

Jahrb. d. k. k. Geol. Reich, 1895, Bd. 45, Heft 2 and 3, pp. 495-614, plates 13-17.

Agnostus section Laevigati: *Agnostus nudus* Beyr., *A. bibullatus* Barr.

Agnostus section Limbati: *Agnostus rex* Barr., *A. granulatus* Barr. *Agnostus integer* Barr., also var. *spinosa* n. var. *Paradoxides spinosus* Boeck, *P. rotundatus* Barr., *P. rugulosus* Corda, *P. imperialis* Barr., *P. orphanus* Barr., *P. expectans* Barr., *P. inflatus* Barr., *P. pusillus* Barr., *P. Jahni* n. sp. *Hydrocephalus carens* Barr., *H. saturboides* Barr. *Conocoryphe Sulzeri* Schloth., *C. (Ctenocephalus) coronata* Barr. *Ptychoparia striata* Emm., also var. *tenuis* n. var., *P. (Conocephalites) Emmrichi* Barr., *P. (Conocephalites) marginata* n. sp. *Solenopleura torifrons* n. sp., *S.? conifrons* n. sp. *Agraulos ceticephalus* Barr., *A. spinosus* Jahn. *Ellipsocephalus Hoffi* Schloth., *E. Germari* Barr., *E. vetustus* n. sp. *Protypus? bohemicus* n. sp. *Sao hirsuta* Barr.

——— Ein neuentdecktes Vorkomen von Tremadoc-Fossilien bie Hof. Munchen, 1896.

Bavarilla Hofensis Barr. *Dikelocephalus? bavaricus* Barr. *Niobe inotata* Barr., *N. discrepans* Barr.

——— Ueber Calymmene Brongniart.

Neuen Jahb. Mineral. Geol. Pal. Jahrg., 1898, vol. 1.

The Calymmenidae are divided as follows:

1. Subgenus Pharostoma Corda type, *P. pulchrum* Barr.
2. Subgenus Calymmene type, *C. tuberculata* Brunn.

First Family—*Calymmene senaria* Conrad.

Second Family—*Calymmene cambrensis* Salter.

1. Synhomalonotus type, *Calymmene Tristani* Brong.
2. Synhomalonotus type, *Calymmene Arago* Roul.
3. Subgenus Ptychometopus type, *P. Volborthi* Schmidt.

——— Versteinungen der Paradoxides Stufe von La Cabitza in Sardiniens und Bermerkungen zur Gliederung des Sardischen Cambrium.

Zeitschr. Deutsch Geol. Ges., 1901, pp. 1-23, plate.

Paradoxides mediterraneus n. sp. *Conocoryphe Héberti* Mun-Chalm et Berg. *Ptychoparia* sp. *Olenopsis Bornemanni* Menegh. *Olenellus (Holmia) Broggeri* Walc. *Conocoryphe Levyi* Mun-Chalm et Berg.

The new name of *Paradoxides mediterraneus* is given to *P. rugulosus* Bergeron Massif. Ancien, p. 336, pl. 2, f. 5-7.

Price (W. Armstrong). Notes on the Palæontology of Boone County.

Geol. Sur. West Virginia, p. 614.

Griffithides scitulus Meek and Worthen.

Prosser (Charles) and **Kindle** (Edward M.) Geol. Sur. Maryland Middle Devonian.

Baltimore, 1913, pp. 326-335, pls. 42-44.

The authors describe the following Fossil Crustacae:

Trilobita: *Cryphaspis Stephanophara* Hall. *Homalonotus DeKayi* Green. *Phacops rana* Gr., *P. cristata* Hall and var. *pipa* Hall.

Dalmanites (Cryphaeus) Boothi Gr.

The genus Cryphaspis was proposed by Dr. Green for certain Devonian Trilobites, in 1837, Am. Jour. Sci, vol. 32, 1837, p. 343, with figures of the genotype *Cryphaeus Boothi* and *C. calliteles.*

The term was pre-occupied for the Coleoptera in 1833.

Burmeister Org. Tril, 1843, under his sub-group Phacops, in which the pygidium has long spines on its circumference, classes *Asaphus archnoides* Goldf., a similar species, under Phacops. This species is now referred to *Cryphaeus punctatus* Steininger, 1831.

Milne Edwards Hist. Nat. Crust., vol. 3, 1840, pl. 34, fig. 8, copies Hoeninghaus's figure of *Calymmene archnoides,* 1833, and refers it to his new genus Pleuracanthus, at this time pre-occupied by Agassiz and Gray for fossil fish, 1832.

Corda Mong., Böhm Tril, 1847, p. 242, pl. 6, fig. 67, uses the term Metacanthus for *Phacops stellifer* Burmiester, and that of Asteropyge, on p. 241, with *Calymmene arachnoides* Goldf. as the genotype.

All the species described under Cryphaeus Green should take the generic name of Asteropyge Corda.

In the European species of this genus the terminal spine upon the pygidium generally exceeds in length all of the five marginal spines on each side.

Provost (Pierre). Notes sur les Entomostraces bivalves du terrain Houiller du Nord de la France.

Lill. Ann. Soc. Geol., vol. 40, 1911, pp. 60-80, plate.

Phyllopoda Estheria simoni n. sp. *Estheriella reumauxi* sp. nov.

Raymond (Percy E.) The Crown Point section.

Bull. Amer. Palæontology, vol. 3, No. 14, 1902, plates 18 and 19.

Gives list of Chazy fossils, including Trilobites and figures of *Thaleops ovatus* Conrad. *Bathyurus spiniger* Hall.

——— Notes on the names Amphion, Harpina and Platymetopus.

Amer. Jour. Sci., vol. 29, 1903, pp. 377-378.

Changes preoccupied name Amphion to Pliomera Ang. Harpina to Eoharpes n. gen. Platymetopus to Amphilichas n. gen.

——— The Trilobites of the Chazy Limestone.

Ann. Carnegie Mus., vol. 3, 1905, pp. 328-386, plates.

Harpina antiquatus Bill., *H. Ottawaensis* Bill. *Lonchodomas Halli* Bill. *Remopleurides canadensis* Bill. *Bathyurus Angelini* Bill. *Bathyurellus brevispinus* n. sp., *B. minor* n. sp. *Asaphus marginalis* Hall. *Asaphus* sp. *alpha beta* and *gamma. Isotellus Harrisi* n. sp., *I. obtusum* Hall, *I. angusticaudum* n. sp., *I. ? Beari* n. sp. *Illaenus indeterminatus* Walc., *I. punctatus* n. sp., *I. Bayfieldi* Bill., *I. globosus* Bill., *I. Erastusi* n. sp. *Thaleops ovata* Conrad. *Proetus Clelandi* n. sp. *Lichas (Platymetopus)* Ang. this subgenus changed to *Amplilichas* n. subgen. by the author in another publication *(Platymetopus minganensis* Bill.). *Acidaspis* (subgen. *Glaphurus* n. subgen.). *Glaphurus pustulatus* Walc., *G. primus* n. sp. *Cybele valcourensis* n. sp.

RAYMOND (Percy E)—Continued

Amphion canadensis Bill. *Ceraurus pompilius* Bill., *C. hudsoni* n. sp. *Pseudosphaerexochus vulcanus* Bill., *P. vulcanus* var. *Billingsi* n. var., *P. approximus* n. sp., *P. Chazyensis* n. sp., *P. (Nieszkowskia) satyrus* Bill. *Sphaerocorphe Goodnovi* n. sp. *Sphaerexochus parvus* Bill. *Dalmanites (Pterygometopus) annulatus* n. sp.

Seven genera—Thaleops, Proetus, Glaphurus, Cybele, Sphaerocorphe, Sphaerexochus and Pterygometopus—make their first appearance in American faunas in the Chazy formation.

Three, Bathyurellus, Glaphurus and Amphion, are not found in formations above the Chazy.

Most of the genera found in the Trenton are represented in the Chazy.

——— The fauna of the Chazy Limestone.

Amer. Jour. Sci., vol. 20, 1905, pp. 353-382.

Leperditia limatula n. sp.

The new generic name of Heliomera is used for *Cheirurus sol* Billings, as the type.

——— Trilobites of the Chazy Formation in Vermont.

7th Report of the State Geologist, 1909-1910, Bellows Falls, Vt., 1910, pp. 213-248, plates 32-40.

This paper was published in Ann. Carnegie Mus., vol. 3, No. 2, 1905; but this article has all been reconstructed and important additions have been made.

The subgenus *Vogdesia*, on p. 225, has been given a generic name with *Isotelus bearsi* as the type.

Nileus vigilans Meek and Worthen, as figured in Palæont. Minnesota, vol. 3, part 2, p. 712, figs. 17-19, the author compares with *Nileus Perkinsi*, which differs principally in respect to the eyes, which are much larger and further back on the cephalon in *N. Perkinsi*.

The species illustrated and described are:

Eoharpes antiquatus Bill., *E. ottawaensis* Bill. *Lonchodomas halli* Bill. *Remopleurides canadensis* Bill. *Bathyurus angelini* Bill. *Bathyurellus brevispinus* Raym., *B. minor* Raym. *Basilicus marginalis* Hall. *Vogdesia bearsi* Raym. *Onchometopus obtusus* Hall. *Isotelus harrisi* Raym., *I. platymarginatus* Raym. *Isotelus beta* Raym. *Bumastus limbatus* Raym. *Isoteloides augusticaudus* Raym. *Thaleops arctura* Hall. *Bumastus globosus* Bill., *B. erastusi* Raym. *Illaenus punctatus* Raym. *Proetus clelandi* Raym. *Amphilichas minganensis* Bill. *Glaphurus pustulatus* Walc. *Cybele prima* Raym. *Pliomerops canadensis* Bill. *Ceraurus pompilius* Bill., *C. hudsoni* Raym. *Pseudosphaerexochus vulcanus* Bill., *P. vulcanus billingsi* Raym., *P. approximus* Raym., *P. chazyensis* Raym. *Nieszkowskia satyrus* Bill. *Sphaerexochus parvus* Bill., *S. goodnovi* Raym. *Pterygometopus annulatus* Raym. *Isotelus harrisi* Raym., *I. platymarginatus* Raym. *Basilicus marginalis* Hall. *Ceratocephala narrawayi* Raym. *Heliomera sol.* Bill. *Nieszkowskia* or *Pseudosphaerexochus.*

——— On two new Trilobites from the Chazy near Ottawa.

The Ottawa Naturalist, vol. 24, Nov., 1910.

The author describes *Bathyurus superbus* n. sp., closely related to *Bathyurus extans* Hall, but larger.

Isotelus arenicola n. sp.

This species is more closely allied to *Isotelus gigas*, but this species has no genal spines like the new species.

——— Notes on Ordovician Trilobites, II. Asaphidae from the Beekmantown.

Ann. Carnegie Museum, vol. 7, No. 1, 1910, pp. 36-44, plate 14.

The author places a new genus under the family *Asaphidae (Isoteloides)*. In this

RAYMOND (Percy E)—Continued

genus the glabella does not reach to the front of the cephalon, nor does it expand towards the front; it has also almost obsolete neck and dorsal furrows with a long and narrow form.

The author takes *Isoteloides Whitfieldi* for the type. This species is the *Asaphalus canalis* Whitfield, Bull. Am. Mus., vol. 1, p. 336, pl. 34, f. 1-8, not that of Conrad or Hall.

Hall credits the name to Conrad in MSS. and figures the hypostoma and doublure from Chazy Village, New York. This is probably what is now known as *Isotelus Harrisi* Raymond.

On account of the facial suture termination at a point in the middle of the anterior margin, the author classes as Isoteliform suture the genera Asaphellus, Asaphus and Isotelus.

In Niobe the suture cuts the anterior margin in front of the eyes, and follows around the frontal margin, as in Nileus; classed as the Niobiform suture.

The genera with forked hypostoma and with Isoteliform suture are arranged:

Asaphidae—Asaphus, Onchometopus Ptychopyge, Isoteloides and Isotelus. Basilicus is the only member with Niobiform suture. This form is common with the undivided hypostoma as in Ogygia, Ptychocheilus, Asaphelina, Niobe, Symphysurus, Illaenurus, Nileus Barrande, Homalopteon and Platypeltis.

A few genera with undivided hypostoma have Isoteliform suture, namely: Megalaspis, Megalaspides and Asaphellus.

The author describes *Asaphellus gyracanthus* n. sp. (*Asaphus canalis* Cleland), *A. monticola.* Subgenus to Niobe, Hemigyraspis n. gen. This genus is proposed with *Asaphus affinis* McCoy as a type. *H. collieana* n. sp.

The author includes *Ogygia desiderata* Barr. *Niobe menapiensis* Hicks, and *N. solvensis* Hicks. *Asaphellus planus* Matt. in the genus.

Megalaspis and *Megalaspides.*

Sub-family Asaphidae:

Asaphidae, hypostoma forked.

Section 1: Asaphidae with anterior limb of facial suture marginal Basilicus.

Section 2: Asaphidae with anterior limb of suture intra-marginal, Pythopyge, Pseudasaphus, Asaphus, Onchometopus, Isotelus, Isoteloides.

The author describes and figures *Asaphus marginalis* Hall, under the genus Basilicus, including as the young of this species *Asaphus alpha* and *A. gamma* Raymond.

The author remarks that the species is closely allied to *Basilicus tyrannus* Murch.

The pygidium figured shows two lobes somewhat similar to that of *Dicellocephalina dicraeura* Ang., as illustrated by Moberg, pp. 1-5, f. 14, Kongl. Fysiogr Söllsk. Handl., Ang., Bd. 17, No. 7, 1906.

Onchometopus obtusus Hall. *Isotelus harrisi* Raym., *I. platymarginatus* n. sp., *I. beta* Raym. *Isoteloides angusticaudus* Raym. *Nileus perkinsi* n. sp.

Subgenus Vogdesia.

The thorax is similar to that of Nileus, as is the pygidium. The cephalon, which is short and broad, is also similar to that of *Nileus,* but differs from it in having smaller and much more elevated eyes, and deeper dorsal furrows.

The author refers *Nileus vigilans* (M. & W.) as figured by Clarke, Palaeont. Minnesota, vol. 3, p. 713, and *Isotelus bearsi* Raym. to this genus. *Thaleops arctura* Hall, refers *Illaenus ovatus* Raym. to this species. *Bumastus globosus* Billings, *B. erastusi* Raym., *B. limbatus* n. sp. *Amphilichas minganensis* Billings. *Ceratophala narrowayi* n. sp. *Glaphurus pustulatus* Walc., *Cybele prima* Raym.

The author figures *Pliomera fischeri* Eich. *Pliomerops canadensis* Bill., *P. pseudoraticulatus* Pörtk., *P. barrandei* Bill., *P. senilis* Barr. The new genus Pliomerops, with

RAYMOND (Percy E)—Continued

P. canadensis as its type, the author suggested, Am. Jour. Sci., vol. 19, 1905, p. 377, for the species of *Amphion (Pliomera),* in which the cephalon has a denticulate frontal border, while the other species have smooth borders.

Subgenus Nieszkowskia sp. ind.

Subgenus *Heliomera sol* Billings.

Sphaerocoryphe goodnovi Raym.

Symphysurus Convexus Cleland, syn. *Illaenurus columbiana* Weller and *Bathysurus ? levis* Cleland.

The author gives illustrations of *S. sicardi* Berg. and *Illaenurus quadratus* Hall.

——— Notes on Ordovician Trilobites, III. Asaphidae from the Lowville and Black river.

Ann. Carnegie Mus., vol. 7, No. 1, 1910, pp. 46-59, plates 15-16.

In this paper the species *Bathyurus longispinus,* the hypostoma of *B. extans,* the free cheek of *B. spiniger,* and cephalon of *Isoteloides homalonotoides* are figured for the first time.

The author illustrates *Basilicus romingeri* Walc., placing as syn. *Asaphus Wisconsensis* Walc. and *Ptychopyge ulrichi* Clarke.

Under the genus Onchometopus, which may be readily distinguished from *Isotelus* by the presence of a median tubercle on the glabella; the absence of a concave border on both cephalon and pygidium, the author illustrates *O. simplex* n. sp.

Under the genus *Isoteloides* the author places *Asaphus homalonotoides* Walc.

The paper also includes notes on *Isotelus gigas* Dekay, *I. maximus* Locke.

——— Notes on Ordovician Trilobites, IV. New and old species from the Chazy.

Ann. Carnegie Mus., vol. 7, pp. 60-79, plates 17-19, 1910

The material on which this paper is based is two collections, the first by the author, and the second by Dr. Perkins, State Geologist of Vermont, from Isle La Motte, which was published in advance of the State Report.

The author notes *Eoharpes antiquatus* Billings. *Remopleurides canadensis* Billings.

The author divides the family Asaphidae Emmerich into two sections. Ogyginae nov. Asaphidae with hypostoma entire and 8 segments in the thorax. Geologically the more ancient.

Section 1—Ogygina with anterior limb of facial suture marginal. Ogygia, Niobe, Asaphellus, Symphysurus, Nileus, Vogdesia, Illaenurus.

Section 2—Ogyginae with anterior limb of suture intra-marginal.

——— Notes on parallelism among the Asaphidae.

Trans. Royal Soc. of Canada, 3rd ser., vol. 5, sec. iv, 1912, pp. 111-120, plates 1-3.

The author remarks: On the ontogeny of the Asaphidae very little is known; also that from the observation of various authors, the following may be looked upon as primitive characters in this family:

1. Strongly segmented cephalon and pygidium.
2. Absence of depressed borders.
3. Long glabella.
4. Eyes distant from the glabella.
5. Facial suture marginal in front of the glabella.
6. Pygidium and cephalon short and broad.
7. Axial lobe narrow.
8. Genal spines present.

Judged merely by these characteristics Ogygopsis, Ogygiocaris, Ogygites, Asaphus,

RAYMOND (Percy E)—Continued

Niobe, Symphysurus and Basilicus, are more primitive than Isotelus, Nileus, Ptychopyge, Hemigyraspis and Asaphellus.

The author quotes Brögger's studies on the hypostoma and his division of three distinct types.

Pointed behind, Megalaspis and Ogygiocaris.

Quadrate, *Niobe insignis.*

Extended behind into two long, large prongs, Asaphus, Isotelus, etc. He remarks under the Geologic range, that the Asaphids appear earlier in America and have a longer range than in any other country.

The Cambrian, which have entire hypostomas, consists of the genera Ogygopsis, Illaenurus, Symphysurus, Asaphellus, Hemigyraspis and Megalaspis.

Ordovican, Beekmantown, the Asaphids are less varied as only Isoteloides and Nileus are present.

In the Chazy, Isotelus, Isoteloides, Basilicus, Onchometopsus, Vogdesia and Nileus occur.

In the Silurian, in the Lowville (Silurian) and Back River (Ordovian), the genera Onchometopus, Isotelus, Isoteloides, Basilicus and Vogdesia.

In the Trenton there are, so far as is now known, only Isotelus and Isoteloides.

In the Utica, Isotelus and Ogygites.

In the Richmond, Isotelus, Onchometopus, Brachyaspis and probably Ogygites.

The author uses *Asaphus expansus* as the type of the genus, which is characterized by its short, broad head, and pygidium from which all depressed borders are absent; by the rather prominent glabella, which expands towards the front and reaches the anterior margin; the large eyes; the course of the anterior portion of the frontal suture, which meets in a point in front of the eye; and the short pygidium, with narrow, well-defined axial lobe and smooth pleural lobes.

The genus is well developed in the Baltic Region.

Under the heading of lines of development from the Asaphus, the author remarks that the variation in the Ordovician Baltic species seems to be in the direction of the obliteration of furrows on the surface; that is a further loss of evidence of original segmentation in cephalon and pygidium.

Onchometopus differs from Asaphus, in having the glabella less marked, the axial lobe of the thorax wider, the thoracic segments flatter, the axial lobe of the pygidium less convex and without rings.

Megalaspides, like Asaphus, with narrow axial lobe, expanding glabella, no depressed border on the pygidium, but with a narrow one on the front of the cephalon.

Isoteloides, in which both the cephalon and pygidium have depressed borders.

Isotelus, in which the axial lobe of the thorax is wide, the glabella and the axial lobe of the pygidium so ill-defined as to merge into the general surface of the head; therefore, both these smooth trilobites and species of Brachyaspis and Onchometopus are so like Isotelus, that the three genera can only be separated by their lines of development.

Basilicus is a primitive genus, with forked hypostoma, with a strongly ribbed tail; the facial suture marginal in front, and the glabella strongly outlined and shows glabella furrows.

The author remarks from Basilicus, Ogygites seems to have developed.

Tromelin and Lebesconte, Assoc. Francaise, Adv. Sci., 1875, p. 33, use the new generic name of Ogygites for Brongniart's Ogygia, it having been used for other genera in natural history. These authors use O. Desmaresti Brog. for the type, and include O. Brongniarti Rou. as a syn. The same authors refer Ogygia, the first species described under the genus by Brongniart, to the genus Asaphus.

RAYMOND (Percy E)—Continued

The author considers Pseudoasphus Schmidt as the next step in the development from Basilicus and Ogygites.

The author is in error in his remarks that Brongniart applied the name of Ogygia to *O. buchii* and *O. dilatata* with forked hypostoma. Brongniart applied the name to an Asaphus. The second species described by Brongniart, according to Tromelin and Lebesconte, *ibid*, p. 34, has the entire hypostoma characteristic of *O. desiderata* Barr. Syst. Sil de Bohéme, vol. 1, Suppl., pl. 4, fig. 3.

The author illustrates *Brachyaspis notans* Billings. *Ogygites canadensis* Chapman. Remarks: this species has a forked hypostoma, and should not be included under the genus.

Plate 2—*Onchometopus susae* Whitfield. *Brachyaspis alacer* Bill., *B. altilis* Raym. n. sp. *Megalaspis goniurus* Bill. *Isotelus gigas* DeKay. *Nileus perkinsi* Raym.

Plate 3—*Nileus perkinsi* Raym. *Onchometopus obtusus* Hall. *Bumastus globosus* Bill. *Nileus affinis* Bill. *Symphysurus illaeonoides* Bill. *Isotelus gigas* DeKay, and *Hemigyraspis* sp.

——— Some changes in the names of genera of Trilobites.

The Ottawa Naturalist, vol. 26, Feb., 1913.

The author remarks on the ten new genera described by Jaekel in Zeit. d. Deutsch Geol. Ges., vol. 61, pp. 380-401, 1909, should be rejected and referred to older names as follows:

Paragnostus to Condylopyge Corda, Dichagnostus to Pleuroctenium Corda, Mesagnostus to Peronopsis Corda, Miagnostus to Lejopyge Corda, Leiagnostus to Phalacroma Corda, Metagnostus to Arthrorhachis Corda. These six new genera the author rejects.

The author would reject Microdiscus Emmons, because it was founded on a young specimen of the genus Trinucleus, and substitutes Eodiscus. This would overlook Salter's Microdiscus—the generic name should read Microdiscus Salter (not Emmons).

Raymond, who examined the type specimen of *Pemphigaspis bullata* Hall, does not place it with Microdiscus, as suggested by Walcott.

The author is in favor of using Green's generic name Cryptolithus for Murchison's genus Trinucleus. This generic name has long been used by Bronn, Goldfuss, Emmrich, Angelin, Foerste and Vogdes. Eaton's genus Nuttainia of 1832 not used. Dr. Jacob Green claimed priority in his Monograph of Trilobites. The generic name was first described in Am. Jour. Geol., June, 1832.

The author uses Ogygites, Tromelin and Lebesconte, for primitive Asaphinae, with annulated pygidia and forked hypostomata, and Ogygiocaris Angelin, for *Ogygia Buchi* and *O. dilatata*.

The author favors the adoption of Goldius for Brontes and Bronteus. For Acaste Goldfuss, the author takes the generic name Phacopidella. Reed, 1906, as Leach in 1811, used the first genus for a genus of Cirripedes. Arges was used by Haan in 1835, and the author uses Ceratarges Gurich, for the generic name; also Aulacopleura Corda, in place of preoccupied generic name Arethusina Barrande.

——— Notes on Cyclosytoides.

Notes on some new and old Trilobites in the Victoria Memorial Museum. Description of some new Asaphidae. Two new species of Tetradium. Revision of the species which have been referred to the genus Bathyurus (preliminary paper).

Bull. No. 1, Victoria Memorial Museum, October 23, 1913, 80 pp., with 7 plates.

The author remarks on *Harpes dentoni,* which he refers to the new genus Eoharpes from a more, or rather poorly preserved specimen, that it has from 18 to 16 segments

RAYMOND (Percy E)—Continued

in the thorax, as it is not possible to tell where the pygidium begins. He compares the species with *E. ottawaensis.* In front of the glabella the brim of *E. dentoni* is narrow, deeply concave, and the anterior rim is curved upward; while in *E. ottawaensis* the brim, at the front, is wide and nearly flat.

The author also describes and illustrates *Bumastus billingis* R. & N. *Holasaphus moorei* Matthew. *Pseudosphaerexochus apollo Billings,* to which he refers the *Amphion cayleyi* Billings and *Ceratocephala goniata* Warder.

VI. Description of some new Asaphidae.

The author includes under the genus Hemigyraspis, a specimen figured in Trans. Roy. Soc. Canada, vol. V, pl. 3, fig. 7, for a form similar to *Asaphellus planus* Matthew, which the author now refers to *Hemigyraspis mcconnelli* sp. nov. Including under the genus this species, also *Asaphellus planus* Matthew and *Hemigyraspis collieana* Raymond, 1910.

The author used as a type for his subgenus Hemigyraspis, *Asaphus affinis* McCoy, as described by Salter, Mong. Brit. Tril., pl. 24, figs. 13-14, p. 164, and included *Ogygia desiderata* Barr. *Niobe menapieensis* Hicks and *N. solvensis Hicks* with the above species.

Under *Basilicus Barrandi* Hall, the author remarks that this species has evaded the eyes of the describers of Trilobites, and it was not until recently that the writer's curiosity to know what form it was which Vogdes referred to Ogygia (Catalogue of Trilobites, p. 324) caused him to unearth it.

Raymond places as syn. to Hall's species *Asaphus wisconsensis* and *romingeri* Walcott, 1879. *Ptychopyge ulrichi* Clarke, and *Basilicus romingeri* R. & N.

Under the Genus Ogygites Tromelin and Lebesconte, 1875.

The author describes and illustrates *Ogygites canadensis* Chapman, referring as syn. *Asaphus halli* and *hinksii,* and comparing *Asaphus latimarginatus* Hall, with the species.

The author describes as new *Isotelus latus,* differing from *I. gigas* in having all its parts much wider.

Raymond remarks, that the Museum contains a number of specimens of Isotelus from St. Joseph Island, from which Stokes in 1823 figured a specimen as *Asaphus platycephalus,* which compares well with DeKay's *I. gigas* of 1824, and advocates the dropping of DeKay's species.

The following authors use *platycephalus* Stokes, in preference to DeKay's name of *I. gigas*: Bronn in 1835, Buckland in 1840, Burmeister in 1843, Roemer in 1851-56, Nieszkowski in 1857, Billings in 1863, and Vogdes in 1893. I think due credit should be given to Stokes and eliminate *gigas.*

The author also describes and illustrates *Isotelus maximus* Locke, and *Brachyaspis altilis* Raymond, the *Asaphus platycephalus* Billings. (Catalogue of Silurian Fossils of Anticosti, p. 26, fig. 9b.)

VIII. A revision of the species which have been referred to the genus Bathyurus.

The author states that Billings erected the genus Bathyurus with *Asaphus extans* Hall, for the type, and described many species under it. Some 50 species have been referred to this genus; but in the revision the author only includes twelve, including three new species.

Under the Family Bathyuridae Walcott, the author gives a revised generic description and describes the following species:

Bathyurus extans Hall, *B. perplexus* Billing, probably a synonym of *B. extans, Bathyurus johnstoni* sp. nov. closely allied to *B. extans.* Bathyurus sp. intermediate between *B. extans* and *B. superbus. Bathyurus superbus* Raymond. This species attains a larger size than any other known Bathyurus. *B. longispinus* Walcott, *B. amplimar-*

RAYMOND (Percy E)—Continued

ginatus Billings (syn. *B. minganensis* Bill.), *B. glandicephalus* Whitf., *B. angelini* Billings, *B. acutus* sp. nov., *B. arcuatus* Bill., *B. spiniger* Hall, *B. ingalli* sp. nov. and *B. schucherti* Clarke.

With *Bathyurus mero* Bill., for a type the author proposes the new genus Petigurus.

The genus is closely allied to Bathyurus, but differs as follows:

The facial suture reaches the posterior margin near the genal angle, the anterior end of the glabella overhangs the concave border; glabellar furrows are entirely absent, and the eyes are somewhat farther forward. The pygidium is without concave border, the ribs of the pleural lobes are reduced to nodes, and the axial lobe is ringed for almost its entire length.

Petigurus Nero (Billings) an Irish species described by Reed, 1910, as *Bathyurus* aff. *nero,* differs in the posterior end of the facial suture, turns sharply outward behind the eye, forming a broad, fixed cheek, different from *Petigurus nero,* and from any species of Bathyurus.

The author also refers to the genus *Petigurus cybele* (Billings).

Family Solenopleuridae Angelin:

The author gives the following diagnosis of his new genus Hystricurus: Type *Bathyrus conicus* Billings.

Glabella conical, tapering towards the front, outlined by deep furrows at sides and front; glabella furrows absent; fixed cheeks long, extending nearly to the genal angle; dorsal furrows paralleled by a narrow, convex ridge; eyes of medium size, situated opposite the middle of the glabella; cranidium with deeply concave border in front; pygidium rounded, with concave border, axial lobe prominent, with 5 rings, and there are 5 pair of ribs on the pleural lobe; surface smooth or pustulose.

In addition to the type which the author illustrates, he includes under the genus *Hystricurus crotalifrons* (Dwight, 1884) and *H. cordai* (Billings), *B. seelyi* Whitf. Bull. Am. Mus., vol. 2, p. 62, pl. 13, figs. 8-14, as a synonym, and not *B. seelyi,* vol. 1, 1886, referred to *Bolbocephalus.*

Family Proetidae Barrande:

Genus Haploconus nov. This genus is proposed to include Trilobites related to Cyphaspis, but differing in not having isolated basal lobes on the glabella, and in having a less prominent axial lobe on the pygidium. Type *Bathyrurus smithi* Billings.

The author describes *H. smithi,* and includes in the genus *Cyphaspis ? galenensis* Clarke, and probably *C. ? brevimarginata* Walcott.

Family Dikelocephalidae, Miller, 1889:

Miller includes in the family Dicellocephalus, Pterocephala and Ptychaspis.

The author proposes the new genus Platycolpus, for *Bathyurus capax* Billings, a Trilobite with hemispheric, rather smooth cephalon, a depressed glabella extending to the anterior border, which is a flat, striated rim; glabella furrows faint or absent; eyes small, situated midway on the length of the head; facial sutures cutting the posterior margin just inside the genal angles, and the anterior margin in front of the eye.

Pygidium semi-circular, without depressed border and with faint traces of segmentation.

The author describes *Platycolpus capax* (Billings), *P. eatoni* Whitf., which has faint glabella furrows, also *P. dubius* with a more pointed glabella, and *P. barabuensis* Whitf. with a more convex glabella.

Family Agraulidae Dalman:

Under the new genus Plethopeltis with *Agraulos saratogensis* Walcott, for the type the author gives the following diagnosis:

Cephalon strongly convex, wider than long, without concave border or marginal rim; glabella faintly defined, without glabella furrows; eyes small, situated well for-

RAYMOND (Percy E)—Continued

ward; free cheeks, rather wide, smooth, with short spines at the genal angles; pygidium small, with few traces of segmentation; convex; no border.

The author also includes *Plethopeltis armatus* (Billings) described under Bathyurus by Billings in 1860.

Family uncertain.

Goniurus nov. Type *Bathyurus perspicator* Billings, 1865.

Type diagnosis for this genus includes Trilobites, in .which the facial suture, as in Bathyurus, except that the fixed cheek extends a little farther towards the genal angle; eyes very long, narrow and close to the glabella; glabella long, reaching almost to the frontal margin, tapering rapidly in front of the eyes; neck furrow sharp, extending across fixed and free cheeks; genal angles with short, sharp spines; a narrow, elevated rim extends around the whole cephalon, and the cephalon is slightly nasute in front; pygidium convex, triangular, with a long terminal spine.

Goniurus perspicator (Billings), *G. caudatus* (Billings), *G. elongatus* n. sp.

Matthew, Trans. Roy. Soc. Canada, vol., 1895, p. 269, referred to *Bathyurus candatus* Billings, as a possible species of this genus Holasaphus; but the pygidium has no furrow within the border.

Genus Lloydia Vogdes, 1890.

This genus was proposed by Vogdes in Ball. U. S. Geol. Sur., No. 63, p. 97, for *Bathyurus bituberculatus* Billings, in honor of the first author on Trilobites.

Edward Lloyd published in Philosophical Trans., vol. 20, No. 243, p. 279, 1698, the first description of Trilobites.

Dr. Billings, in the Canadian Naturalist and Geologist, vol. 5, 1860, p. 317, provisionally refers to his genus Bathyurus, two species of fossils from Point Levi as *Bathyurus dubius* and *B. bituberculatus* figs. 21 and 22. The second species, which is represented by a rough woodcut, presents a glabella, somewhat tumid and extending to the front margin, with basal lobes elongated, oval and pointed at both ends, separated from the glabella by shallow, obscure grooves; eyes opposite the mid-length of the glabella.

Raymond places the first species of Bathyurus in the family Dikelocephalidae, under a new genus *Platycolpus bubius,* and gives the following diagnosis of Lloydia Vogdes.

Whole animal oblong in outline; cephalon and pygidium regularly rounded, with elevated convex borders; cephalon convex; glabella usually tapering towards the front and reaching to the marginal border; glabella outlined by shallow or deep dorsal furrows; eyes small, near the dorsal furrows, and situated halfway to the front; facial sutures cut the posterior margin at the genal angles and the anterior margin in front of the eyes; genal angles usually without spines; thorax of 9 segments, pleura deeply grooved, ending in long, acute spines; pygidium with narrow axial lobe, which may have from 1 to 8 joints; pleural lobes smooth. The convex border which encircles the pygidium is set off by a shallow furrow.

Type *Bathyurus bituberculatus* Billings, which is common in the conglomerates at Point Levis near St. Joseph's Church, Beekmantown age.

The author also includes under Lloydia, Bathyurus Saffordi, which differs from the type, in lacking the basal lobes on the glabella; also *Bathyurus solitarius*, from Hare Bay, Newfoundland. *Lloydia oblongus* (Billings), similar to *L. saffordi,* but has straight sides to the glabella instead of tapering forward.

The author includes with doubt *Lloydia strenuus* Billings.

The illustration given by Billings, Pal. Fossils of Canada, p. 204, fig. 188, compares well with the type of Bathyurus.

Dr. Raymond places two species described by Billings as *Bathyurus quadratus* and *breviceps,* under a new genus Leiostegium, with the following diagnosis: General

RAYMOND (Percy E)—Continued

form elongate, oval; cephalon and pygidium, nearly equal, both rounded, smooth and convex; glabella quadrate, outlined by deep, narrow dorsal furrows and extending to the very narrow elevated anterior rim; fixed cheeks wide, eyes small and far from the glabella; thorax of 9 segments; pygidium almost semi-circular, unsegmented; axial lobe elevated, extending nearly the whole length. No concave border. Type *Bathyurus quadratus* Billings.

——— Notes on the ontogeny of *Isotelus gigas* DeKay.

Bull. Mus. Comp. Zoology Harvard College, vol. 58, No. 5, 1914, p. 247-263, with 3 plates.

The author gives the ontogeny of three Asaphids, namely, *Isotelus gigas, I. maximus* and *Basilicus barrandei.* Raymond remarks on:

I. Basilicus stage. The glabella is convex, narrowed behind, with a median tubercle and basal lobes. The brim is wide and horizontal; the cephalon semi-circular in outline; the genal angles produced into long spines; the axial lobe of the thorax is narrow; the pygidium has a prominent axial lobe, and the pleural lobes of the pygidium are ribbed.

II. Ogygites stage. The glabella soon becomes flattened and the facial sutures intermarginal, as in the adult of Ogygites.

III. Isotelus stage. The head and tail both become smooth and the axial lobe widens, as in the adult of Isotelus.

IV. *Isotelus gigas* stage. The head and tail becomes triangular and the spines are lost from the genal angles, a combination of characters distinguishing this species.

The author remarks in regard to *Isotelus Iowensis* Owen, that it is so closely allied to *I. gigas,* that where the two species occur together, as at Trenton Falls, it seems almost like hair-splitting to recognize two species. The adult *Isotelus iowensis,* has long genal spines extending to the 5th, 6th and 7th segments of the thorax.

Isotelus maximus Locke.

The author remarks that the common asaphids at Cincinnati are *Isotelus gigas, I. maximus, I. latus,* an undescribed species and one of the genus Onchometopus.

The four more common species of Isotelus in the Middle and Upper Ordovician are classed as follows:

A. Shield about three-fourths as long as wide.
   a. Adult without genal spines, shield subtriangular, *I. gigas.*
   b. Adult with genal spines, shield rounded, *I. iowensis.*

B. Shields less than three-fourths as long as wide, regularly rounded.
   a. Adult without genal spines, *I. latus.*
   b. Adult with genal spines, *I. maximus.*

The author places *Proetus spurlocki* Meek as a young Isotelus, probably that of *I. maximus.*

The article closes with a description of *Basilicus Barrandei* Hall, the author referring *Asaphus romingeri* Walc. and *A. wisconsensis* Walc. to the species, including *Ptychopyge ulrichi* Clarke, under the same.

——— Notes on the ontogeny of Paradoxides, with description of a new species.

Bull. Mus. Comp. Zoology Harvard College, vol. 58, No. 4, 1914, pp. 225-244, plates.

The author describes and illustrates *Paradoxides Harlani* Green, and a new species, under the name of *Paradoxides Haywardi,* with a Bibliography of the genus.

The author classes the genus after Ford into two groups:

A. With the second segment of the thorax prolonged beyond the others. To this group belong the Bohemian and South European species.

RAYMOND (Percy E)—Continued

B. A group of species, in which the second segment of the thorax is in no way distinguishable from the others. To this group belong the Scandinavian, British and American forms.

The author remarks that *Paradoxides Harlani*, differs from other species and one which makes it almost unique, in the wide, depressed brim at the anterior end of the cranidium.

——— New and old Silurian Trilobites from S. E. Wisconsin, with notes on the genera of Illaenidae.

Bull Mus. Comp. Zool., vol. 60, 1916, No. 1.

The author divides the Illaenoidae into two sections: .

I. Illaenoidae.

Genera Illaenus, Thaleops, Dysplanus, Wossekia gen. nov. and Octillaenus, Bumastinae, Genera Bumastus, Actinolobus, Illaenoides.

Under Bumatus the author includes descriptions of the following species:

Bumastus cuniculus Hall, *B. Niagarensis* Whitf., *B. Dayi* nov., *B. decipiens* nov., *B. tenuis* nov., *B. insignis* Hall, *B. ioxus, B. graftonensis.*

M. & W. & B. *indeterminatus* Walc.

Under Eichwald's genus Actinolobus, he refers a single pygidium as *Actinolobus Americanus* from Racine Dolomite.

II. Lichadidae—The author refers Weller's *Dicranopeltis nasuta* to *Trochurus nasuta.*

Odontopleuridae—Ceratocephala goniata Warder, 1838.

Encrinuridae—Encrinurus reflexus nov.

The author refers to a new species a pygidium of large size, with 8 pairs of ribs on the lateral lobes, which he compares with other American species.

Calymmenidae—The author enumerates the following species:

Calymmene Niagarensis Hall, *C. breviceps* nov. for Hall's *C. Niagarensis,* 28th Rep. N. Y. State Cab. Nat. Hist., pl. 32, fig. 7-15.

Calymmene celebra nov. for Hall's *C. Niagarensis,* 20th Rep. N. Y. State Cab. Nat. Hist., p. 334, based on the pygidium which has 4 pairs of narrow ribs without impassed line, that reach only one-half way to the margin. New genus Liocalymene, with Vauxem's species *Hemicrypturus Clintoni* for its genotype. This form has a smooth pygidium without ribs and a jointed axis, from the Clinton of New York.

This genus should include the French and Spanish Silurian form described as *Calymmene Aragoi* by Rouault, which differs from *C. Salteri* described by the same author in having 10-11 joints on the axis, and *C. Arago* only 7.

Cheirurus Niagarenis Hall. The author restricts this species to Hall's species from Rochester, Pal. N. Y., vol. 2, p. 303, pl. 67, figs. 9-10.

Raymond refers the *Ceraurus insignis* Hall, Pal. N. Y., vol. 2, 1852, p. 300, pl. 6a, fig. 4, to *Cheirurus Welleri* nov. Also included Roemer's *C. bimucronata* Sil. Fauna, Tenn., p. 80, pl. 5, fig. 19, and Hall's *C. Niagarensis,* 20 Rep. N. Y. State Cab. Nat. Hist., pl. 21, figs. 10-11, and others.

Cheirurus dilatatus nov. for Hall's *Sphaerexochus Romingeri?* 28 Rep. N. Y. State Mus. Nat. Hist., 1877, pl. 32, fig. 16.

Cheirurus patens nov., *C. Tarquinius* Bill., *C. Hydei* Weller, and *C. nuperus* Bill. The type of this species was lost and no further specimens have been described.

Sphaerexochus Romingeri Hall. The author remarks that the pygidium of this species is rare and usually incorrectly figured. The pygidium is entire, and the spine figured by Hall are the ribs on the pleural lobes.

——— Beecher's classification of Trilobites after twenty years.

Am. Jour. Sci., ser. 4, vol. 43, 1917, p. 196-210.

RAYMOND (Percy E)—Continued

The author remarks on the order Hypoparia in Beecher's classification. Since the young of practically all primitive Trilobites lack eyes on the dorsal side, Beecher grouped all Trilobites in which absence of eyes was a primary characteristic in his First Order, Hypoparia. Recent studies and discoveries have led a number of investigators to the conclusion that blindness in the Agnostidae, Eodiscidae, Trinucleidae, Raphiophoridae and Harpedidae is secondary and a degenerative not primitive characteristic. If their position is well taken, then the order should disappear and the families be distributed in the two orders which remain.

The author gives a figure of *Agnostus nudus* exhibiting the facial suture and free cheeks. The facial sutures are not marginal, but intra-marginal. They meet in an obtuse angle at the front and run backward just inside the margin, somewhat like the course of the pre-ocular portion of the suture in an Homalonotus. The sutures keep within the angles, so that the fixed cheeks bear the genal angles—a Proparian characteristic. The sutures in this manner cut off a yoke-shaped area, bounded outside by the facial sutures and inside by a marginal edge, which follows the outline of the base of the elevated portion of the cranidium (the glabella). Both limbs of the yoke taper backward to a point, and it forms a continuous plate, with no vertical or epistomal sutures. This plate has the position and aspect of a large epistomal plate, but, whether called an epistoma or free cheek, the sutures which separate it from the cranidium. must be interpreted as the facial sutures.

The author includes only one family under Hypoparia, that of Eodiscidae, Eodiscus as defined by Matthew, 1896, Mollisonia Walc. and Pagetia Walc. The discovery of *Pageria vootes* and *P. clytia,* which bear eyes very close to the lateral margins, seems to be a confirmation of the previous supposition that the Eodoscidae have ventral free cheeks.

Dr. Raymond does not note *Microdiscus caudatus* Delgado, a species with a mucronated pygidium and with free cheeks, from the Cambrian of Portugal.

Delgado's description, p. 349, pl. 3, fig. 12, Fauna Cambrian Haut Alemtejo.

Remarks: "La suture faciale, mais il semble que á partir de l'angle anterieur de l'oeil; il décrit une courbe tres courbe, ayant la convexité tournée en dehors, allant traverser le contour exterieur de la téte prés de la projection de l'oeil; postérieurement il décrit aussi une courbe analogue, atteignant le contour intérieur en dedans de la projection postérieure du centre de figure de l'oeil."

I would suggest the new genus Delgadoia for this species as a type.

Dr. Raymond remarks on Shumardidae, that these little trilobites are too much of a puzzle to be discussed at any length.

The paper ends in a discussion of Harpedidae and Trinucleidae.

The author would not include Orometopus in the last family, and remarks: "It is so unlike any of the Trinucleidae, that the burden of proof that it belongs to that family should be upon those who placed it there."

Under Raphiophoridae, a figure of *Lonchodomas portlocki* Barr., which shows on the ventral side of the head, a yoke-like plate similar to that of *Agnostus nudus,* but instead of being confined to the ventral side it laps over the margins up onto the dorsal side, being separated from the cranidium by a suture which has the course of the ordinary facial suture. The absence of eyes makes the analogy with the ventral plate of Agnostus the more complete.

Having reviewed all the families of the Hypoparia the author remarks that there seems to be a tendency in two directions—in Agnostus and Eodiscidae towards the Proparia, and in the Trinucleidae and Raphiophoridae towards the Opisthoparia.

Mesonacidae:

The author remarks there can be no doubt that *Elliptocephala asaphoides* and other

RAYMOND (Percy E)—Continued

species of this family show distinct traces of facial sutures, particularly of the part behind the eyes. He gives a figure of the head of a young species of *Elliptocephala asaphoides* Emmons.

In regard to the placing of Calymmenidae, Dr. Raymond follows that of Beecher and places it in the Order Proparia, because the post ocular portion of the facial sutures cut the genal angles in Pharostoma and the genal spines are borne by the fixed cheeks. The free cheeks are decidedly Proparian.

——— and **Barton** (Donald C.) A revision of American species of Ceraurus.

Bull. Mus. Comp. Zoology, vol. LIV, No. 20, 1913.

The authors state that the genus Ceraurus was proposed in 1832 by Green, for a new Trilobite which he describes as *Ceraurus pleurexanthemus,* and refer to Green's Monograph, 1832, p. 83.

The original description of this genus was first published in The Monthly Journal of Geology, June, 1832, p. 560, fig. 10, republished in the monograph.

Although the authors do not quote Corda, they take Reed's classification of Cheirurus into two groups on the form of the pygidae. The first with cyrtometopian pygidium like Ceraurus Green. The second like *Cheirurus insignis* type of pygidium with 3 pairs of subequal pleural spines and a short median spine.

The American species they class as follows:

Ceraturus bispinosus sp. nov.

Glabella or occipital segment strongly spinose with a pair of short, horn-like spines on the crest of the frontal lobe.

Ceraurus numitor Billings. A single medium spine on the neck segment.

Ceraurus mismeri Foerste. Glabella expanding rapidly forward. Genal angles with spines.

Ceraurus hudosoni Raymond. Glabella expanding forward; eyes more than one-half the length of the head; a small form glabella expansion 1 in 4.

Ceraurus pleurexanthemus Green. A medium-sized glabella expansion 1 in 7.

2. *Ceraurus milleranus* M. & G. Eyes one-half the length of the head from the posterior margin.

3. *Ceraurus dentatus* n. sp. Eyes less than one-half the length of the head from the posterior margin.

Ceraurus granulosus sp. nov. Glabella with parallel sides.

The authors note in the Trenton fossils of *Ceraurus pleurexanthemus* Green, from the typical locality, that the pygidium varies on the posterior border with either aspinose and rounded border or with 2, 4 or 5 short spines or denticles.

The *Ceraurus dentatus* sp. nov.

The authors refer to Hall's *C. pleurexanthemus,* Pal. N. Y., vol. 1, p. 1847, pl. 65, figs. 1d, 1h, 1i, and pl. 66, figs. 1a-1g.

The *Ceraurus granulosus* sp. nov. is the *C. pompilius* Raymond, 7th Report, Geol. Vermont.

The *Ceraurus Milleranus* M. & G. is the *Calymmene bucklandi,* Anthony, 1839. (I would suggest the older name.)

The authors refer *Ceraurus rarus* Walcott to *Encrinurus Ceraurus pustulosa* Hall to *Eoharpes.*

To conform with the authors' reclassification, the authors remark that besides the species noted, that Vogdes' Catalogue, made in the year 1893, contains a number of other species, which do not belong to the genus as now restricted, as follows:

Cheirurus apollo Billings, to the genus Anacheirurus. *Cheirurus glaucus, C. satyrus* and *C. perforator* Billings, belong to Nieszkowskia (Schmidt subgenus of 1881).

RAYMOND (Percy E.) and BARTON (Donald C.)—Continued

Cheirurus vulcanus, C. prolificus and *G. mercurius* Billings.

The authors refer with doubt to Pseudosphaerexochus.

They refer *Ceraurus niagarensis* Hall, *Ch. tarquinius* Bill., *Ch. nuperus* Bill. and *C. hydei* Weller, to Cheirurus, though the last two show a curious parallel development in that they have a Ceraurus-like pygidium. (Then why divide the genus?)

Cheirurus sol the type of Raymond's genus Heliomera.

The author classes *Ch. polydrus* Bill. and *Ch. pompilus* Billings, under Ceraurinus Barton, a new genus.

——— and **Narraway** (J. E.) A new American Cybele.

Annals of the Carnegie Mus., vol. 3, No. 4, 1906, pp. 597-602, fig.

Cybele Ella. n. sp.

The glabella described as *Glaphurus primus* Ann. Carnegie Mus., vol. 3, p. 362, belong to the genus Cybele. The Chazy form should be known as *Cybele prima,* and the name *Cybele valcourensis* should be eliminated.

Ravn (J. P. J.) Trilobitfaunaen i den bornholmske Trinucleusskifer Avec résumé en francais.

Danmark's Geologiske Undersogelse, 11 R., No. 10, 1899, pp. 49-62.

Primitia strangulata Salt. *Agnostus trinodes* Salt. *Trinucleus Wahlenbergi* Rouault, *T. Bucklandi* Barr. ? *Ampyx Portlocki* Barr., *A. gratus* Barr. *Dionide euglypta* Ang. *Remopleurides radians* Barr. *Calymene* sp. *Asaphus (Ptychopyge) nobilis* Barr. *Illaenus leptopleura* Linrs. *Illaenus Angelini* Helm. *Illaenus* sp., *I. (Panderia) megalophthalmus* Linrs. *Phacops recurvus* Linrs. *Cheirurus insignis* Beyr. ? *Pseudopharexochus laticeps* Linrs. *Cybele* sp. *Dindymene ornata* Linrs. *Acidaspis (Cyrtometopus?) decacantha* Ang. *Phillipsia parabola* Barr.

Redlich (K.) The Cambrian Fauna of the Eastern Salt range.

Memoir Geol. Survey India, new series, vol. 1, No. 1, 1899, pp. 1-13, plate.

Hoeferia noetlingi n. gen. et sp. (non Hoeferia Bittner Moll. 1895.)

Dr. Redlich compares this form with the genera *Protolenus, Paradoxides* and *Metatoxides.*

The genus is now referred to *Redlichia,* Crossman, see Rev. Critique Pal., 1902, sixieme Ann., p. 52.

Reed (F. R. Cowper). Woodwardian Museum Notes. On *Phacops (Chasmops) Marri.*

Geol. Mag. London, Decade iv, vol. 1, 1894, p. 241.

——— Woodwardian Museum Notes. New Trilobites from the Bala beds of the County Waterford.

Geol. Mag. London, Decade iv, vol. 8, 1895.

Cybele Tramorensis n. sp.

Trinucleus hibernicus nov.

——— The fauna of the Keisley Limestone.

Quart. Jour. Geol. Soc. London, vol. 52, 1896, pp. 407-437, plates.

Agnostus cf. *galba* Bill. *Ampyx binodulosus* n. sp. *Tiresias insculptus* McCoy. *Remopleurides Colbii* Portl., *R. longicostatus* Portl. *Cyphoniscus socialis* Salt. *Calymmene Blumenbachi* var. *Caractaci* Salt.

Illaenus Bowmani Salt., also var. *brevicapitatus* and *longicapitatus. Illaenus fallax* Holm., *I. Roemeri* Volb., *I. caecus* Holm., *I. galeatus* n. sp.

REED (F. R. Cowper)—Continued

Cheirurus bimucronata Murch. var. a *C. cancrurus* Salt., *C. Keisleyensis* n. sp., *C.* cf. *glaber* Ang., *C.* cf. *clavifrons* Dalm. ? *C. (Pseudosphaerexochus) conformis* Ang., *C. (P.) subquadratus* n. sp.

Sphaerocoryphe granulata Ang. *Sphaerexochus mirus* Beyr., *S. latirugatus* n. sp. *Straurocephalus Murchisoni* Barr.

Acidaspis convexa n. sp. *Lichas laxatus* McCoy, *L. affinis* Ang., *L. conformis* Ang. var. *Keisleyensis, L. Hibernicus* Portl., *L. bifurcata* n. sp., *L. bulbiceps* Phil. MS.

Cyphaspis ? Harkessi n. sp., *C. (Tornquistia)* n. subgen. *Nicholsoni* n. sp.

Phillipsinella parabola Barr. *Harpes Wegelini* Ang., *H. costatus* Ang.

Harpes species a-b.

——— Woodwardian Museum Notes. On the evolution of the genus Cheirurus.

Geol. Mag. London, Decade iv, vol. 3, 1896, pp. 117-123 and pp. 161-167.

The author arranges the genus Cheirurus as follows:

1. Cheirurus (Anacheirurus) type, *C. Frederici* Salt. Cambrian.

The Tremadoc species has 11-12 thoracic segments, each of which is deeply grooved along its middle. Pygidium has 4 rings and 3 short pleural lobes on each side, which are grooved throughout and extend over the margin into spines.

2. Cheirurus (Eccoptocheile) type, *C. claviger* Beyrich. Ordovician.

Glabella oval, often much inflated. Thorax 10 segments, grooved imperfectly.

3. Cheirurus (Cyrtometopus) type, *clavifrons* Dalm. Ordovician-Silurian.

4. Cheirurus (Hemisphaerocoryphe) type, *pseudo-hemicranium,* Nieszk. Ordovician.

The basal lobes of the glabella are separated by a strong glabella, side furrow joining the neck furrow. These lobes are less elevated than the rest of the glabella.

5. Cheirurus (Sphaerocoryphe) type, *S. cranium* Kutorga. Ordovician.

6. Cheirurus (Nieszkowskia) type, *cephaloceros,* Nieszk. Cambrian and Ordovician.

7. Cheirurus (Pseudosphaerexochus) type *hemicranium* Kutorga. Ordovician.

The characteristics of the above two genera are 12 thoracic segments and the presence of a longitudinal row of puncta instead of a furrow on the inner portion of each pleura.

8. Cheirurus (Group 1 with cyrtometopian pygidium) type, *C. Exsul* Beyr. Ordovician-Silurian.

In this group the anterior pleura of the tail are enlarged and project behind the posterior ones.

Barton refers this group to Ceraurus.

9. Cheirurus Group 2 type *C. bimcronatus* Murch. Ordovician-Silurian.

In this group the pygidium has 3 pair of pleura with free ends. The fourth pair are represented by a single medium terminal piece.

Barton refers this group to Cheirurus:

10. Cheirurus (Crotalocephalus type, *C. articulata* Münster. Devonian.

This genus is almost entirely restricted to the Devonian. The important subgeneric characteristics are the continuous first and second side furrows of the glabella, the triangular basal lobes, which nearly or quite meet in the centre of the glabella at their apices, and the nearly straight obliquely directed third side furrows.

——— *Trinucleus seticornis.*

Geol. Mag. London, Decade iv, vol. 4, 1897, pp. 427-428.

REED (F. R. Cowper)—Continued

——— Fossils from the Grey shales marked on the map as Trilobite shales.

Quart. Jour. Geol. Soc. London, vol. 53, 1897, p. 538.
Trinucleus seticornis His. var. *portrainensis* n. var.

——— Notes on the Geology of the County Waterford.

The fauna of the Ordovician beds near Tramore.
Geol. Mag. London, Decade iv, vol. 4, 1897, pp. 502-512. List of fossils.

——— Notes on the affinities of the genera of Cheirurus.

Geol. Mag. London, Decade iv, vol. 5, 1898, pp. 206-214.

——— Blind Trilobites.

Geol. Mag. London, Dec. iv, vol. 5, 1898, pp. 439-447, and 493-506.
The author divides the Blind Trilobites into two divisions as follows:

Group 1—Primitive forms.
Agnostus Cambrian—Ordovician.
Microdiscus Cambrian.
Trinucleus Ordovician.
Ampyx Ordovician-Silurian.
Dionide Ordovician.
?*Salteria* Ordovician.
Endymionia Ordovician.
Tiresias Ordovician.
Conocoryphe s. str. Cambrian.
Ctenocephalus Cambrian.
Erinnys Cambrian.
Carausia Cambrian.
Dictyocephalites Cambrian.
Eryx Cambrian.
Aneucanthus Cambrian.
Anopocare Cambrian.
?*Avalonia* Cambrian.
?*Bathynotus* Cambrian.
Carmon Ordovician.
Holocephalina Cambrian.
?*Telephus* Ordovician.
Dindymene Ordovician.
Areia Ordovician.
Placoparia Ordovician.
Prosopicus.
Isocolus Ordovician.
Typhloniscus, Lower Devonian.
?*Cyphoniscus* Ordovician.
Conophrys probably—Ordovician.
Shumardia larval forms—Ordovician.

Group 2—Adaptive forms.
Harpes benignensis Barr., Etage Dd. 1.
Illaenus Angelini Holm.
—*aratus* Barr., Etage Dd. 1.
—*caecus* Holm., Keisley Limestone.
—*galeatus* Reed, Keisley Limestone.
—*Katzeri* Barr., Etage Dd. 1.
—*leptopleura* Linnars., Trinucleus Beds.
—*Zeidleri* Barr., Etage Dd. 5.
Proetus dormitans Richter, Tentaculites Beds.
Proetus expansus, Tentaculites Beds.
Acidaspis myops Richter, Tentaculites Beds.
Phacops (Trimerocephalus) laevis, Münst. Upper Devonian.

The genera Dindymene Typhloniscus and Carmon the author places with some hesitation in Group 1, which may be regarded as reversionary or degenerate types on account of their primitive adult cephalic features, combined with morphological characters.

The genera Salteria, Avalonia, Bathynotus, Telephus and Cyphoniscus may be ultimately found to possess eyes.

REED (F. R. Cowper)—Continued

——— Woodwardian Museum Notes. A new Carboniferous Trilobite.

Geol. Mag. London, Decade iv, vol. 6, 1899, pp. 241-245, plate.

Phillipsia cracoensis n. sp.

——— Woodwardian Museum Notes. A new Trilobite from Mount Stephen Field, B. C.

Geol. Mag. London, Decade iv, vol. 6, 1899, pp. 358-361, figure.

Oryctocephalus Reynoldsi n. sp.

——— The Lower Palæozoic bedded rocks of County Waterford.

Quart. Jour. Geol. Soc., London, vol. 55, 1899, pp. 718-772, pl. 49.

Asaphus Haugtoni n. sp. *Cybele Macheneryi* n. sp., *C. sex-tuberculata* n. sp. *Encrinurus fallax* n. sp. *Illaenus Davisi* var. *pseudolimbatus* n. sp. *Remopleurides Portlocki* n. sp., *R. Salteri* n. sp., *R. tuberculatus* n. sp. *Tramoria punctata* n. sp.

The author abandons this genus and refers the species to *Apatokepalus punctatus*, Geol. Mag., Dec. 4, vol. 7, p. 46, 1900.

——— Woodwardian Museum Notes. On the British species of the genus Conocoryphe.

Geol. Mag. London, Decade iv, vol. 7, 1900, pp. 250-257.

The genus Conocoryphe sens. str., is confined in Britain to the Lower and Middle Cambrian beds.

The author reclassifies the species as follows:

Euloma abdita Salt. *Solenopleura applanata* Salt. *Olenus ? bucaphalus* Belt. *Conocoryphe (Bailiella) bufo* Hicks. *Ctenocephalus coronatus* Barr. *Solenopleura ? depressa* Salt.

The *C. ? ecorne* Ang. Salter, Cat. Camb. Sil. Foss., p. 12, is a species of *Peltura*.

Conocoryphe ? Homfrayi Hicks. *Olenoides humerosus* Salt. *Apatokephalus invitus* Salt. *Olenus (Parabolinella?) longispina* Belt. *Conocoryphe Lyelli* Hicks. *Peltura ? malvernia* Phillips. *Euloma monile* Salt. *Conocoryphe ? perdita* Hicks. *Olenus (Parabolinella) Planti* Salt. *Olenus (Cyclognathus) simplex* Salt. *Ctenocephalus (Hartella) solvensis* Hicks. *Solenopleura ? variolaris* Salt. *Angelina verisimilis* Salt. *Olenus (Parabolinella?) Williamsoni* Belt.

——— Woodwardian Museum Notes. Salter's undescribed species.

Geol. Mag. London, Decade iv, vol. 7, 1900, pp. 303-308, plate.

Olenus (Parabolinella) Planti Salter, Cat. Camb. Sil., Foss, p. 11.

Olenus (Ctenopyge) expansus Salt., *ibid.*, p. 12.

Neseuretus recurvatus (Hicks) Salter, Cat. Camb. Sil., Foss, p. 22.

Neseuretus quadratus (Hicks) Salter, Cat. Camb. Sil., Foss, p. 22.

Neseuretus sp. *(Homalonotus monstrator)* Salter, Cat. Camb. Sil., Foss, p. 22.

——— Woodwardian Museum Notes. Salter's undescribed species No. 2.

Geol. Mag. London, Decade iv, vol. 8, 1901, pp. 5-14, plate.

Lichas scutalis Salter MSS. *Proetus Fletcheri* Salt., Cat. Camb. Sil., Foss, p. 134 (a 825, a 828).

——— Woodwardian Museum Notes. Salter's undescribed species No. 3.

Geol. Mag. London, Decade iv, vol. 8, 1901, pp. 106-110, plate.

Phacops (Odontocheile) caudatus var. *corrugatus* Slater.

Encrinurus multiplicatus Salt., Cat. Camb. Mus. Sil., Foss, p. 51.

REED (F. R. Cowper)—Continued

——— Notes on the genus *Lichas*.

Quart. Jour. Geol. Soc. London, vol. 58, 1902, p. 50.

The author classifies the Lichadidae into two groups as follows:

Group 1—Protolichas:

Sec. A. Corydocephalus type *L. plamatus* Barr.
—B. Dicranopeltis type *L. scaber* Bevr.
—C. Platylichas type *L. margaritifer* Nieszk.
—D. Metopolichas type *L. verucosus* Eichw.
—E. Metalichas type *L. cicatricosus* Schm.
—F. Uralichas type *L. Ribeiroi* Delg.
—G. Ceratarges type *L. armatus* Goldf.
—H. Oncholichas type *L. ornatus*.

Group 2—Deuterolichas:

Sec. A. Hopolichas type *L. tricuspidatus* Beyr.
—B. Homolichas type *L. angustus* Beyr.
—C. Conolichas type *L. aequiloba* Steinh.
—D. Echinolichas type *L. Eriopis* Hall.
—E. Leiolichas type *L. illaenoides* Nieszk.
—F. Paralichas type *L. dalecarlicus* Ang.
—G. Terataspis type *L. grandis* Hall.
—H. Ceratolichas type *L. gryps* Hall.

The classification is based on (1st) a group with a pair of bi-composite lateral lobes to the glabella, and a more or less definite fourth pair of lateral lobes; (2nd) a group with a pair of tri-composite lateral lobes, originating by the fusion of the fourth pair, with the bi-composite pair of the preceding group.

——— Woodwardian Museum Notes. *Brachymetopus Strzeleckii* McCoy.

Geol. Mag. London, Decade iv, vol. 10, 1903, pp. 193-197, figure.

The author remarks (on p. 196): "It seems open to question, whether the European species of Brachymetopus should not be regarded as constituting a distinct group or subgenus, for which the name Brachymetopina may be suggested."

——— The Lower Palæozoic Trilobites of the Girvan District, Ayrshire.

Palaeontological Society London, Part 1, pp. 1-48, plates 1-6, December, 1903.
Part 2—pp. 49-96, plates 7-13, December, 1904.
Part 3—pp. 97-186, plates 14-20, December, 1906.

List of the species:

Agnostidæ—*Agnostus agnostiformis* McCoy, *A. girvanensis* n. sp., *A. perrugatus* Barr., *A. tardus* Barr.

Harpedidæ—*Harpes Flanagani* Portl. ? *H.* sp. (a) to (c).

Trinucleidæ—*Trinucleus Bucklandi* Barr., *T. ? Maconochiei* Eth. & Nich., *T. subradiatus* n. sp., *T.* sp. ind. (a) to (g). *Ampyx depressus* Ang., *A. Drummuckensis* n. sp., *A. Hornei* Eth. & Nich., *A. incurvus* n. sp., *A. Macallumi* Salt., *A. mammillatus* var. *Austini* Portl.? *A.* cf. *foveolatus* Ang., *A.* cf. *scanicus* Ang. *Dionide Lapworthi* Eth. and Nich., *D. Richardsoni* n. sp.

Olenidæ—*Triarthrus Becki* Green ? *Apatokephalus* sp. *Remopleurides Barrandei* Eth. and Nich., *R. (Teratorhynchus) bicornis* n. sp., *R. Colbii* Portl. ? *R. correctus* n. sp., *R. dorsospinifer* Portl., *R. longicostatus* Portl., *R. Salteri* Reed *girvanensis* var. nov., *R.* cf., *nanus* Leucht., *R.* cf., *platyceps* McCoy. *Shumardia scotica* n. sp. *Salteria primaeva* Wyv. Thom. *Telephus fractus* Barr.

REED (F. R. Cowper)—Continued

Asaphidæ—*Asaphus (Isotelus) gigas* DeKay ? *A. Isotelus instabilis* n. sp., *Asaphus* sp. *Stygina latifrons* Portl. *Cyclopyge armata* Barr., *C. rediviva* Barr., *C.* cf. *gigantea* Barr. *Bohemilla* sp. *Illaenus aemulus* Salt., also var. *I. balclatchinensis* n. sp., *T. Barriensis* Murch., *I. Bowmani* Salt ? and var. *longicapitatus* Reed, *I. Davisi* Salt., *I. extensus* n. sp., *I. latus* McCoy, *I. Macallumi* Salt., *I. memorabilis* n. sp., *I. Murchisoni* Salt. ? *I. nexilis* Salt., *I. Portlocki* Salt., *I. shallochensis* n. sp., *I. Thomsoni* Salt., *I.* cf. *oculosus* Holm., *I.* cf. *perovalis* Murch. *Illaenus* sp.

Proetidæ—*Proetus girvanensis* Eth. and Nich., *P. latifrons* McCoy, *P. procerus* Eth. and Nich., *P. pseudolatifrons* n. sp., *P. Stokesi* Murch., *P.* cf. *obconicus* Lindstr., *Proetus* sp. *Cyphaspis megalops* McCoy. *Arethusina Konnincki* Barr. ? *Phillipsinella parabola* Barr. *Menocephalus ? (Tornquistia)* cf. *Nicholsoni* Reed.

Bronteidæ—*Bronteus Andersoni* Eth. and Nich., *B. craigensis* n. sp., *B. Grayi* n. sp. *Bronteus* sp. ind. (a) and (b). *Bronteopsis ardmillanensis* n. sp., *B. scotia* Salt.

Lichadidæ—*Lichas (Corydocephalus) anglicus* Beyr.
Lichas (Corydocephalus) Geikei Eth. and Nich.
Lichas (Corydocephalus) scutalis Salt.
Lichas (Corydocephalus) cf. *Wesenbergensis* Schm.
Lichas (Platylichas) Grayi Fletch., also var. *scoticus.*
Lichas (Platylichas) laxatus McCoy.
Lichas (Metopolichas) bulbiceps Phill. var. aff. *marginatus* Lindstr.
Lichas (Amphilichas) hibernicus Portl.
Lichas (Conolichas) cf. *aequiloba* Steinh. also sp. ind. (a).
Lichapyge ? problematica n. sp.

Acidaspidæ—*Acidaspis Barrandei* Fletch. and Salt., *A. callipareos* Wyv. Thom., *A. coronata* Salt., *A. deflexa* Lake, *A. Grayae* Eth., *A. hystrix* Wyv. Thom., *A. lalage* Wyv. Thom., *A. dalecarlica* Tornq.

Encronuridæ—*Encrinurus punctatus* Brunn var. *calcareus, arenaceus.*
Encrinurus multisegmatatus Portl. *Cybele* cf. *aspera* Linnrs., *C. bellatula* Dalm., *C. Loveni* Linrs. var nov. *girvanensis, C. verrucosa* Dalm., *C.* sp. ind. (a) and (b). *Dindymene cordai* Eth. and Nich.

Calymmenidæ—*Calymmene Blumenbachi* Brong. also var. *drummuckensis, C. cambrensis* Salt., *C. planimarginata* n. sp., *C.* sp. ind. (a) and (b).

Cheiruridæ—*Cheirurus bimucronatus* Murch., *C. gelasinosus* Portl., also var. *Cheirurus (Cyrtometopus) octolabatus* McCoy, *C. (Nieszkowskia) unicus* Wyv. Thom., *C. (Sphaerocoryphe) Thomsoni* n. sp., *C. (Youngia) tripinosus* Young. *Cheirurus* sp. (a) and (b). *Deiphon Forbesi* Barr. *Sphaerexochus mirus* Beyr. *Staurocephalus globiceps* Portl. *Pliomera* sp.

Phacophidæ—*Phacops (pterygometopus) Brongniarti* Portl.
Phacops (Phacopidella) Downingiae Murch.
Phacops (Phacopidella) elegans Sars and Boeck.
Phacops (Chasmops) Bisetti n. sp.

——— Sedgwick Museum Notes. New fossils from the Haverfordwest District.

Geol. Mag. London, Decade v, vol. 1, 1904, pp. 106-109, plate.
Phacops Robertsi n. sp.

REED (F. R. Cowper)—Continued

——— Sedgwick Museum Notes. New fossils from the Haverfordwest District. No. 2.

Geol. Mag. London, Decade v, vol. 1, 1904, pp. 383-388, plate.

Phacops (Dalmanites) socialis Barr. var. *P. (Dalmanites)* aff. *incertus* Deslong. *Phacops (Chasmops) conicophthalmus* Boeck. *Phacops (Chasmops) macroura* Sjogren. *Encrinurus multisegmentatus* Portl.

——— Sedgwick Museum Notes. New fossils from the Haverfordwest District. No. 3.

Geol. Mag. London, Decade v, vol. 2, 1905, pp. 97-104, plate.

Harpes sp.— *Ampyx* cf. *rostratus* Sars. *Remopleurides Salteri* Reed var. *girvanensis*. *Cyphaspis megalops* (McCoy), *C.* cf. *Harknessi* Reed. *Acidaspis (Ceratocephala) Turnbulli* nov., *A. (C.) sladensis* nov. *Lichas (Metopolichas) affins* Ang. var., *L. (M.) laciniatus* Dalm ? *L. (Platylichas) margiritifer* Nieszk. var. *Cheirurus (Pseudosphaerexochus)* aff. *subquadratus* Reed.

——— The classification of the genus Phacopidæ.

Geol. Mag. London, Decade v, vol. 2, pp. 171-178 and 224-228.

The author classifies the genus as follows:

1. Sub-family Dalmanitinae subgenera Dalmanitina:

SYNPHORIA. { Dalmanites sens str. Haumanannia. Asteropyge. Odontocephalus. Corycephalus. Malladaia. Coronura. Probolium. Cryphina.

2. Sub-family phacopinae. 2—Genus Phacops, subgenera Phacopidella:
   Phacops sens str.
   (Somatrikelon).
   Trimerocephalus.
3. Sub-family Pterygometopinae, Genus Pterygometopus:
   Subgenera Pterygometopus sens st.
   Chasmops.
   Homalops.
   Monorakos.

——— Sedgwick Museum Notes. Crustacea from Girvan.

Geol. Mag., Decade v, vol. 4, 1907, pp. 108-115, plate iv.

Anatifopsis balclatchiensis n. sp. *Pinnocaris curvata* n. sp. *Solenocaris solenoides* Young. *Ceratiocaris (Solenocaris?)* sp. *Helminthochiton Grayiae, H. Woodw. Chiton* sp.

——— Sedgwick Museum Notes. A new species of Lichas.

Geol. Mag., Decade v, 1907, vol. iv, pp. 396-400, plate xvii.

Lichas (Homolichas) melmerbiensis n. sp.

——— New fossils Heverfordwest.

Geol. Mag., Decade v, vol. v, 1908, pp. 433-436, pl. xiv.

Typhloniscus princeps n. sp.

The only species of this genus previously described was *T. Baini* Salter, from South Africa.

REED (F. R. Cowper)—Continued

——— A new species of Cyclus from the Carboniferous Limestone of Ireland.

Geol. Mag., Decade v, vol. v, 1908, pp. 551-552.

Cyclus simulans n. sp.

——— On *Phacops Weaveri*, Salter.

Geol. Mag., Decade v, vol. vi, 1909, p. 69.

Refers only the *Phacops Weaveri* Salt. Mong. Brit. Tril., plate iv, fig. 7, from Llandovery rocks of the Tortworth area.

——— Rocks of the Toumakeady District. Vii Palæontological Appendix.

Quart. Jour. Geol. Soc. London, vol. 65, 1909, pp. 151-152, pl. 6.

Illaenus Weaveri n. sp. closely resembles, *I. esmarkii* Schloth., *I.* aff. *chudleighensis* Holm., *Pliomera* aff. *Fischeri* Eichw., *P.* aff. *Barrandei* Billings.

Cybele connemarica n. sp. Encrinurus sp.

The author compares *E. varicostatus* Walc., and *E. vannulus* Clarke. It differs in the shape of the pygidium and course of the lateral ribs. Acidaspis sp. Apatocephalus sp. ? and *Telephus hibernicus* n. sp. also Symphysurus ? sp.

——— The Cambrian fossils of Spiti.

Memoirs Geol. Sur. of India, ser. xv, vol. 7, Memoir No. 1, Calcutta, 1910, 76 pp., plates 1-6.

The author describes the following species of Trilobites:

Agnostus spitiensis n. sp.

There are considerable affinities between this species and *A. acadicus* Hartt, also with *A. montis* Matthew.

Microdiscus: The author uses *M. punctatus* Salter for the type of the genus and not *M. quadricostatus* Emmons, certainly the young of the Trinucleus from the Hudson River group; and remarks, "Should *Pemphigaspis bullata* Hall, prove to belong to this genus, this name will have to be adopted as Emmons founded his genus Microdiscus on a young of another genus."

Matthew Trans. N. Y. Acad. Sci., 1896, p. 236, remarks, as a general rule, in the genus Microdiscus the number of rings in the axis of the pygidium increase according to the geological age of the species. The majority of those of the Olenellus zone have but few rings (4 to 6), but in the Paradoxides zone species with many rings (8 to 10, even 12) are multiplied.

He divides the genus into four Sections: With long glabella—Section 1, Lobatus; Section 2, Speciosus. With short glabella—Section 3, Dawsonia; Section 4, Eodiscus.

The following Himalayan species are described and illustrated:

Microdiscus Griesbachi sp. nov. The species agrees in general characters with *M. connexus* Walcott, *M. haimantensis* sp. nov. *Redlichia Noetlingi* Redlich.

The author remarks that this species is very closely related to *R. nobilis* Walcott. Indeed, it seems difficult to separate the new Chinese species *R. chinensis* Walcott, *R. finalis* Walcott and *R. nobilis* Walcott, by any strongly marked and constant features from the Indian species.

Zacanthoides indicus sp. nov. *Oryctocephalus Salteri* sp. nov., *O.* cf. *Reynoldi* Reed.

Under the genus Ptychoparia, Corda, 1847, the author remarks:

There has been extraordinary diversity in the use of the generic name Ptychoparia, and in spite of the recent efforts of palæontologists to bring order out of chaos it cannot be said that uniformity of usage prevails at the present date.

REED (F. R. Cowper)—Continued

He also remarks with regard to Ptychoparia that there happily cannot be any dispute as to the type of the genus, for Corda's first described species, *Ptychoparia striata* Emmrich, is well known and universally acknowledged.

Reed quotes Corda's original description of the genus and remarks that Pompeckj agrees with this strict limitation of the generic name Ptychoparia, but instead of regarding it as a subgenus of Conocephalites, as Wallerius did, prefers to place the latter as a subgeneric division of the genus, which is followed by the author with *C. Emmerichi* Barrande, as a type.

With regard to the genus Liostracus Angelin, the author quotes Matthew's divisions of the genus Ptychoparia and Liostracus, and remarks that the only constant differentiating feature of value is the shape of the genal angle, spined or rounded.

Matthew takes *L. aculeatus* as a type, but Brögger is followed by Wallerius in regarding the genal angles as typically spined, as in *L. costatus* Angelin. Reed places the genus as a subgenus to Ptychoparia.

Also Conocephalites, with *C. Emmrichi* Barrande, as a type. The leading characteristics of it are: 1—the long narrow eyes; 2—the position of the eyes near the glabella; 3—the course of the facial sutures, which behind the eyes run out almost horizontally before bending back; 4—the furrow on the eye lobes; 5—the absence of occular ridges; 6—the flat border.

The author describes *Ptychoparia spitiensis* sp. nov., *P. Stracheyi* sp. nov., *P. urceolata* sp. nov., *P. consocialis* sp. nov., *P. admissa* sp. nov., *P. pervulgata* sp. nov., *P. maopoensis* sp. nov., *P. defossa* sp. nov. *Ptychoparia (Liostracus)civica* sp. nov.

Subgenus Conocephalites: *Ptychoparia (Conocephalites) memor* sp. nov., *P. (C.) hesterna* nov. sp.

Subgenus *A. Ptychoparia hostilis* sp. nov., *P. praeterita* sp. nov.

Subgenus *B. Ptychoparia himalaica* sp. nov.

Bathyuriscus Stoliczkai sp. nov.

Dicellocephalus interpres sp. nov. *The author* compares it with *D. Dewinei* Billings and other species, remarking that *D. Dewinei* and *D. Hisingeri* of Billings cannot rightly be retained in the genus Dicellocephalus.

Genus Agraulos Corda, *A.* aff. *Roberti* Matthew, *A. simulans* sp. nov., *A. ? fervidus.*

Anomocare Angelin, 1854, *A. conjunctiva* sp. nov.

The peculiar course of the marginal furrow, so as to make a broad V in front of the glabella, occurs also in several species attributed to Ptychoparia, *P.* sp. *ind.* Walcott, from Yellowstone, and *P. teucer Billings.* The author compares *A. Angelini* Grönwall. Anomocare sp.

Schantungia Lorenz, 1906, *S.* cf. *frequens* Dames.

Reed remarks, that unfortunately the name Schantungia is apparently preoccupied, Walcott having employed it for a type of trilobites from China in 1905, but without a figure. If it is proved that the type of Walcott's Shantungia and Lorenz's Schantungia belong to different genera a new name must be given to this group or genus containing Dames' *C. frequens.*

Olenus haimantensis sp. nov.

The author compares *O. attenuatus* Boeck.

——— Palæontological Notes.

The Ordovician of the Glensaul District by C. I. Gardiner and S. H. Reynolds.

Quart. Jour. Geol. Sec. London, vol. 66, 1910, pp. 271-278, plates 20-2

The author describes *Illaenus Weaveri* Reed, *Niobe* sp. *Nileus armadillo* Dalman. *Bathyurellus glensaulensis* sp. nov.

This genus has not been previously recorded from the British Isles.

REED (F. R. Cowper)—Continued

The author compares *B. formosus* Bill., *B. expansus* Bill. and *B. brevispinus* Raymond. *Bathyurus* cf. *Timon* Bill., *B.* aff. *nero* Billings.

Pliomera pseudoarticulata Port. *Encrinurus octocostatus* sp. nov. *Phacop (Chasmops)* aff. *Odini* Eichwald.

——— Sedgwick Museum Notes. *Dionide atra*, Salter.

Geol. Mag., Decade 5, No. 5, vol. 9, p. 200, plate 11.

The author includes the *Trinucleus Ramsayi* Hick., 1875, under this species. The author remarks the many points of affinity possessed by the head shield with other genera, indicate the intimate relations of Dionide with Harpes, Harpides and Erinnys.

——— New fossils from the Dufton Shale.

Geol. Mag., Decade v, vol. 7, No. 5, 1910, p. 211, plates 16 and 17.

Trinucleus Nicholsoni sp. nov.

The author remarks: *T. ornatus* (Sternb.) Barrande seems closely allied to our Dufton species in the shape of the head shield, nuchal spine, pits in axial furrows, tubercle on glabella, and radial arrangement of the pits on the fringe, but these pits are more numerous and smaller.

Acidaspis semievoluta sp. nov. *Homalonotus ascriptus* sp. nov.

Ostracoda: *Beyrichi (Ceratopsis) duftonensis* sp. nov., *B. (Ctenobolbina) ? superciliata* sp. nov., *B. (Tetradella) Turnbulli* sp. nov.

——— Sedgwick Museum Notes. On the genus Trinucleus.

Geol. Mag. Decade v, vol. 9, p. 346, pl. 18, 1912.

The author discusses the fringe of Trinucleus, the double nature of the fringe, the character of the pits, arrangement of the pits. Difference in the upper and lower surfaces of the fringe, the outer and inner bands and the position of the girder.

The plate illustrates *Trinucleus concentricus* Eaton, *T. hibernicus, T. fimbriatus* Murch., *T. seticornis* His., *T. Nicholsoni* Reed, *T. subradiatus* Reed, *T. favus* Salter and *T. Murchisoni* Salter.

——— Sedgwick Museum Notes. On the genus Trinucleus.

Geol. Mag., Decade 5, vol. 9, pp. 385-394, pl. 19, part 2, 1912.

The author figures the upper and lower surface of fringe of five species of the genus Trinucleus.

Trinucleus hibernicus Reed, *T. fimbriatus* Murch., *T. Murchisoni* Salter, *T. Nicholsoni* Reed and *T. seticornis* Hisinger.

Reid (James) and **Macnair** (Peter). On the genera Psilophyton, Lycopodites, Zosterophyllum and Parka decipiens of the Old Red Sandstone of Scotland, their affinities and distribution.

Trans. Edinb. Geol. Soc., vol. 7, 1899, pp. 368-380.

Remelé (A.) Zwei neue Trilobiten aus undersilurischen Diluvial Geschieben von Eberswale.

Zeitschr. Deutsch Geol. Ges., vol. 37, 1885, p. 1032.

Rhinaspis erratica n. sp. and subgen. of Meglaspis.

Hydrocephalus Hauchecornei gen. et sp. nov. of Ampyx.

Remes (M. Poznamky). Trilobitech Celechovského Devonu.

Prostejove, 1913.

The author describes *Bronteus granulata* Goldf. *Lichas* cf. *armata* Goldf. *Cyphaspis ceratophthalmoides* Rud. Richter. *Proetus moravicus* Smycka. *Schizoproetus celechovicensis* Smycka (emend Rud. Richter).

REED (F. R. Cowper)—Continued

Dechenella subgen. Eudechenella n. gen.
Dechenalla (Eudechenella) rittbergensis. H. Zimmermann emend Rud. Richter.
The author illustrates *Cyphaspis ceratophthalmoides* Rud. Richter.

Reynolds (S. H.) Certain fossils from the Lower Palæozoic rocks of Yorkshire.

Geol. Mag. Decade iv, vol. 1, 1894, p. 108, plate 4.
The author illustrates *Staurocephalus* cf. *Murchisoni* Barr.—a pygidium. *Dindymene Hughesiae* Roberts MS., entire figure.
The author compares the new species with *D. ornata* Linrs., *D. Frederici Augusti* Barr., *D. Haidingeri* Barr and *D. Cordai* Eth. and Nich., remarking the differences in the number of large tubercles on the glabella in each and the new form.

Richter (Reinard) and **Unger** (Franz). Beitrag zur Paläontologie des Thuringer Waldes.

K. Akad. der Wissench. mathem. naturw Bd. cixi, 1856.
Cytherina: *Phacops ? granulatus* Münster. *Calymene marginata* Münster, *C. furcata* Münster.
Phacops cryptophthalmus Emm., *P. macrocephalus* Richter, *P. mastophthalmus* Richter Phacops sp.
Dalmanites punctata Steininger, Cylindraspis sp., *C. latispinosa* Sandb. Pygidium. ?
Cypridina serrato-striata Sandb., *C. globulus* Richter, *C. gyrata* Richter, *C. taeniata* Richter, *C. calcarata* Richter.

Richter (Rudolf). Beiträge zur Kenntnis devonischer Trilobiten ans. dem Rheinischen Schiefergebirge Vorbericht zu einer Monographie der Trilobiten der Eifel. Dissert, Marburg, 1909.

The author describes *Proetus Cuvieri* Steininger, 1831, including two var. *laevigata* Goldf. and *granulosa* Goldf. *Proetus cornutus* Goldf., referring *Proetus Holzapfeli* to the species. *Proetus tenuimargo* nov. for *P. cornutatus* Beyr. non Goldf. *Proetus (Tropidocoryphe) filicostus* Novák, 1890, *P. crassimargo* Römer.
Cyphaspis ceratophthalmus Goldf. and *C. hydrocephala* Römer.
Dechennella Verneuili Barr., *D. Burmeisteri* nov. for *Tril verticalis* Burmeister, 1843, pl. V, fig. 9a, not 9b. *Dechenalla Kayseri* nov., *D. Romanovski* Tschern, *D. Tschernyschewi* nov., *D. uralica* nov.
Harpes macrocephalus Goldf. refers *H. ungula* Burmeister, 1843, to this.
Lichas armata Goldf. var. *berolinensis* and *geesiana* nov. *Lichas beryllifera* nov., *L. parvula* Noväk, syn. *L. Haueri* Barr., pl. 28, fig. 38, non 39-40.
Acidaspis elliptica Burmeister refers *Arges armata* Goldf. 1839, pl. 33, fig. 1e and d, non a, b, c. *Odontopleura dentata* Goldf., 1843, and *Acidaspis armata* Römer, 1876, Atlas, pl. 31, fig. 7, to this species.
Acidaspis aries nov., *A. radiata* Goldf. refers *A. pilata Whidborne*, 1889, and *A. lacerata* Barr. to this species.
Cryphaeus rotundifrons Emm. the author refers C. laciniatus Roemer, and *C. acutifrons* Schlüter, to this species.
Cryphaeus Drevermanni nov. for *C. laciniatus* Drevermann, 1902. *Cryphaeus boopis* nov., *C. Kochi* Kayser, *C. Lethaeae* Kayser, for *Pleuracanthus laciniatus* Roemer, 1844, and that of Lethaea Pal. Atlas, pl. 25, fig. 10, 1876.
Cryphaeus diadema nov., *C. cometa* nov., *C. punctatus* Steininger, 1833, the *Calymmene archnoides* Höninghaus and other authors.

RICHTER (Rudolf)—Continued

Cryphaeus stellifer Burmeister, 1843.
Acaste Schmidti nov. *A. Henni* nov., *A. nolens* nov.

——— Das übergreifen der pelagischen Trilobitengattungen Tropidocoryphe and Thysanopeltis in das normale Rheinische Mitteldevon der Eifel und Belgiens.

Centralblatt für Mineral Geol. and Palæont. Jahrg., 1914, No. 3.

The author gives a figure in the text of *Tropidocoryphe Barroisi* Maillieux and refer to the genus *Tropidocoryphe ascania* (Corda), *T. memmon* (Corda), also *T. filicostata* Novák, the genotype.

The author figures *Thysanopeltis acanthopeltis* (Schnur.).

———Über das Hypostoma und einige Arten der Gattung Cyphaspis.

Centrabatt für Mineral Geol. Palæont. Jahrg., 1914, No. 10.

The author illustrates *Cyphaspis hydrocephala* Röm., *C. ceratophthalmus* Goldf., and two new species: *Cyphaspis ceratophthalmoides* and *stigmatophthalmus.*

——— Beiträge zur Kenntnis devonischer Trilobiten.

1 Die Gattung Dechenella und einige verwandte Formen. Abhandl d. Senckenb. Natuf. Gesellsch, Bd. 31, 1913, 9 text figures, 4 plates.

The author divides the Dechenella into one new genus and three subgenera:

(A.) Basidechenella nov. subg.
(B). Eudechenella nov. subg.
(C.) Paradechenella nov. subg.
(D.) Dechenella.
(E.) Schizoproetus nov. gen.

Under the subgenus Basidechenella the author places:
Dechenella (Basidechenella) Kayseri Rud. Richter.
D. (B.) dombrowiensis Gürich, *D. (B.) onyx* nov.
Dechenella sp. Beushausen and D. sp.
Under the subgenus Eudechenella.
Dechenella (Eudechenella) Verneuili Barrande, syn. *Archegonus aequalis* Steininger, 1853, and *Phillipsia verticalis* Kayser, 1878.
Dechenella (Eudechenella) aff. *Verneuili* sp. A-B-C.
Dechenella (Eudechenella) Burmeisteri Rud. Richter syn. *Phillipsia verticalis* Kayser, 1878; *Tril. verticalis* Schlüter, 1880.
Dechenella verticalis Oehlert, 1885, Kayser, 1880, and Asselbergs, 1912, under *Dechenella Verneuili* Kayser, 1880, Oehlert, 1885, Schmidt, 1905.
Dechenella (Eudechenella) granulata n. sp.
Dechenella (Eudechenella) rittergensis Zimmermann, 1892.
Dechenella (Eudechenella) setosa Whidborne, 1889.
Dechenella (Eudechenella) Romanovski Tschernyschew, 1887.
Dechenella (Eudechenella) Polonica Gürich, 1896.
C. Under the subgenus Paradechenella the author describes:
Dechenella (Paradechenella) Tschernyschewi Rud. Richter, 1909.
Dechella hofensis Leyh., 1897.
Dechenella waigatschensis Tschernyschew and Yakovlew, 1898.
Dechenella disjecta n. sp.
Dechenella dubia n. sp.
Phillipsia (Dechenella) cfr. *setosa* (Whidborne) *Gortani.*
Dechenella incerta Oehlert, 1889.
Proetidarum genus *uralicum* (Rud. Richter) the *Dechenella Haldemanni* Tschernyschew (non Hall), 1887.

RICHTER (Rudolf)—Continued

Under the new genus Schizoproetus the author places:
Schizoproetus celechovicensis (Smycka), 1895.
The work also includes notes on *Proetus unguloides* Barr. and *Phillipsia raclawicensis* Jarosz. The first referred by Gortani, 1907, to Dechenella, and the second by its author to that genus.

——— Beiträge zur Kenntnis devonischer Trilobiten.

Abbhandl der Senckenbergischen Nat. Ges. Bd. 31, 1913, pp. 346-423, plates 22 and 23.

The author describes and illustrates under (A.) Drevermannia n. genus, *D. Schmidti* n. sp., *D. brecciae* n. sp., *D. adorfensis* n. sp., *D. nodannulata* n. sp., *D.* n. sp., a, b, *D. globigenata* n. sp., *D. carnica* n. sp., *D. ? formosa* nov.

Under (B) Cyrtosymbole, new genus, the following species:
Cyrtosymbole Escoti Koenen, 1886; described under the genus Dechenella by Koenen Frech in 1887.

Cyrtosymbole n. sp., *C. nana* n. sp., *C. calymmene* n. sp., *C. bergica* n. sp., *C. wildungensis* n. sp., *C. Ussheri* Ivor Thomas *(Dechenella Ussheri* Thomas, 1909).

Cyrtosymbole dillensis (described by Drevermann, 1901, under Proetus), *C. pusilla* (described by Güirich, 1896, under Dechenella), *C. elegans* (described by Münster, 1842, under the genus Otarion), *C. Vinassai* (described by Gortani, 1907, under Dechenella), Cyrtosymbole sp., *C. italica Gortani.*

Under (C) Typhloproetus Frech nomen MSS.: *T. microdiscus* Frech mscr., 1909.

Under (D) Pteroparia n. gen., *P. columbella* n. sp.

Under (E) Proetus (Euproetus) nov. subgen. *Euproetus bivallatus* n. sp. and *E. glacensis* n. sp.

Under (F) Proetidae (subg.): *P. subcarintiacus* n. sp., *P. carintiacus* Drevermann, *P.* ex. aff. *carintiacus* Drevermann, *P. pusillus* Münster, (described under Asaphus Münster, 1840), *P. ebersdorfensis* n. sp., *P. Gortanii* n. sp., *P. palensis* n. sp., *P. Gümbeli* (The *Asaphus Cawdori* Münster, 1840), *P. anglicus* n. sp., *P. eurycraspedon* n. sp., *P. marginatus (Calymmene marginata* Münster, 1842).

Under (G) *Euproetus macrophthalmus (Cylindraspis macrophthalmus* Sandberger, 1850-56.):
Proetus (subg.) *furcatus (Calymmene furcata* Münster, 1842).
Proetus (Calymmene) furcatus Richter, 1856, non Münster.
Proetus Münsteri (Calymmene marginata Richter and Unger, 1856).
Proetus Münsteri (Calymmene marginata Münster, Richter, 1869).
Proetus (Otarion) elegans Richter, 1869: *P. tenellus* Richter, 1869, Proetus (subg.) n. sp. a-c.

Trilobites Münsteri Gümbel, 1879. *(Agnostus pisiformis* Münster, 1840).

Proetus sp. indet. Tietze, 1870; *Proetus* cfr. *Phocion* Billings Gortani, Proetus sp. indet. Gortani, Proetus f. ind. Rzehak. *Proetus aekensis* Born, 1912, *P.* sp. Born.

——— Neue Beobachtungen über den Bau der Trilobitengattung Harpes.

Geol. Anzeiger, Ba. 45, No. 4, 1914.
Harpes macrocephalus Goldfuss.

Ritter (R.) 1—Aus dem thüringischen Schiefergebirge.

Zeitsch. Deutsch. Geol. Ges., vol. 15, Heft 4, 1863, pp. 659-676, plates 18-19.

Harpes radians n. sp. *Proetus dormitans* n. sp., *P.* sp. *Phyllaspis raniceps* n. gen. et sp. *Arethusina* sp. *Phacops strabo* n. sp., *P. pyrifrons* n. sp., *P. Roemeri* Geinitz,

RITTER (R.)—Continued

P. liopygus n. sp. *Acidaspis myops* n. sp. *Beyrichia (Leperditia) armata* n. sp., *B. Klöedni* McCoy, *B. subcylindrica* nov.

Corrections for reference on page 184, Bibliography Palæozoic Crustacea.

——— Der Kulm in Thuringen.

Zeitsch. Deutsch. Geol. Ges., 1864, p. 155.

Proetus posthumus n. sp. *Cythere spinosa* n. sp.

——— Untersilurische Petrefakten aus Thuringen.

Zeitsch. Deutsch. Geol. Ges., 1872, p. 72.

Calymmene sp. *Asaphus marginatus* n. sp. *Beyrichia excavata* n. sp.

Roberts (George L.) On some Crustacean Tracks from the Old Red Sandstone near Ludlow.

Quart. Jour. Geol. Soc., vol. 19, 1863, pp. 233-235.

——— and **Randall** (John). On the Upper Silurian Passage beds at Linley, Salop.

Quart. Jour. Geol. Soc., vol. 19, 1863, pp. 229-232.

Roemer (F.) Geoghostische Beobachtungen im polnischen Mettlelgebirge.

Zeitschr. d. Deutsch Geol. Ges., Bd. xviii, 1866.

Phacops cryptophthalmus Emm. Roemer's pl. xiii, figs. 6-7, has been described by Prof. Frech as *Phacops (Trimerocephalus) anophthalmus* n. sp. Lethaea Palæozoica, Bd. 2, pp. 124, 178, 179, 180.

——— *Eurypterus lacustris* von Buffalo, New York.

55 Jahrester der schles Ges., 1877.

Rogers (Austin F.) Some new American species of Cycles from the Coal Measures.

Contributions Geol. Dept. Columbia Univ., No. 88, vol. X, 1902.

Kansas Univ. Bull., vol. 1, 1902, pp. 269-275, plate 14.

Cyclus communis n. sp., *C. Packardi* n. sp., *C. permarginatus* n. sp., *C. limbatus* n. sp., *C. minutus* n. sp.

Rouault (Marie). Notice sur quelques especies de fossiles du Terrain Devonien du nord du Dept. de la Manche.

Bull. Soc. Geol. France, vol. 12, 1855, p. 1040.

Homalonotus Forbesi n. sp.

Add to the reference on p. 190, Bib. Pal. Crust., under Mem. Palæozoques des environs de Renness, 1851, the following species: *Cyphaspis Gaultieri* n. sp. *Phacops Michelini* n. sp. and *Beyrichia Hardouinina* n. sp.

Rowley (R. R.) Descriptions of Fossils.

Contributions to Indiana Palæontology, Green, New Albany, vol. 2, part 2, pp. 21-31, plate, 1906.

Gives systematic descriptions of various species of Trilobites and Crinoids.

——— The Geology of Pike County.

Missouri Bureau of Geol. and Mines, vol. 8, 2nd series, 1907, 122 pp., 20 plates and map.

ROWLEY (R. R.)—Continued

The author notes and illustrates the following Ordovician Trilobites:

Illaenus taurus Hall. *Asaphus gigas* DeKay, *A. megistos* Locke. *Lichas trentonensis* Conrad, Illaenus sp.

Carboniferous Crustaceans Phillipsia *Strantton Porteri* n. sp., *P. Missouriensis* Shumard.

Ruedemann (Rudolf). Trenton conglomerate of Rysedorph Hill, Rensselaer County, New York, and its fauna.

Bull. N. Y. Museum, No. 49, 1901, pp. 3-114, plates 1-7.

Tretaspis reticulatus n. sp., *T. diademata* n. sp.

These species are specially characterized by the presence of the glabellar pits, the apical tubercle on the glabella and the ocular tubercles, the eye lines, the deep dorsal furrow, and the structure and profile of the marginal border. *T. seticornis* His. is the typical form.

Ampyx (Lonchodomas) hastatus n. sp. *Remopleurides tumidus* n. sp., *R. (Caphyra) linguatus* n. sp. *Isotelus maximus* Locke. *Gerasaphes Ulrichana* Clarke. *Illaenus Americanus* Bill. *Thaleops ovata* Conrad. *Cyphaspis matutina* n. sp., *C. hudsonica* n sp. *Bronteus lunatus* Bill. *Cybele* sp. *Calymmene senaria* Conrad. *Ceraurus pleurexanthemus* Green. *Sphaerocoryphe major* n. sp. *Dalmanites achates* Bill. *Pterygometopus eboraceus* Clarke, *P. callicephalus* Hall.

Ostracoda: *Leperditia fabulites* Conrad, *L. resplendens* n. sp. *Isochilina armata* Walc. var. *pygmaea* n. var. *Aparchites minutissimus* Hall var. *robustus* n. var. *Schmidtella crassimarginata* Ulrich var. *ventrilabiata* n. var. *Eurychillina reticulata* Ulrich, *E. bulbifera* n. sp., *E. ? solida* n. sp., *E. subradiata* Ulrich var. *rensselaerica* nov., *E. dianthus* nov., *E. ? anthus* n. sp., *E. obliqua* n. sp., *Primitia mundula* Miller var. *Jonesi* n. var. *Bollia cornucopiae* n. sp. *Macronotella Ulrichi* n. sp., *M. fragaria* n. sp. *Bythocrypris cylindrica* Hall. *Lepidocoleus Jamesi* H. & W.

——— The Lower Siluric shales of the Mohawk Valley.

N. Y. State Museum Bull., 162, 1912.

The author illustrates *Eoharpes ottawansis* Billings.

Proetus undulostriatus Hall.

This is the *Olenus undulostriatus* Hall describes in Pal. N. Y., 1847, p. 258, pl. 67, fig. 3 a-b. The author doubtfully refers *Proetus parviusculus* Hall, of the 13th Report N. Y. State Mus., 1860, p. 120, and the *Proetus parviusculus* Ruedemann, Bull. 42, 1901, p. 536, and *Cyphaspis hudsonica* Ruedemann, Bull. 49, 1901, p. 64, pl. 4, figs. 8 and 9, to this species.

Acidaspis crossota Locke. *Calymmene senaria* Conrad. *Isotelus gigas* DeKay.

Ostracoda: *Ulrichia bivertex* Ulrich. *Eurychilina subradiata* Ulrich. *Primitiella unicornis* Ulrich var. *Ceratopsis chambersi* Miller var. *Technophorus cancellatus* nov. *Pollicipes siluricus* Ruedemann, a barnacle from Snake Hill beds of Green Island, New York.

——— Palæontologia Universalis, Fac. 1, Ser. IV. Dr. Jacob Green's original of description North American Trilobites.

Calymene callicephala, original specimen N. Y. State Museum, pl. 233.

Calymene platys, original specimen N. Y. State Museum, pl. 234.

Asaphus micrurus, original specimen N. Y. State Museum, pl. 235.

Ceraurus pleurexanthemus, original specimen N. Y. State Museum, pl. 236.

The author quotes Dr. Green's monograph Trilobites of North America, published Oct. 1, 1832, for original description of the species illustrated. This is an error. The Synopsis of the Trilobites of North America, issued in June, 1832, in The Monthly

RUEDEMANN (Rudolf)—Continued

American Journal of Geology and Natural Science, pp. 558-560, plate 14, was the original publication in which Dr. Green figures *Asaphus micrurus,* fig. 3, and *Ceraurus pleurexanthemus,* fig. 10.

——— Account of some new or little known species of fossils, mostly from Palæozoic rocks of New York.

Bull. New York State Mus., No. 189, 1916.

The author describes the following Crustacea:

Agnostus Cushingi nov.

It differs from *A. Newtonensis* Weller and its congeners in the broad, anteriorly well-rounded convex cranidium and obscure glabella.

Amphilichas conifrons nov.

This species differs from *A. Trentonensis* Hall, in the entirely different outline of the middle lobe of the glabella, which in the former is widest behind and in the new species broadens forward.

Ceratiocaris (Liminocaris) salina nov.

Spathiocaris Emersoni Clarke.

These specimens differ markedly from the strange valves figured with *S. Emersoni* on plate 34, fig. 13, Pal. N. Y., vol. 7, which latter possesses a much broadened flat posterior fold and a very shallow anterior notch. The author makes a new species of this form, referring it to *Pholadocaris Lutheri.*

Spathiocaris lata nov., *S. chargrinensis* nov., *S. Cushingi* nov., *S. Williamsi* nov. This is of larger size than the congenors and is readily distinguished by its broad form and coarse lines.

On p. 98 the author gives a discussion on the genera Spathiocaris and the Discinocarina and certain organic bodies called Cardiocaris, Pholadocars, etc., by Woodward and Clarke, considered as Crustaceans by other authors (Roemer, DeVerneuil, Kayser and Dames) as aptychi of Goniatites.

Lepidocoleidae. *Anatifopsis Wardelli* nov.

Pseudoniscus.

The eyes of this genus have for some time been an object of speculation. Nieszkowski, pl. 2, fig. 15, who first described a Pseudoniscus, figured a small incision along the edge of the fixed cheek as place for the eye; Eichwald Lethaea Ross, p. 1445, speaks there of large lunular eyes, and Woodward, Mong. of the Merostoma, p. 177, fig. 65, restored the cephalon completely with eyes.

The author describes. *Pseudoniscus Roosevelti* Clarke and *P. Clarkei* nov., a Bertie Waterline species.

Echinognathus Clevelandi Walcott. *Eusarcus trigonus* nov.

Article II. Notes of the habitat of the Eurypterids.

Article IV. A new Ceraurus from the Chazy, by Percy E. Raymond. *Ceraurus Reudemanni* nov.

Article V. The presence of a median eye in Trilobites.

Gives figures in text of *Isotelus gigas* and *Basilicus tryannus.* It is claimed in this paper that most, if not all, Trilobites possessed a median or parietal eye on the glabella. A great number of species, belonging to more than 30 genera, possess a distinct tubercle on the glabella. This tubercle occurs alone in many genera otherwise smooth, as in Asaphidae and is hence of functional importance. The author gives a list of the species with median eye tubercles.

Article VI. The cephalic suture lines of Cryptolithus.

The author gives figures in the text of *Dionide formosa* Barr., *D. atra* Salter and *Cryptolithus tesselatus* Green. The author concludes that these genera are not Hypo-

RUEDEMANN (Rudolf)—Continued

peria, but belong among the families of Opisthoparia. The figure of *Cryptolithus tesselatus* shows the lateral facial suture and the lateral eye tubercle, also median eye tubercle.

Plate 36 contains a few figures of various genera of Trilobites with median eye tubercle, such as:

Isoteloides homalonotoides Walc. *Symphysurus convexus* Cleland. *Basilicus Kegelensis* Sch. *Symphysurus angustatus* S. & B. *Asaphellus monticola* Raym. *Asaphus ludibundus* mut. *jewensis* Schm. *Hemigyraspis collicana* Raym. *Nileus Armadillo* Dalm. *Ceratopyge forficula* Sars. *Niobe insignis* Linrs. *Barrandia crassa* Barr. *Æglina umbonata Illaenus oriens* M. & S. *Bronteus Haidingeri* Barr.

——— and **Clarke** (John M.) Catalogue of the type specimens of Palæozoic Fossils in New York State Museum.

Bull. New York State Museum, No. 65, 1903.

Crustacea, pp. 658-765 and 814.

Classification of the type specimens by geologic formations, pp. 815-847.

Sarle (Clifton J.) A new Eurypterid fauna from the base of the Salina of Western New York.

Bull. New York State Mus., No. 69, 1903, pp. 1087-1108, pls. 6-26.

The author proposed a new genus Hughmilleria for a small form, which from its general appearance in many ways suggests the genus Eurypterus, but a study of its structure shows it to be closely related to Pterygotus.

The author described *Hughmilleria socialis* nov. and var. *robusta* nov. var. A new species of Eurypterus is included under the name of *E. pittsfordensis*, which closely resembles *E. lacustris*, approximately of the same size, also in the position and shape of the eyes. The posterior portion of the cephalon flares out in *E. pittsfordensis*, or at least broadens out in a hyperbolic curve, while *E. lacustris* is marked by the nearly parallel sides of the cephalon.

The author also describes *Pterygotus monroensis* nov.

Savage (T. E.) Stratigraphy and Palæontology of the Alexanderian series in Missouri and Illinois, part one.

Bull. No. 23, State Geol. Sur. Illinois, 1913, 124 pp., with 7 plates.

The author describes *Proetus princeps* n. sp. This rare specimen from the Thebes, Illinois, has a glabella resembling that of *P. determinatus* Foerste, and differs but slightly from the Edgewood species. From the Girardeau limestone, Shumard, Geol. Mo., 1855, p. 198, gives the name of *Proetus depressus* to a species without figure or description. This is not the *P. depressus* Weller, Pal. N. J., vol. 3, p. 249.

The author also describes *Cyphaspis girardeauensis* Shumard. *Acidaspis Halli* Shumard. *Encrinurus deltoideus* Shumard and *Calymmene dubia* n. sp., which resembles *Calymmene platycephala* Foerste.

From the Edgewood series of Illinois the author describes:

Proetus determinatus Foerste, described as Bathyurus Foerste in the Bull. Lab. Den. Univ. vol. 1, p. 103, pl. 14, fig. 5, 1885.

Cyphaspis intermédia Weller, and *Metapolichas breviceps* var. *clintonensis* Foerste.

Dalmanites Danai Meek and Worthen.

The species resembles *D. limulurus* Green, but somewhat larger.

From Channahon, Illinois, the author describes *Proetus channahonensis* Weller. It has a more prominent glabella and deeper glabella furrows than *P. determinatus* Foerste.

SAVAGE (T. E.)—Continued

Cyphaspis intermedia Weller, *Metapolichas ferrisi* Weller, and a new species of Ostracoda, *Leperditia illinoisensis*—shell differing from *Leperditia faba,* in being shorter and more nearly circular in outline.

——— Some interesting new species of Arthropods from the Devonian strata of Illinois.

Am. Jour. of Science, vol. 35, 1913, p. 149-152, figures.

The author describes *Lepidocoleus Illinoisensis* n. sp. a barnacle from the Clear Creek of Union County Oriskany chert and a new trilobite *Dalmanites palaceus.* This shovel form closely resembles *D. tridentiferus* Shumard, but the anterior extension is short and concave with margin entire instead of having that extension prolonged into a three-lobed process.

——— Alexandrian Rocks of Northeastern Illinois and Eastern Wisconsin.

Bull. Geol. Soc. Am., vol. 27, 1916, pp. 305-344, pls. 15-17.

Eurypterus pumilus nov.

Schlüter (Clemens). Neuere Arbeiten über die ältesten Devon Ablgerungen des Hartz.

Verdhandl, des Naturhist, Verenins der preuss. Rheinl. und Westfalens, vol. 35, Jahrg. 4, Folge V, Bd. p. 330.

Gives a list of Fossil Crustacae.

Schmidt (Friedrich). Physikalische Section.

Sitzungsb. d. niederrhein Gesellschaft, in Bonn, 1881.

The author describes *Cryphaeus limbatus,* p. 77, and *C. acutifrons* nov., p. 144, and *C. rotundifrons* Emm.

Richter refers the last two species to *Cryphaeus rotundifrons* from the Eurypterus beds of Oesel, and compared them with those of North America.

——— Ueber die neue Merostomenform *Stylonurus Simonsoni* aus dem Obersilur von Rootzküll auf Oesel.

Bull. Acad. Imp. Sci. de St. Petersb. ser. 5, vol. 20, No. 3, p. 199.

——— Revision der Ostbaltischen Silurischen Trilobiten. Abtheilung V, Asaphiden Lieferung 1.

Mem. Acad. St. Petersburg, 8th ser., vol. 6, No. 11, 1898.

Gen. Asaphus Brong. emend. Ang.

Asaphus expansus Dalm. and var. *lepidura* Nieszk., *A. raniceps* Dalm., *A. Broggeri* n. sp., *A. pachyophthalmus* n. sp., *A. platyurus* Ang., *A. Kowalewskii* Lawr., *A. Eichwaldi* n. sp., *A. cornutus* Pander, *A. laevissimus* n. sp., *A. latus* Pander, *A. delphinus* Lawr., *A. ornatus* Pomp., *A. devexus* Eichw., *A. Nieszkowskii* n. sp. Mut. *Itferensis* Mut. *Jewensis* Mut. *Kegelensis, Asaphus Stacyi* n. sp.

Subgen. Onchometopus Schmidt.

Onchometopus Volhorthi n. sp.

Subgen. Ptychopyge Angelin.

Ptychopyge angustifrons Dalm., *P. excavato-zonata* Ang. and var. *truncata* Nieszk., *P. limbata* Ang. ? *P. Lawrowi* n. sp., *P. Kuckersiana* n. sp., *P. globifrons* Eichw., *P. tectieaudata* Steinh.

Gen. Isotelus Dekay.

Isotelus remigium Eichw., *I. platyrhachis* Steinh., *I. robustus* Rom.

SCHMIDT (Friedrich)—Continued

Gen. Niobe Angelin.

Niobe laeviceps Dalm., *N. frontalis* Dalm.

Megalaspis planilimbata Ang., *M. limbata* Boeck, *M. polyphemus* Brogg., *M. Kolenkoi* n. sp., *M. Mickwitzi* n. sp., *M. hyorhina* Herz. v. Leucht., *M. gibba* n. sp., *M. Lawrowi* n. sp., *M. longicauda* Herz. v., Leucht. (mit *M. gigas* Ang.), *Meglaspis extenuta* Wahlb., *M. acticauda* Ang., *M. heros* Dalm.

Gen. Nileus Dalman.

Nileus Armadillo Dalm.

——— Revision der Obstbaltischen Silurischen Trilobiten. Abtheilung V. Asaphiden Lieferung II.

Mem. Acad. St. Petersburg, 8th ser., vol. 12, No. 8, 1901, 12 plates.

Asaphus Broggeri n. sp., *A. expansus* Dalm., *A. lepidurus* Nieszk., *A. raniceps* Dalm. var. *Lamanskii* and var. *acuminata* Boeck.

Asaphus pachyopthalmus n. sp. var. *minor* and var. *major, A. Eichwaldi* n. sp. var. *Knyrkoi, A. delphinus* Lawr., *A. cornutus* Pand. and var. *Holmi, A. Kowalewskii* Lawr., *A. platyurus* Ang., *A. laevissimus* n. sp. and var. *laticauda, A. latus* Pand. and var. *Plautini, A. devexus* Eichw., *A. ornatus* Pomp., *A. ludibundus* Torq. mut. *Itferensis* mut. *jewensis* mut. *Kegelensis.*

Onchometopus Volborthi n. sp.

Gen. Isotelus Dekay.

Isotelus remigium Eichw., *I. platyrhachis* Steinh., *I. robustus* F. Rom., *I. Stacyi* n. sp.

Gen. Niobe Angelin.

Niobe laeviceps Dalm., *N. Lindstromi* n. sp., *N. frontalis* Dalm.

——— Communication before the Section of Geology and Mineralogy, Oct. 19, 1902, announcing the discovery of *Eurypterus simonsoni.*

Comptes rendus des Sci. in Travaux de la Soc. Imp. de Nat. de St. Petersburg, vol. 33, livr. 1, No. 6, 1902, pp 202-3, in Russian.

——— Ueber die neue Merostomenform *Stylonorus simonsoni* aus dem Odersilur von Rootzküll auf Oese.

Bull. Acad. Imp. de Sci. St. Petersburg, vol. 20, No. 3, ser. V, 1904, pp. 99-105, plate.

——— Revision der Ostbaltischen Silurischen Trilobiten. Abtheilung V, Asaphiden Lieferung III.

Mem. Acad. St. Petersburg, 8th. ser., vol. 14, No. 10, 1904, 8 plates.

Gen. Ptychopyge Angelin.

Subgen. Pseudasaphus.

Pseudasaphus globifrons Eichw., *P. ? Mickwitzi* n. sp., *P. tecticaudatus* Steinh. and var. *praecurrens.*

Subgen. Basilicus Salter.

Basilicus Lawrowi n. sp., *B. kuckersianus* n. sp., *B. keyelensis n.* sp.

Subgen. Ptychopyge sens. str.

Ptychopyge angustifrons Dalm. and var. *gladiifera, P. truncata* Nieszk. and var. *Broggeri, P. cincta* Brogg., *P. Plautini* n. sp., *P. Wohrmanni* n. sp., *P. Knyrkoi* n. sp., *P. Pahleni* nov.

Gen. Ogygia Brongniart auct.

Ogygia dilatata Brunn var. *Panderi* n. var. and var. *Plautini.*

Gen. Nileus Dalman.

Nileus Armadillo Dalm.

SCHMIDT (Friedrich)—Continued

——— Revision der Ostbaltischen Silurischen Trilobiten. Abtheilung V, Asaphiden Lieferung IV.

Mem. Acad. St. Petersburg, 8th ser., vol. 19, No. 10, 1906, 8 plates.

Megalaspis planilimbata Ang. and var. *Leuchtenbergi* Lam., *M. limbata* Boeck and var. *elongata, M. Lawae* n. sp., *M. polyphemus* Brögg. aff. and var. *Tornquisti* var. *minor* var. *Lamanskii* and var. *Knyrkoi, M. hyorhina* Leucht. also var. *Kolenkoi, Mickwitzi* and *Stacyi.*

Megalaspis Pogrebowi Lam., *M. Knyrkoi* n. sp., *M. gibba* n. sp., *M. acuticauda* n. sp. also var. *typica, obtusa, triangularis* and *Lamanskii.*

Megalaspis extenuata Dalm., *M. heros* Dalm., *M. centaurus* Dalm. and var. *rudis, M. Lawrowi* n. sp.

——— Revision der Ostbaltischen Silurischen Trilobiten.

Memoiries Acad. Imp. des Science de St. Petersburg, vol. xx, No. 8, 1907.

Phacops elliptifrons Esm., *P. Downingiae.* Murch. *Pterygometopus.*

Phacops sclerops Dalm., *P. trigonocephala* F. S., *P. Panderi* F. S., *P. exilis* Eichw., *P. laevigata* F. S., *P. Kuckersina* F. S., *Kegelensis* F. S., *P. Nieszkowskii* F. S.

Subgenus Chasmops. *Phacops ingrica* F. S., *P. nasuta* F. S., *P. praecurrens* F. S., *P. Odeni* Eichw., *P. Odini* var. *itferensis* F. S., *P. marginata* F. S., *P. bucculenta* Sjogr., *P. Wrangeli* F. S., *P. brevispina* F. S., *P. mutica* F. S., *P. Wenjukowi* F. S., *P. maxima* F. S., *P. Wesenbergensis* F. S., *P. Eichwaldi* F. S.

Cheirurus ornatus Dalm., *C. ingricus* F. S., *C. exsul* Beyr., *C. macrophthalmus* Kut., *C. gladiator* Eichw., *C. spinulosus* Nieszk., *C.* cf. *glaber* Ang.

Subgenus Crytometopus. *Cheirurus primigenus* var. *Lamanskii* Ang., *C. clavifrons* Dalm., *C. affins* Ang., *C. Plautini* F. S., *C. aries* Eichw., *C. Pseudohemicranium.*

Subgenus *Sphaerexocoryphe cranium* Kut., *S. Hubneri* F. S., *S.* cf. *granulata* Ang.

Subgenus *Pseudosphaerexochus hemicranium* Kut., *P. conformis* Ang., *P. Pahnschi* F. S., *P. Roemeri* F. S.

Subgenus *Nieszkowskia tumida* Ang., *N. variolaris* Linrs., *N. cephaloceros* Nieszk.

Sphaerexochus angustifrons Ang. *Deiphon Forbesi* Barr.

Amphion Fischeri Eichw., *Diaphanometopus Volborthi* F. S.

Crotalurus Barrandei Volb.

Cybele bellatula Dalm., also var. *Wohrmanni* F. S., *C. Panderi* F. S., *C. Revaliensis* F. S., *C. rex* Nieszk., *C. Grewingkii* F. S., *C. coronata* F. S., *C. Worthi* Eichw., *C. affinis* F. S., *C. Kutorgae* F. S., *C. brevicauda* Ang.

Encrinurus obtusus cf. Ang., *E. punctatus* Wahlb., *E. multisegmatatus* Portl., *E. Sechachi* F. S.

Acidaspis Marklini Ang., *A. Kuckersiana* F. S. and var. *Mickwitzi* F. S. *Lichidae* subgen. Arges *Lichas wesenbergensis* F. S.

Subgen. Leiolichas. *Lichas illaenoides* Neiszk.

Subgen. Platymetopus. *Lichas lineatus* Ang., *L. dalecarlicus* Ang., *L. Holmi* F. S.

Subgen. Metopias. *Lichas celorhin* Ang., *L. verrucosus* Eichw., *L. pachyrhinus* Dalm., *L.* var. *longerostrata* F. S., *L. platyrhinus* F. S., *L. Hübneri* Eichw., *L. Kuckersianus* F. S.

Subgen. Hoplolichas. *Lichas tricuspidatus* Beyr. and var. *longispina L. Plautini* F. S., *L. furcifer* F. S., *L. conicotuberculatus* Nieszk.

Subgen. Conolochas. *Lichas triconicus* Dam., *L. aequilobus* Steinh., *L. schmidtii* Dam.

Subgen. Ceratolichas. *Lichas inexpectatus* F. S.

Subgen. Homolichas. *Lichas depressus* Ang., *L. Pahleni* F. S., *L. deflexus* Sjogr., *L. Eichwaldi* Nieszk., *L. angustus* Beyr.

SCHMIDT (Friedrich)—Continued

Subgen. Oncholichas. *Lichas ornatus* Ang., *L. gotlandicus* Ang.

Subgen. Platylichas. *Lichas St. Mathiae, L. margaritifer* Nieszk., *L. docens* F. S., *L. cicatricosus* Lov., *L. hamatus* F. S., *L. laxatus* McCoy.

Illanus Esmarcki Schl., *I. sphaericus* Holm., *I. jewensis* Holm., *I. laticlavius* Eichw., *I. chiron* Holm., *I. intermedius* Holm., *I. crassicauda* Waldh., *I. tauricornis* Kut., *I. ariensis* Holm., *I. sulcifrons* Holm., *I. Plautini* Holm., *I. revaliensis* Holm., *I. Dalmani* Volb., *I. oculosus* Holm., *I. chudleighensis* Holm., *I. sinuatus* Holm., *I. Schmidtii* Nieszk., *I. ladogensis* Holm., *I. oblongatus* Ang., *I. Roemeri* Volb., *I. angustifrons* Holm., *I. atavus* Eichw., *I. Masckei* Holm., *I. centrotus* Dalm., *I. Linnarssoni* Holm., *I. proles* Holm., *I. livonicus* Holm., *I. triquetrus* Volb., *I. caecus* Holm.

Subgen. Bumastus. *Illaenus barriensis* Murch., *I. sulcatus* Lindstr.

Calymmendiae: *Calymmene tuberculata* Brunn., *C. intermedia* Linstr., *C. frontosa* Lindstr., *C. laevigata* F. S., *C. conspicua* F. S., *C. spectabilus* Ang., *C. Stacyi* F. S.

Subgen. Pharostoma. *Calymmene pedibola* F. Rom., *C. Nieszkowskii* F. S., *C. denticulata* Eichw.

Subgen. Ptychometopus. *Calymmene Volborthi* F. S.

Bronteidae: *Bronteus laticauda* Wahl., *B. estonicus* F. S., *B. Marklini* Ang.

Proetidae: *Proetus concinnus* var. *Osiliensis* F. S., *P. verrucosus* Lindstr., *P. conspersus* Ang., *P. planedorsatus* F. S., *P.* cf. *distans* Lindstr., *P. ramisulcatus* Nieszk., *P. Kertelensis* F. S., *P. Wesenbergensis* F. S., *P. Wöhrmanni* F. S.

Cyphaspis elegantula Lov., *C. planifrons* Eichw.

Menocephalus minutus Nieszk.

Harpedidae: *Harpides Plautini* F. S.

Harpes Spasskii Eichw., *H. Wegelini* Ang.

Trinucleus seticornis His.

Ampyx Volborthi F. S., *A. Linnarssoni* F. S., *A. costatus* Sars ? *A. rostrata* Sars, *A. Kuyrkoi* F. S., *A. dubius* F. S.

Remopleurides nanus Leucht., *R.* var. *elongata* F. S., *R. emarginatus* Törnq.

Dikellocephalidae: *Apatocephalus serratus* Sars and Boeck; also var. *dubius* Mob.

Agnostus glabratus var. *ingrica* F. S.

Asaphus Broggeri F. S., *A. expansus* Dalm., *A. lepidurus* Nieszk., *A. raniceps* Dalm., *A. pachyophthalmus* F. S., *A. Eickwaldi* F. S., *A. delphinus* Lawr., *A. cornutus* Pander, *A.* var. *Holmi* F. S., *A. Kowalewskii* Lawr., *A. platyurus* Ang., *A. laevissimus* F. S.; also var. *laticauda* F. S., *A. latus* Pander and var. *Plautini* F. S., *A. devexus* Eichw., *A. ornatus* Pomp., *A. lepidus* Törnq. *Nieszkowskii* F. S. and var. *jewensis* F. S., *A. Kegelensis* F. S.

Onchometpus Volborthi F. S.

Isotelus remigium Eichw., *I. platyrhachis* Stein, *I. robustus* F. Rom., *I. Stacyi* F. S.

Niobe laeviceps Dalm., *N. Lindstromi* F. S., *frontalis* Dalm., *N. Volborthi* F. S.

Ptychopyge Ang. subgen. Pseudasaphus F. S., *P. globifrons* Eichw., *P. tecticaudatus* Steinh.

Subgen. Basilius Salt., *B. Lawrowi* F. S., *B. Kuckersianus* F. S., *B. Kegelensis* F. S.

Ptychopyge angustifrons Dalm., *P.* var. *gladiifera* F. S., *P. truncata* Nieszk. and var. *Broggeri, P. cincta* Brogg., *P. Plautini* F. S., *P. limbata* Ang., *P. Knyrkoi* F. S., *P. Pahleni* F. S.

Ogygia dilatata var. *Panderi* F. S., *P. dilatata* var. *Plautini* F. S.

Nileus Armadillo Dalm.

Megalaspis planilimbata Ang., *M. limbata* Boeck, *M. Lawae* F. S., *M. polyphemus* Br. aff. and var. *minor* F. S., *M. Lamanskii* F. S., *M. Knyrkoi* F. S., *M. hyorhinus* Leucht and var. *Kolenkoi* F. S., *M. Mickwitzi* F. S., *M. Stacyi* F. S., *M. Pogrebowi* F. S., *M. Knyrkoi* F. S., *M. gibba* F. S., *M. acuticauda* Ang., *M. extenuata* Dalm., *M. heros* Dalm., *M. centaurus* Dalm. and var. *rudis* Ang., *M. Lawrowi* F. S.

SCHMIDT (Friedrich)—Continued

Megalaspides Schmidtii Lam.
Olenellus Mickwitzi F. S.
Cheirurus (Cyrtometopus) primigenus Ang., *Cybele bellatula* var. *Wohrmanni.*
Lichas Pahleni F. S., *L. cicatricosus* Loven, *Niobe Volborthi* F. S.
Cyrtometopus Pseudohemicranium Nieszk. *Encrinurus Seebachi* F. S.
Calymmene frontosa Lindstr., *C. laevigata* and *conspicua* F. S.
Asaphus lepidus Törnq. and *A. Nieszkowski* F. S. *Niobe laeviceps* Dalm.
Megalaspis hyorhina Leucht.

Schmidt (W. E.) Cryphaeus in dem Siegener Schichten.

Zeitschr. d. Deutsch. Geol. Ges., vol. 59, 1907.

The author describes as *Cryphaeus attavus* a species with a head and a short, triangular pygidium, which shows a faint development of four pairs of marginal lappets, seen best by the four pairs of pits within the doublure.

Dr. Clarke in his paper on Devonic of Parana, p. 156, remarks: This, certainly, is not a Cryphaeus, even phylogenetically, for exceedingly young forms of Cryphaeus have sufficiently demonstrated that the ontogeny presents no four-spined stage. The tail is similar in the character of its lappets to those obscure structures in *Proboloides pessulus,* a new genus created by Clarke in the same work.

Schumacher (R.) Ueber Trilobitenreste aus dem Unterkarbon im Ostlichen Teil des Rosbergmassivs in den Südvogesen.

Zeitschr. Deutsch. Geol., Ges. 55, 1903, pp. 432-438, plate 19.
Phillipsia Silesiaca Scupin, *P. Eichwaldi* var. *alsatica* n. var.
Griffithides Frechi Scupin, *G. Damesi* Scupin.

Schuchert (C.) On the Lower Silurian (Trenton) fauna of Baffin Land.

Proc. Natl. Museum, vol. 22, 1900, pp. 143-177, plates 12-14.
Dalmanites (Pterygometopus) Goodridgi n. sp. *Illaenus vigilans* H. & W., *I. crassicauda Americanus* Billings. *Isotelus gigas* DeKay. *Ceraurus pleurexanthus* Green.

Scupin (Hans). Die Trilobiten des niederschlesischen Untercarbon

Zeitschr. Deutsch. Geol. Ges., Jahrg, 1900, pp. 1-20, plate, figs. 1-3, text.
Phillipsia aff. *aequalis* Meyer, *P. longicornis* Kays., *P. gemmulifera* Phill., *P. truncatula* Phill., *P. Silesica* n. sp., P. Spec.
Griffithides Damesi n. sp., *G. Frechi* n. sp., *G. depressus* n. sp., *G. claviger* n. sp.

Seemann (Fr.) Beiträge zur Gigantostraken fauna Böhmens.

Beitr. zur. Pal. and Geol. Österr-Ung. u. d. Orients, Bd. 19, Hft. 1, p. 49, 1906.

Semper (M.) Die Gigantostraken des älteren böhmischen Paläozoicum.

Beiträge zur Palæontologie and Geol. Oesterreich-Ungarns u. d. Orients, Bd. 11, 1898, p. 71.

Seward (A. C.) Notes on Fossil Plants from the Witteberg series of the Cape Colony.

Geol. Mag., Decade 5, vol. 6, No. 11, 1909, p. 482.

The author refers the *Hastimima Wheitei* to the genus Eurypterus, p. 485, as part of a body segment of that genus.

This paper is followed on p. 486 with a note on the genus Hastimima from Brazil and the Cape, by Henry Woodward, in which the author compares it with *Eurypterus punctatus* Salter.

Shimer (H. W.) Almost complete specimen of *Strennella strenua* Billings.

Am. Jour. Science, vol. 23, 1907, pp. 199-201, figure.

In the Amer. Jour. Sci., vol. 23, 1907, p. 319, the author refers *Ptychoparia murronatus* Shaler and Foerste, Bull. Mus. Zool., vol. 16, plate 2, to *Strenuella strenua* Billings, remarking that it appears that *S. strenua* is quite variable in the shape of the free cheeks and in the ornamentation of the axis.

Shuler (E. W.) New Ordivician Eurypterid.

Am. Jour. Sci., vol. 39, 1915, p. 551.

Stylonurus (Ctenopterus) alveolatus p. 552, fig. in text 1-6, from the Bay sandstone, Walker's Mt., Virginia.

The subgeneric name of Ctenopterus was used on account of the long, flattened segments of the endognathite; the lack of serrations on the segments, such as is found in Eurypterus; the presence of the long joint, belonging probably to the walking leg or balancer characteristics of Stylonurus, and the long, broadened spines or bristles which are especially characteristic of the subgenus Ctenopterus.

Siegert (L.) Versteinerungs-führenden Sedimentgeschiebe im Glacialdiluvium des Nordwestlichen Sachsens.

Palæontologisches Institut der Univ. Leipzig, 1898, pp. 37-138.

Cambrian: *Eurycare latum* Ang. *Peltura scarabaeoides* Wahl. *Sphaerophthalmus alatus* Boeck.

Silurian: *Asaphus expansus* Dalm. *Cheirurus (Nieszkowskia) variolaris* Lin. *Remopleurides nanus* c. Leucht. *Agnostus glabratus* Ang. *Chasmops conicophthalmus* S. & B. *Beyrichia costata* Lin. *Chasmops macrourus* Sjogren, *C. Wesenbergensis* Schmidt.

***Siemiradski** (J. von). Die Paläozischen Gebilde Podoliens. (Not seen.)

11 Paläontologischer Teil Wien Beitr. Pal. Geol., Ost Ung. 19, 1906, pp. 213-286, Taf. xv-xxi.

Siemiradzki (von Jos.) Die palæozoischen Gebilde Podolens.

Beiträge Z. Pal. and Geol. österr-Ung. u. s. Orients, Bd. 19, Heft 2, vol. 3, 1906, p. 4.

Six (Achille). Les appendices des Trilobites d'aprés M. Ch. D. Walcott.

Soc. Geol. du Nord, Ann. xi, 1883-84, pp. 228-236.

Slocum (A. W.) On the Trilobites of the Maquoketa beds of Fayette County, Iowa.

Field Mus. Nat. Hist., No. 171, Geol. Ser., vol. 4, No. 3, pp. 43-83, plates 13-18, 1913.

The author has secured from these beds 20 species of Richmondian Trilobites, 17 of which are here named, 11 of them being new.

The new genus Cybeloides is also defined.

The author describes and illustrates the following Crustacae:

Isotelus gigas DeKay, *I. maximus* Locke, with the remark that most of the specimens of Isotelus from this locality, which have been referred by other authors to *I. maximus*, are here referred to *Isotelus Iowenis* Owen.

Isotelus Iowensis Owen. *Megalaspis Beckeri* sp. nov. Compares *M. gonioceras* Meek and *M. extenuata* Angelin.

Nileus vigilans Meek and Worthen. *Bumastus Beckeri* sp. nov. *Thaleops ovata* Conrad. *Amphilichas rhinoceros* sp. nov., *A. clermontensis* sp. nov.

SLOCUM (A. W.)—Continued

Encrinurus pernodosus sp. nov.

Cybeloides gen. nov. This genus differs from Cybele Loven, as exhibited in *C. bellatula* the genotype, in the form of the glabella furrows, and in the genal angles being produced into spines, instead of being rounded.

The author describes *Cybeloides iowensis* sp. nov.

Calymmene fayttensis sp. nov., *C. gracilis* sp. nov. *Ceraurus pleurexanthemus* Green, *C. Milleranus* Miller and Gurley, *C. elginensis* sp. nov.

Eccoptochile meekanus S. A. Miller.

Sphaerocoryphe maquokensis sp. nov. *Pterygometopus Fredricki* sp. nov., *P. larrabeei* sp. nov.

Smith (J. F., Jr.) Canadian Journal, new series, vol. 6, 1861, p. 275.

Triarthrus canadensis nov.

The genal angles of the head are spined.

Smycka (F.) Beiträge zur Kenntniss der Trilobiten fauna in mahrischen Devon bei Celechovitz.

Acad. des Sci. de l'Empereur Francis Joseph, 1 Bull., Intern. class des Sci. Math. and Nat., pp. 19, plate 1, 1895.

The author gives a list of 60 species, which serves to indicate the Upper Devonian age of the fauna. He gives descriptions of several Trilobites, two of which are new, namely: *Proetus celechovincensis* n. sp. and *P. moravicus* sp. nov.

——— Ueber die Trilobiten des Celechovitzer Devon in Mahren.

Vesmir Prag., 1895, Jahrg. 24, p. 136.

Bronteus intermedius Goldf. *Dechenella Verneuili* Barr.

This species is referred by Richter to *Dechenella (Eudechenella) rittbergensis* Zimmermann.

Proetus Celechovicensis n. sp., *P. maravicus* n. sp. and *Cyphaspis* sp.

Sobolev (D.) Mittel Devon des Kielec-Sandonir Gebirges.

Mater Geol. Ross., St. Petersburg, vol. 24, 1909, pp. 41-536, with 5 plates.

Devonian Ostracoda.

Spencer (W. K.) The hypostomaic eyes of Trilobites.

Geol. Mag., Decade 4, vol. 10, 1903, pp. 489-492, with 3 figures.

This is a review of Dr. Lindstrom's paper, "Researches on the Visual Organs of the Trilobites," to show the close correspondence of the maculae with certain sense organs present in the Phyllopod genus Branchipus, and also in Limulus.

Spriestersbach and **Fuchs**. Die Fauna der Remscheider Schichten.

Abh. Geol. Landesant, N. F. Heft 58, 1909, pp. 111 and 81, with 11 plates.

Beyrichia embryoniformis n. sp., *B. montana* n. sp. *Entomis* sp. *Cryphaeus* sp. (Dr. Green's genus Cryphaeus, 1837.) This generic name was used in 1833 for a genus of Coleoptera, therefore will have to be abandoned.

Stauffer (Clinton R.) The Middle Devonian of Ohio.

Geol. Sur. Ohio, Fourth Series, Bull. No. 10, 1909.

The author describes as new *Proetus Welleri* from Venice, Ohio. The species was referred by Rud. Richter to *Dechenella* (aff. ? *Eudechenella Welleri)*.

Stepanov (P.) Fauna aus der Umgebung des Balchas Sees.

Verh. Russ. Mineral. Ges., Ser. 2, vol. 46, 1908, pp. 161-198, plates 1 and 2.

Leperditia shearsbii Chapman.

Steusloff (A.) Ostrakoden aus Diluvialgeschieben von Neu-Brandenburg.

Zeitschr. Deutsch. Geo. Ges., Jahrg., 1894, pp. 775-787, pl. 53.

Cambrian: *Bythocypris polita* n. sp.

Ordovician: *Primitia excelsa* n. sp., *P. reticulata* n. sp., *P. concinna* n. sp., *Beyrichia antiqua* n. sp., *B. digitata* var. *separata* n. var. *Entomis latisulcata* n. sp., *E. impressa* n. sp., *E. umbonata* n. sp.

Brandschiefer: *Strepula elliptica* n. sp. *Entomis sigma* Kr.

Macroura Kalk: *Beyrichia Krausei* n. sp., *B. rostrata* Kr. *Entomis oblonga* n. sp.

Untersilurischer Beyrichien Kalk: *Primitia angulata* n. sp., *P. curva* n. sp. *Strepula lineata* var. *granulosa* n. var. *S. constans* n. sp.

Borkholmer Kalk: *Leperditia praelonga* n. sp. *Primitia cuneata* n. sp., *P. canaliculata* n. sp., *P. elongata* var. *obliqua* n. var., *P. rugosa* n. sp.

Leperditia Kalk: *Leperditia Krausei* n. sp., *L. ? Kiesowii* n. sp. *Isochilina frequens* n. sp. *(Leperditia brachynotus* F. Schm.) ? *P. elongata* var. *semicircularis* n. var.

Fraglichen Alters: *Strepula signata* n. sp., *S. lineata* var. *separata* 111 Obersilur.

Obersilurischen Beyrichien Kalkes: *Primitia praerupta* n. sp., *P. punctata* n. sp. *Octonaria Bollii* n. sp.

Steusloff (A.) Sedimentärgeschiebe von Neubrandenburg.

Zietschr. d. Deutsch. Geo. Ges., vol. 44, 1892.

Stschegloff (H.) Sur les Trilobites en genéral et en particulier sur ceux de Zarskœ-Selo.

Jour. fur neue Entdeckungen in der Phys. Chem. Natur. und Technologie, St. Petersburg, Nos. 1, 2, 1827, p. 227, plate vii, fig. 9.

The author proposed the new genus *Deucalion* for such species as *Nileus armadillo, Illaenus crassicauda.*

Stur (D.) Der Trilobiten Fund des Herrn Kasch in den Kalkmuggeln des Heiligenberger Schachtes bei Pribran.

Verhandl. der K. K. Geol. Reich. Jhg., 1876, pp. 31-32.

Phacops fecundus Barr. also var. *major.*

***Swinerton.** On the classification of Trilobites. (Not seen.)

Geol. Mag., Decade vi, vol. —, 1915, p. 487.

The author states in regard to Beecher's Classification of 1897, that the majority of new Trilobites found since the publication fit into it without difficulty and prove that to a large extent it is conceived on a sound basis. A few, however, do not fit in, and have therefore revealed its weakness.

Taylor (Julius S.) Notice of fragments of Trilobites of gigantic size in the Cabinet of Julius S. Taylor.

Am. Jour. Sci., ser. 2, vol. 6, p. 431, 1848.

Thomas (H. H.) Fossils of the Oxford Museum IV. Notes on some undescribed Trilobites.

Quart. Jour. Geol. Soc., vol. 56, 1900, p. 616, pls. 34-35.

Phacops (Dalmanites) coronatus n. sp. *Phacops (Dalmanites) nobilis* n. sp. and *Olenus Mitchensini* n. sp.

Thomas (Ivor). Neue Beiträge zur Kenntnis der devonischen Fauna Argentiniens.

Zeitschr. Deutsch. Geol. Ges. lxvii, 1905, pp. 233-290, plates xi-xiv.

Homalonotus Kayseri n. sp. *Phacops argentinus* n. sp. *Dalmanites Drevermanni* n. sp., *D.* sp., *D.* sp: and *Beyrichia argentina* n. sp.

——— New Devonian fossils from Cornwall.

Geol. Mag., Dec. v, vol. vi, No. 3, 1909, pp. 97-102, plate 3.

Phacops (Trimerocephalus) pentops n. sp.

The species was classed under this subgenus on the size of the angle made by the dorsal furrows bounding the glabella, which in the case of Trimerocephalus would be about 50 deg., and Phacops 80-90 deg.

——— A note on *Phacops* (*Trimerocephalus*) *laevis* Munster.

Geol. Mag., Dec. v, vol. vi, No. 4, 1909, pp. 167-169.

The author refers the British species *Phacops (Trimerocephalus) laevis* Salter, Decade xi, pl. ix, figs. 1-5, to Salter's name of *Phacops trinucleus.*

——— Notes on the Trilobite fauna of Devon and Cornwall.

Geol. Mag., Decade v, vol. vi, 1909, pp. 193-204, pl. vii.

Phacops (Trimerocephalus) anophthalmus Frech. *Phacops (Trimerocephalus)* aff. *cryptophthalmus Emm.* as interpreted by Gümbel.

Phacops (Trimerocephalus) tripartitus n. sp. *Proetus dunhevidensis* n. sp. *Dechenella ussheri* n. sp. *Phillipsia minor* H. Woodward.

The name of Dechenella was first employed by Kayser for those members of the Proetidae with very tapering and strongly lobed glabella.

——— A new Devonian Trilobite and Lamellibranch from Cornwall.

Geol. Mag., Decade V, vol. 6, p. 537, pl. 3, 1909.

Phacops (Trimerocephalus) pentops sp. nov.

Toll (Edward von). Beiträge zu Kenntniss des Sibischen Cambrium.

Mem. de l'Acad. Imp. des Science de St. Petersburg, viii ser, vol. 8, 1899, No. x, with plates.

Microdiscus lenaicus n. sp., *M. Kocki* n. sp., *Microdiscus* sp.

Agnostus Schmidti n. sp. *Olenellus* sp. *Agnostus Czekanowski* Schm.

Dorypyge Slatskowskii Schm.

Ptychoparia Czekanowski n. sp., *P. Meglitzkii* n. sp.

Solenopleura ? sibirica Schm.

Bathyuriscus Howelli Walcott.

Anomocare Pawlowski Schm.

Liostracus Maydelli Schm.

The first part of Baron Toll's important contribution to Cambrian literature refers to the earlier work of Dr. F. Schmidt, in which he places some of these fossils as Devonian, but Toll correctly refers them to the Cambrian. One of these is *Doryphyge Slatkowskii,* described under the genus Proetus by Schmidt—the three others are referred to *Anomocare Pawlowskii* Schm., *Liostracus Maydelli* Schm., and *Solenopleura sibirica,* described by Schmidt under the genus Cyphaspis.

On plate 1 are figured some new species of Trilobites from a new locality.

Two minute species are referred to the genus Ptychoparia, which Dr. Matthew, in his review of Toll's paper, remarks might be compared with the Strenuella type of Agraulos.

The Agnostus described as *A. Schmidti* has an unusual association, if occurring in strata with Microdiscus. The Agnostus, however, is flatter than the typical species of the Paradoxides beds, and Dr. Matthew says it may be an earlier form.

Tornquist (S. L.) On the appendages of Trilobites.

Geol. Mag. London, Decade iv, vol. 3, 1896, p. 142.

On *Parabolina spinulosa* Wahlenb. as figured by Linné, Svenska Vet. Akad. Handl., vol. 20, 1759, showing one pair of antennae at their true place.

Linné says: "Fig. 1 is one of the clearest specimens I ever saw among so many thousand. Most remarkable in this specimen are the antennae in front, which I never saw in any other example, and which clearly proves the fossil to belong to the insects."

——— Linné on the appendages of Trilobites.

Geol. Mag., London, Decade iv, vol. 3, 1896, pp. 567-569.

The author does not conform Beecher's suggestion that Linné's figure may be interpreted as the thickened border between the facial sutures, but considers them as true antennae.

——— Fördrojda Paleontologiska meddelanden.

Geol. Fören. Förhandl., No. 238, Bd. 27, Häft. 27, 1906.

Chirurus Clasonii n. sp.

Turner (H.) Trilobites and their modern representatives.

Seventh Ann. Report Proc. Crpyden Micr. Club, 1878, pp. 42-46.

Compares the Trilobites with the living Limulus.

Tullberg (Sven Axel). Skänes Graptoliter.

Sveriges Geol. Undersökning, Ser. C, n. 55, 1883.

On p. 18 the author describes a new *Calymmene dilatata* nov. and *C. trinucleina* Linrs. msc. nov.

The species was afterwards fully described and illustrated by Dr. E. Olin, Meddelande från Lund. Geol. Fältkubb Ser. B, No. 1, 1906, p. 56, plate 2, figs. 10, 11 and 12.

Pompeckj in his reclassification of the Calymmenidae, places this species under the group Synhomalonotus, section *Calymmene Tristani. Calymmene (Synhomalonotus) dilatatus* Tullbg.

Twenhofel (W. H.) The Anticosti Island faunas.

Geol. Sur. Canada Mus. Bull., No. 3, Geol. series, No. 19, October 30, 1914.

The author describes as new *Triarthrus Becki* var. *macastyensis.*

This variety is like *T. Becki* except the facial sutures are slightly more sinuous, and in front they diverge from the axis instead of converging as in *T. Beckii.*

Triarthrus jemtlandicus Lindström has a similar facial suture, though otherwise different.

Ulrich (Edward O.) Ostracoda.

Text Book of Palæontology (Zittel's) translated by C. R. Eastman, London and New York, 1900, pp. 642-648.

——— and **Bassler** (Ray S.) New American Palæozoic Ostracoda. Notes and descriptions of Upper Carboniferous genera and species.

Proc. Natl. Mus., vol. 30, 1906, pp. 149-164, pl. 40.

Paraparchites n. gen., *P. humerosus* n. sp. *Beyrichia ? radiata* J. & K., *B. ? emaciata* n. sp. *Beyrichiella gregaria* n. sp., *B. bolliaformis* n. sp., *B. bolliaformis tumida* n. var. *Kirbya pinguis* n. sp., *K. centronota* n. sp.

ULRICH (E. O.) and BASSLER (Ray S.)—Continued

Cythere ? Haworthi n. sp. *Bairdia Beedei* n. sp. and var. *adrupta.*
Cypridina subovata n. sp.

The genus Paraparchites is closely related to and probably derived from Aparchites. In the latter the ventral edges of the valves meet without appreciable or, at any rate, constant overlap, and it is this difference that is chiefly relied on to distinguish the two genera.

The authors refer the Ordovician species *Aparchites elliptia* Ulrich, to this genus.

——— and Bassler (Ray S.) New American Palæozoic Ostracoda. Preliminary revision of the Beyrichiidæ with descriptions of new genera.

Proc. U. S. National Museum, vol. xxxv, 1909, pp. 277-340, plates 37-44.

New genera: Scofieldia, Treposella, Hollina, Kirbyina, Jonesina.

New subgenus: Steusloffia.

New species: *Beyrichia moodeyi, B. waldronensis, Kloedenia centricornis, K. fimbriata, K. marginalis, K. praenunfia, K. punctillosa, K. retifera.*

New name *Beyrichia granulifera.*

The authors divide the family into 21 genera, as follows:

Beyrichia McCoy emended.

Ordovician species: *Beyrichia (Steusloffia) acuta, (B. erratica* var. *acuta* Krause), *B. (Steusloffia) antiqua, (B. antiqua* Steusloff), *B. granulifera* new name *(Bollia granulosa* Krause), *B. (Steusloffia) Linnarssoni (Strepula Linnarssoni* Krause), *B. (Steusloffia) signata (B. signata* Krause). *Beyrichia tumida (Ctenobolbina tumida* Ulrich), *B. v-scripta (Bollia v-scripta* Krause).

Silurian species: *Beyrichia admixta* Jones and Holl., *B. aequilatera* Hall, *B. Baueri* Reuter, *B. Baueri tripartita* Reuter, *B. (Steusloffia) beyrichiodides (Strepula beyrichiodides* J. & H.), *B. bolliana* Reuter, *B. Bronni* Reuter, *B. Buchiana* Jones, *B. Buchiana angustata* Reuter, *B. Buchiana incisa* Reuter, *B. Buchiana lata* Reuter, *B. Buchiana nutans* Kiesow, *B. clavata* Kolmodin, *B. Damesi* Krause, *B. diffusa* Jones, *B. dubia* Reuter, *B. grandis* Kolm., *B. granulosa* Hall, *B. interrupta (Bollia interrupta* Jones), *B. Jonesii* Boll., *B. Kloedeni* McCoy, *B. Kloedeni acadica* J., *B. Kloedeni antiquata* J., *B. Kloedeni bicuspis* Kiesow., *B. Kloedeni granulata* J., *B. Kloedeni infecta* J., *B. Kloedeni intermedia* Jones, *B. Kloedeni intermedia* sub. var. *subspissa* Jones and Holl., *B. Kloedeni nuda* Jones, *B. Kloedeni protiberans* Boll., *B. Kloedeni subtorosa* J., *B. Kloedeni torosa* Jones, *B. Kloedeni verruculosa* Jones, *B. Kochii* Boll, *B. lata* Hall, *B. lauensis* Kiesow. *B. Lindsromi* Kiesow, *B. MacCoyiana* Jones, *B. MacCoyiana sulcata* Reuter, *B. Moodeyi* n. sp., *B. muldensis* Chapman, *B. nodulosa* Boll, *B. nodulosa expansa (B. Lindstromi* var. *expansa* Kiesow), *B. Noetlingi* Reuter, *B. Noetlingi conjuncta* Reuter, *B. plagosa* Jones, *B. plicata (Entomis plicata* Krause), *B. pustulosa* Hall, *B. reticulata (Strepula reticulata* (limbata in text) Krause), *B. Reuteri* Krause, *B. salteriana* Jones, *B. scanensis* Kolmodin, *B. (Steusloffia) simplex (Strepula simplex* Krause), *B. spinulosa* Boll, *B. Steusloffi* Krause, *B. trilobata (Entomis trilobata* Krause), *B. tuberculata (Battus tuberculatus* Kloeden), *B. tuberculata bigibbosa* Reuter, *B. tuberculata foliosa* Jones, *B. tuberculata spicata* Jones, *B. tuberculata Kockiana* Reuter, *B. umbonata (B. bolliana umbonata* Reuter), *B. waldronensis* n. sp.

Devonian species: *Beyrichia aurita* Richter, *B. devonica* J. & W., *B.* new species *(B. Kloedeni* var. Jones).

Of the 225 named species and varieties, varying in time from the Cambrian to the Permian, and referred to the genus Beyrichia, only 73 species and varieties listed above are referred to the genus.

The authors places under Group *Beyrichia Kloedeni:*

Beyrichia Kloedeni, B. MacCoyiana, B. Bollinana, B. Kockii, B. tuberculata-Kockiana, B. Moodeyi and *B. Lindstromi.*

ULRICH (E. O.) and BASSLER (Ray S.)—Continued

The valves are usually short, semi-elliptical in outline, and sharply lobed.

Group *Beyrichia Buchiana:*

The anterior and median lobes are joined, but the anterior lobe is thinner and the ventral connection proportionally thicker than usual, the combination giving to the united lobes a striking similarity to the horseshoe ridge in the *B. ungula* section of Bollia.

Group *Beyrichia tuberculata:*

This section comprises a number of species, in which the anterior and posterior lobes are broken up by minor furrows—the posterior lobe into 2, the anterior lobe into from 2 to 6 or 7 node-like parts. *Beyrichia Buchiano-tuberculata* Reuter, would represent about the simplest type, and *B. pustulosa* Hall and *B. Noetlingi* Reuter the most complex.

Group *Beyrichia Salteriana:*

The species of this group are not as large as those of the preceding groups and differ in the fullness of their lobes and proportionate narrowness of the furrows.

Group *Beyrichia clavata:*

The small group includes *B. Jonesii* Boll, and possibly *B. umbonata* Reuter.

Subgenus *Steusloffia,* new.

Group *Beyrichia Linnarssoni:*

This group includes *B. antiqua, B. acuta, B. simplex, B. Linnarssoni, B. signata, B. beyrichiodes* and probably *B. erratica* Krause.

Group *Beyrichia interrupta:*

The illustrations given by the authors show possible derivation of the *B. interrupta* group from Eurychilina, and its relations to *Beyrichia clavata* group and to Steusloffia.

The authors place under Kloedenia the following species:

Kloedenia apiculata Jones, *K. Barretti (Beyrichia Barretti* Wel.), *K. centicornis* n. sp., *K. concinna (Beyrichia concinna* J. & H.), *K. fimbriata* n. sp., *K. granulata (Beyrichia granulata* Hall), *K. initialis (Beyrichia initialis* Ulrich), *K. intermedia (B. intermedia* J. & H.), *K. intermedia marginata* J. & H., *K. jerseyensis (Beyrichia jerseyensis* Weller), *K. Kummeli (Beyrichia Kummeli* Weller), *K. manliensis (Beyrichia manliensis* Wel., *K. manliensis deckerensis (Beyrichia deckerensis* Weller), *K. marginalis* n. sp., *K. montaguensis (Beyrichia momtaguensis* Wel.), *K. nearpassi (Beyrichia nearpassi* Weller), *K. oculina (Beyrichia oculina* Hall), *K. parasitica (Beyrichia parasitica* Hall), *K. praenuntica* n. sp., *K. punctillosa* n. sp., *K. retifera* n. sp., *K. scotica (Beyrichia Kloedeni* var. *scotica* J. & H.), *K. simplex* Jones, *K. Smocki (Beyrichia Smocki* Weller), *K. sussexensis (B. sussexensis* Weller), *K. tuberculata (Beyrichia tuberculata* Salter), *K. wallpackensis (Beyrichia wallpackensis* Weller), *K. Wilckensianna (Beyrichia Wilckensianna* Jones), *K. Wilckensianna plicata (Beyrichia Wilckensianna plicata* Jones).

Of the above species *K. initalis* and *K. praenuntia* are Middle Ordovian and *K. simplex* late Devonian. All the others Silurian.

The genus Kyammodes Jones is closely allied, distinguished chiefly by the much greater inequality of its valves, the thick ventral edge of the right overlapping the smaller left valve. There are some peculiar differences in lobation also.

Tetradella Genotype *T. quadrilirata* H. & W.

List of Ordovician species:

Tetradella ? affinis (Beyrichia affinis Jones), *T. bohemica (Beyrichia bohemica* Barr. MSS. Jones), *T. bussacensis (B. bussacensis* Jones), *T. carinata (B. carinata* Krause), *T. complicata (B. complicata* Salter), *T. complicata decorata (Beyrichia complicata* var. *decorata* Jones), *T. ? digitata (Beyrichia digitata* Krause), *T. ? digitata separata (Beyrichia digitata* var. *separata* Steusloff), *T. (Kiesowia) dissecta (Beyrichia dissecta* Krause), *T. ? erratica (Beyrichia erratica* Krause), *T. harpa (B. harpa* Krause), *T. ?*

ULRICH (E. O.) and BASSLER (Ray S.)—Continued

lacunata (Beyrichia lacunata J. & H.), *T. (Kiesowia) mamillosa (Beyrichia mamillosa* Krause), *T. marchica (B. marchica* Krause), *T. marchica angustata (B. marchica* var. *angustata* Krause), *T. marchica lata (B. marchica* var. *lata* Krause), *T. palmata (Beyrichia palmata* Krause), *T. quadrilirata (Beyrichia quadrilirata* H. & W.), *T. (Kiesowia) radians (B. radians* Krause), *T. ribeiriana (B. ribeiriana* Jones), *T. simplex (T. quadrilirata* var. *simplex* Ulrich), *T. subquadrans* Ulrich.

Ceratopsis Genotype *Beyrichia Chambersi* Miller.

The genus includes *C. robusta* Ulrich, *C. intermedia* Ulrich, *C. oculifera* Hall, all Upper Ordovician species, and *C. hastata (Beyrichia hastata* Barr.)

Stenobolina Genotype *Beyrichia ciliata* Emmons.

Group of *Ctenobolina ciliata.*

Ordovician species:

Ctenobolina alata Ulrich, *C. bispinosa* Ulrich, *C. ciliata* Emmons, *C. curta (C. ciliata* var. *curta* Ulrich), *C. Duryi (Beyrichia Duryi* Miller), *C. emaciata (C. ciliata* var. *emaciata* Ulrich), *C. Guillieri (B. Guillieri* Tormelin), *C. Hammelli (B. Hammelli* Miller and Faber), *C. obliqua* Ulrich, *C. oblonga (Entomis oblonga* Steusloff).

Silurian species:

Ctenobolina granosa Ulrich, *C. punctata* Ulrich.

Devonian species:

Ctenobolina papillosa Ulrich.

Group of *Ctenobolina subcrassa.*

Ordovician species:

Ctenobolina crassa Ulrich, *C. fulcrata* Ulrich, *C. impressa (Entomis impressa* Steusloff), *C. major (Bollia major* Krause), *C. minor (Bollia minor* Krause), *C. subcrassa* Ulrich, *C. umbonata (Entomis umbonata* Steusloff).

Silurian species:

Ctenobolina auricularis (Bollia auricularis Jones).

Devonian species:

Ctenobolina mimima Ulrich.

Mississippian species:

Ctenobolina loculata Ulrich.

Drepanella. Genotype *D. crassinoda* Ulrich.

Ordovician species:

Drepanella ampla Ulrich, *D. bigeneris* Ulrich, *D. crassinoda nitida* Ulrich, *D. elongata* Ulrich, *D. macra* Ulrich, *D. Richardsoni (Beyrichia Richardsoni* Miller), *D. Richardsoni canadensis* Ulrich.

This wholly American genus is remarkable for the extreme variability of the nodes within the central area of the valves.

Scofieldia new genus. *Genotype Drepanella bilateralis* Ulrich.

Treposella nov. gen. genotype *Beyrichia Lyoni* Ulrich. This genus proposed for a link in the evolution of Hollina from Beyrichia.

Hollina new genus. Genotype *Ctenobolina insolens* Ulrich.

Devonian species:

Hollinia antespinosa Ulrich, *H. armata* Ulrich, *H. cavimarginata* Ulrich, *H. informis* Ulrich, *H. spiculosa* Ulrich.

All these species were described as species of Ctenobolina by Ulrich.

Carboniferous species:

Hollina granifera (Bollia granifera Ulrich), *H. radiata (Beyrichia radiata* J. & K.), variety *cestriensis* Ulrich, *H. longispina (Beyrichia longspina* J. & K.), *H. emaciata (Beyrichia ? emaciata* U. & B.).

The authors include under this genus *Beyrichia Kolmodini* and *B. tricollina* Ulrich.

ULRICH (E. O.) and BASSLER (Ray S.)—Continued

Kloedenella new genus. Genotype *Kloedenia Pennsylvanica* Jones.

The genus includes some 8 to 10 species, two of them probably only varieties ranging in time from the Clinton to Middle Devonian. The British species *Beyrichia ? bicaesa* J. &. K., may be included.

This genus is divisable into two sections:

In the first, the genotype, the posterior and median furrows are shorter than in section number 2, and the anterior furrow either wanting or more or less well-developed.

In the 2nd section, of which *Beyrichia Halli* Jones, is a good example, the posterior and anterior furrows are long, subequal and extending nearly or quite across the valve.

Kirkbyina new genus. Genotype *Beyrichiella ? reticosa* Jones and Kirkby.

Kirkbyina resembles Primitia, but is readily distinguished by its overlapping valves and thicker anterior end.

Beyrichiella J. & K. Genotype *B. cristata* J. & K.

The shell is relatively longer than that of Kirkbyina, and its larger valve is not the right, as in that genus, but the left.

The authors include under Beyrichiella *B. cristata* and *Kirkbyina annectens* the type of Synaphe Jones and Kirkby, also *Ulrichia confluens* Ulrich.

The generic term Synaphe was used by Huebner, therefore preoccupied.

Beyrichiopsis J. & K. Genotype, *B. fimbriata* J. & K.

Other typical species are the Carboniferous species:

Beyrichiopsis cornuta, B. subdentata, B. fortis, B. granulata and *B. simplex,* all described by Jones and Kirkby.

Jonesina new genus. Genotype *Beyrichia fastigiata* J. & K.

The following species are referred to *Jonesina Beyrichia arcuata* Bean: *B. Bradyana* J. & K., *B. craterigera* Brady MS. J. & K., *B. fodicata* J. & K. *Carboniferous* species, also *Beyrichiella bolliaformis* var. *tumida* and *B. gregaria* Ulrich and Bassler.

——— Ostracoda.

Geol. Sur. Maryland Lower Devonian, Baltimore, 1913, pp. 513-542, pls. 97-98.

The following species are described:

Leperditia altoides Weller, 1903, *L. elongata* Weller, 1903, *L. gigantea* Weller, 1903. *Aparchites Gordoni* n. sp. *Primitia postturgida* n. sp., *P. ? cumberlandica* n. sp., *P. ? concentrica* n. sp.

Primitiella variolata n. sp. *Ulrichia aequalis* n. sp. *Strepula irregularis* Jones and Holl, 1886. *Halliella seminulum* var. *longa* n. var., *H. ? triplicata* n. sp. *Aechimina cuspidata* Jones and Holl, 1869.

Mesomphalus n. gen.

Carapace of medium size, 1 mm. to 2½ mm. in length, equivalved; valve moderately convex, oblong, subquadrate in outline, with a small ventral pit lying between two rather small rounded nodes; edges of valves rather thick, usually concealed by a flat border, which overhangs it; ventral pouch somewhat elongated, sausage-shaped, occupying nearly the full length of the ventral side.

Type *Mesomphalus hartleyi* n. sp., *M. submarginata* n. sp.

Ctenobolbina denticula n. sp., *C. dubia* n. sp. *Bollia americana* n. sp., *B. curta* n. sp., *B. irregularis* n. sp., *B. jugalis* n. sp., *B. ungula* Jones, 1891. *Kloedenia centricornis* Ulrich and Bassler, 1908, *K. fimbriata* U. & B., 1908, *K. nearpassi* Weller, 1903, *K. Kümmeli* Weller, 1903, *K. sussexensis* Weller, 1903, *K. Barretti* Weller, 1903, *K. Pennsylvanica* Jones, 1889, *K. Clarkei* Jones, 1890, and var. *paupera* U. & B., 1908, *K. turgida* U. & B., 1908, for *K. Pennsylvanica* Jones, in part, 1889, figs. 8 and 9, not figs. 5 and 7; also var. *ventrosa* U. & B. for *K. Pennsylvanica* Jones, 1889, figs. 7 a-b, not figs. 5, 6, 8 and 9.

ULRICH (E. O.) and BASSLER (Ray S.)—Continued

Thilipsura multipunctata n. sp. *Octonaria angulata* n. sp., *O. inequalis* n. sp., *O. simplex* Krause, 1891.

Craterellina n. gen.

The most obvious characteristic of the genus is the presence of a crater-like depression, bordered by a more or less distinctly elevated rim, occupying the anterior one-third or one-half of each valve.

Craterellina robusta n. sp., *C. oblonga* n. sp.

Bythocypris punctatulata var. *arctatum* n. var. *Pontocypris arcuata* n. sp., *P. mawii* var. *breviata* Jones, 1889, and *Pachydomella longula* n. sp.

Van Ingen (Gilbert). The Silurian fauna near Batesville, Arkansas. School of Mines Quart., vol. 23, 1901, No. 1.

The author refers to certain plates which were not issued with the publication.

The author remarks on the family Acidaspidae Barr. (used for the xii family, without a family name), that this term is used in preference to Odontopleuridae of Burmeister (used by this author for a family name), which latter name had more recently been suggested by Etheridge and Mitchell in 1897, inasmuch as the genus Acidaspis Murch. (January, 1839,) and Emmrich's name Odontopleura (1839) is of later date. There was no date of publication given on Emmrich's De. Trib. Dissertates.

The author refers to Murchison's Acidaspis, on p. 55, as a similar genus.

The author quotes Barrande, Vogdes and Clarke on the family and gives figures of *Odontopleura ovata, Selenopeltis Buchi, Ceratocephala prevosti* and *C. Danai, Dicranurus humatus* and *Acidaspis Brighti* in the text. The author describes seven species from the Niagaran limestone of St. Clair Springs.

Odontopleura Ortonti Foerste, *O. arkansana* nov. with fig. in text.

Ceratocephala gonita Warder *(depauperata), C. nodulata* nov., fig. of head in text, *C. coalescens,* fig. glabella in text.

Acidaspis quinquespinosa Salter MS., fig. 12 head in text.

The unpublished plates of Acidaspis Salter and Fletcher (two plates), the second one (figs. 10-12) of *Acidaspis quinquespinosus* nov. of a small head with spined occipital ring, and an entire specimen (fig. 12) with a median node to the occipital ring. Van Inger's figure is more in keeping with Lake's fig., pl. 7, fig. 4.

Acidaspis obsoleta nov., figs. 13 and 14 in text.

Ampyx niagarenis nov., fig. 15 in text, compares *A. parvulus* Forbes, differs in its longer and narrower glabella, and less tumid cheeks.

Proetus corrugatus nov., figs. 16-17 in text, head and tail; *P. subanulatus* nov., fig. 18 in text, tail.

Arges phyctenoides Green, depauperatus.

The author uses the preoccupied term Arges referred by Gurich to Ceratages.

Van Ingen places *Lichias Hanovensis* Miller and Gurley and *L. Byrneansus* M. & G. as syn. to Green's species.

Arges arkansanus nov., fig. 19 in text, head compares *Lichas Grayi* Fletcher. *Lichas nereus* Hall.

Encrinurus punctatus Wahl., refers *E. ornatus* H. & W., to this.

Dalmanites (Synphoria) viglans Hall, *D. (Synphoria) arkansanus* nov., figs. 20-22, heads and tail, broad and narrow forms.

These forms differ in the well-marked triangular outline of both cephalon and the frontal glabellar lobe, of the American Ordovician and Silurian species. Their nearest ally appears to be *Phacops Brongniartii* Portlock, which has been referred to the subgenus Pterygometopus.

Vogdes (A. W.) Notes on Palæozoic Crustacea, No. 5. Carboniferous Trilobites from Missouri.

Proc. Cal. Acad. Sci., 2nd ser., vol. 6, 1896, p. 197, fig. in text.

Proetus ? placidus nov.

This species from Chouteau limestone of Sedalia has the lateral lobes of the pygidium smooth, similar to the Silurian species of France named by Rouault *Calymmene Arago* and *C. Salteri*, although it belongs to a different group of the Proetidae, with only nine thorax segments. The head is parabolic in form, genal angles rounded. The eyes are similar in location to those of *Phillipsia Sampsoni* from the same locality. The tail has eight axial joints with indications of two faintly defined segments on the lateral lobes.

——— The genus Encrinurus: its history, its species, its proper division in the family of Trilobites.

Trans. San Diego Soc. Nat. Hist., vol. 1, 1907, No. 2, pp. 61-82, plates 1-3.

The author divides the family into two divisions:

Encrinurus. Genotype *E. punctatus* Wahl.

Cryptonymus. Genotype *C. variolaris* Brong.

Although Eichwald used this term in 1825 for certain Asaphidae and Illaenidae, he used the same term in 1840 for such species as *Calymmene punctatus* and *C. variolaris*, which was adopted by Angelin. The term should stand under the strict rule of priority for the second use of the term.

Cryptonymus Eichwald, 1840.

The author uses it for the second species included by Eichwald in 1840. Figures and descriptions of *Encrinurus punctatus* Walh., *E. vigilans* Hall, *E. ornatus* H. & W., *E. Threcheri* Foerste, *E. Trentonensis* Walc., *E. nereus* Hall, *E. Eagani* Miller, *E. Americanus* Vogd., *E. sex-costata* Salt., *E. delitides* Shumard, *E. Barrandei* DeKon., *E. Mitchelli* Foerste, *E. schisticola* Törnq., *E. Seebachi* Schm., *E. multi-segmatus* Portl., *E. fallax* Reed, as given.

Under the genus Cryptonymus the author includes *Cryptonymus variolaris* Brong., *C. expansa* Hasw. Henderson, 1868, refers the free cheeks of *Zethus Payeii* Haswell, to *E. expansus*. *C. obtusus* Ang., *E. raricostatus* Wal., *C. laevis* Ang., *Encrinurus Bowningi* Foerste, *E. tuberculatus* Collie.

Certain species described by Barrande under the genus Cromus have been referred by Novak to the genus Encrinurus on account of the direction of the facial sutures, which are the same in both genera. They are *Cromus Beaumonti, C. Bohemicus, C. transient* and *C. intercostatus*. The *Encrinurus Novaki* Frech, has been referred to *Encrinurus Beaumonti* var., *Novaki* by Gornani and Le Regny.

Remarks the name of *Encrinurus punctatus* has often been applied to a common Scandinavian species, first illustrated by Wahlenberg in an advanced publication of his paper in 1818. Petrificata telluris Svencanae, Brunnich's fossil from Bohemia, from a soft yellow limestone, may be the *Cromus Beaumonti* Barr. The author remarks, in his paper, on two very imperfect petrified impressions of this fossil, that it had across the fossil body impressed spotted rings, which marks are sufficient to distinguish them from other species. The size of it seems to vary greatly, as my collection contains one small and one very large back part of this species; each has 18 joints. The only Bohemian Encrinuridæ recorded are those described under Cromus by Barrande and Novak.

Verneuil (E.) Observations sur la description de quelque Trilobites russes par M. A. de Volborth.

Bull. Soc. Geol. de France, 2nd ser., vol. 5, 1848, p. 384.

Review of Dr. Volborth's paper on the genus Zethus.

Wade (A.) On the Llandovery and associated rocks of Northeastern Montgomeryshire.

Quart. Jour. Soc. London, vol. 67, No. 267, 1911, p. 415, plates 33-36.

Notes on the Palæontology of the area 1—Trilobita.

The author describes the following species:

Trinucleus intermedius sp. nov.

Refers *T. concentricus* Hall, Pal. N. Y., vol. 1, p. 249, pl. 65, figs. 4a-4c; also p. 255, pl. 67, figs. 1a-h, to the new species.

Dionide sp.

Ostracoda Melanella n. gen.

The author gives the following description of the genus:

Carapace small; equivalves moderately convex, subcircular, rather flattened anteriorly; hinge straight; valves with a small, faintly raised horseshoe ridge confined to the posterior half, enclosing a small semicircular sulcus; edges simple.

The genus is closely allied to Jonesella of Ulrich.

Melanella hemidiscus gen. et sp. nov.

Primitiella unicornis Ulrich. *Primitia Ulrichi* Jones, *P. tumidula* Ulrich. *Ctenobolina* cf. *ciliata* Emmons. *Bolla lata* V. & H. *Krausella arcuata* Ulrich.

Walcott (Charles D.) Description of new genera and species of fossils from the Middle Cambrian.

Proc. U. S. Natl. Mus., vol. 11, 1888, Washington, 1889, pp. 441-446.

The author includes under the genus *Dorypyge* the following species:

D. richtofeni with *Olenoides nevadensis, O. quadriceps, O. wasathchensis* and *O. curticei*—a new species which he illustrates on p. 444, fig.; also the new genus *Karlia,* named in honor of Dr. Karl Rominger.

Genotype Karlia minor n. sp.

The author refers *Menocephalus salteri* Rominger, 1887, Proc. Acad. Nat. Sci., pt. 1, p. 16, pl. 1, fig. 6, to a new species: *Karlia stephenensis.*

The Bathyurus Rominger, Proc. Acad. Nat. Sci. Phila., pt. 1, pl. 18, fig. 8, is referred to *Bathyuriscus (Kootenia) dawsoni* n. sp.

A new genus, Ogygopsis, is founded on the species *Ogygia Klotzi* Rominger, it differs from Ogygia in having a well-defined ocular ridge, and in the narrow palpebral lobe.

——— Cambrian Fossils, Yellowstone National Park.

Mong. U. S. Geol. Survey, No. 32, part 2, pp. 440-478, plates, 1899.

Agnostus interstrictus White, *A. bidens* H. & W., *A. tumidosus* H. & W.

Ptychoparia Penfieldi n. sp., *P. antiquata* Salt., *P. (Euloma) affinis* Walc., *P. Llanoensis* Walc., *P.* sp. *Crepicephalus Texanus* Shumard, *P. (Lonchocephalus) hamulus* Owen, *P. (Lonchocephalus) Wisconsensis* Owen, *P. ? diademata* Hall.

Arionellus levis n. sp. *Arionellus* sp. *Liostracus parvus* n. sp. *Solenopleura Weedi* n. sp. *Zacanthoides* sp. *Bathyuriscus* sp.

——— Precambrian fossiliferous formations.

Bull. Geol. Soc. Amer., vol. 10, pp. 189-244, 1899, plates.

Beltin Danai n. gen. et sp.; also figures of Pterygotus, Eurypterus, Slimonia and Stylonurus for comparison.

The author refers to the genus Beltina certain fragmentary remains of a crustacean collected from the calcareous Greyson shales of Montana, and remarks, as far as can be judged from what we now know of it, is referable to the Merostomata.

WALCOTT (Charles D.)—Continued

——— *Asaphus Emoryi* Hall. Description and figure of in Palæontogia.

Universalis Fasc. 11, plate 28, 1904.

——— The Cambrian fauna of India.

Proc. Washington Acad. Sci., vol. 7, 1905, pp. 251-256.

Notes on the genus *Redlichia Noetlingi* Redlich. *Ptychoparia Richeri* Redlich, *P. Warthi* and *Olenus indicus*.

——— Cambrian faunas of China.

Proc. U. S. Natl. Mus., vol. 29, 1905, pp. 1-106.

Trilobita: *Agnostus Kusanensis* n. sp. *Microdiscus orientalis* n. sp. *Redlichia chinensis* n. sp., *R. finalis* n. sp., *R. nobilis* n. sp. *Redlichia* sp. *Olenoides ? cilix* n. sp. *Dorypyge bispinosa* n. sp. *Dorypygella typicalis* n. gen. et sp.

The genus is characterized by the peculiar glabella, narrow frontal margin, and spinose pygidium.

Dorypygella alcon n. sp., *D. alastor* n. sp.

The *Dorypygella typicalis* is a synonym of *Teinistion Lansi* Monke. *Damesella Blackwelderi* n. gen. et sp.

The genus differs from Dorypyge in the character of the head, as far as known. The thorax and pygidium are essentially of the same type. The pygidium of Damesella is of the type of Olenoides and the pleural lobes of the thoracic segments are also of the same type, but the thorax of Olenoides has eight segments, and a strong median spine on the axis, while the thorax of Damesella has twelve or more segments and without a median spine.

Damsella nov. gen. genotype, *D. Blackwelderi* Walcott.

Damesella bellagranulata n. sp., *D. brevicauda* n. sp., *D. chione* (a syn. of *Stephanocare Richthofeni* Monke), *D. sinensis* Bergeron. *Dicellocephalus sinensis*.

Agraulos abaris n. sp., *A. abrota* n. sp., *A. acalle* n. sp., *A. agenor* n. sp., *A. dirce* n. sp., *A. divi* n. sp., *A. dolon* n. sp., *A. dryas* n. sp.

Anomocare alcinoe n. sp., *A. Bergioni* n. sp., *A. bianos* n. sp., *A. biston* n. sp., *A. ? butes* n. sp., *A. ? daulis* n. sp., *A. daunus* n. sp., *A. decelus* n. sp., *A. tatian* n. sp., *A. temenus* n. sp.

Anomocarella chinensis n. gen. et sp.

The genus differs from Anomocare in the absence of glabella furrows and the presence of a relatively narrow, flattened frontal rim.

Anomocarella baucis n. sp., *A. albion, A. carne* n. sp.

Arionellus agonius n. sp., *A. ajax* n. sp., *A. alala* n. sp.

Menocephalus acerius n. sp., *M. agave* nov., *M. Velenus* nov. n. sp., *M. ? depressus* n. sp.

Pagodia lotos n. gen. et sp.

This genus differs from Dolichometopus in the narrowing instead of widening of the glabella in front; in the presence of small instead of large eye-lobes, short instead of long postero-lateral limbs, and obscure glabellar furrows.

Pagodia bia n. sp., *P. dolon* n. sp., *P. macedo* n. sp., *P. lotos* n. sp.

Pterocephalus asiatica n. sp., *P. busiris* n. sp.

Ptychaspis acamus n. sp., *P. cacus* n. sp., *P. cadmus* n. sp., *P. calchas* n. sp., *P. callisto* n. sp., *P. calyce* n. sp., *P. campe* n. sp., *P. ceto* n. sp., *P.* sp.

Ptychoparia aclis n. sp., *P. ? batia* n. sp., *P. ? bromus* n. sp., *P. ceus (Liostracina Krausei* n. sp., Monke), *P. constricta* n. sp., *P. dryope* n. sp., *P. granulosa* n. sp., *P. impar* n. sp.; also var. *P. ligea* n. sp., *P. mantoensis* n. sp., *P. tellus* n. sp., *P. tenes*, *P.* sp., *P. titiana* n. sp., *P. theano* n. sp., *P. tolus* n. sp.

WALCOTT (Charles D.)—Continued

Ptychoparia (Liostracus) toxeus n. sp., *P. (Liostracus) trogus* n. sp., *P. (Liostracus) tutia* n. sp.

Proampyx subgen. of *Ptychoparia* (name used by Frech, 1902, Lethaea Geol., 1 Theil Leathaea Pal. 11, p. 66, for *Anomocare acuminatum* Ang.).

Ptychoparia (Proampyx) burea n. sp.

Shantungia spinifera n. gen. et sp. *Solenopleura alderus* n. sp., *S. acantha* n. sp., *S. acidalia* n. sp., *S. agno* n. sp., *S. belus* n. sp., *S. beroe* n. sp.

Dikelocephalus ? baubo n. sp., *D. ? brizo* n. sp. *Crepicephalus damia* n. sp., *C. magnus* n. sp.

Dolichometopus alceste n. sp., *D. deois* n. sp., *D. derceto* n. sp., *D. dirce* n. sp.

Illaenurus canens n. sp., *I. ceres* n. sp., *I. dictys* n. sp.

Ostracoda: *Bradoria Bergeroni* n. sp., *B. enyo* n. sp., *B. eris* n. sp., *B. fragilis* n. sp., *B. sterope* n. sp., *B. Woodi* n. sp.

——— Cambrian faunas of China.

Proc. U. S. Natl. Museum, vol. 30, 1906, pp. 563-595.

Blackwelderia n. gen. *Dorypyge Richthofeni laevis* n. var. *Blackwelderia cilix* Walc. Genotype *B. sinensis* Bergeron.

Agraulos armatus n. sp., *A. nitida* n. sp., *A. obscura* n. sp., *A. regularis* n. sp., *A. uta* n. sp., *A. vicina* n. sp., *A. ? capax* n. sp., *A. ? melie* n. sp.

Anomocare Bigsbyi n. sp., *A. eriopia* n. sp., *A. flava* n. sp., *A.* sp. ?

Anomocarella contigua n. sp., *A. irma* n. sp.

Ptychaspis bella n. sp.

Ptychoparia comus n. sp., *inflata* n. sp., *P. Lilia* n. sp., *P. nereis* n. sp., *P. undata* n. sp., *P. vesta* n. sp., *P.* sp. ? *P. ? Maia* n. sp., *P. (Liostracus) intermedia* n. sp., *P. (L.) subrugosa* n. sp.

Solenopleura pauperata n. sp.

Dolichometopus hyrie n. sp.

——— Cambrian Geology and Palæontology, No. 5. Cambrian sections of the Cordilleran area.

Smithsonian Miscellaneous Collections, vol. 53, Dec. 10th, 1908.

The names of some new species are given, but without descriptions.

——— Mount Stephen rocks and fossils.

Canadian Alpine Journal, vol. 1, No. 2, pp. 232-248, 4 plates, 1908.

The author illustrates *Olenellus Gilberti* Meek. *Anomolocaris ? Whiteavesi* n. sp., *A. Canadensis* Whiteaves, *A. ? acutangulus* n. sp. *Oryctocephalus Reynoldsi* Reed. *Bathyuriscus occidentalis* Matt., *B. ornctus* Walc. *Karlia stephensis* Walc., *Ptychoparia cordillerae* Rominger, *P. palliseri* n. sp. *Agnostus montis* Matt. *Burlingia Hectori* Walc. *Dorypge (Kootenia) Dawsoni* Walc. *Zacanthoides spinosus* Walc. *Bathyuriscus rotundatus* Rominger. *Neolenus serratus* Rominger. *Ogygopsis Klotzi* Rominger.

No description of the species was given.

——— Cambrian Geology and Palæontology, No. 2. Cambrian Trilobites.

Smithsonian Misc. Collections, No. 1805, vol. 53, 1908.

Burlingidae: This family includes the genera Burlingia and Schmalenseeia. The genotype of the genus is *Burlingia Hectori* Walcot. The facial sutures and free cheeks relate *Burlingia* to some forms of the Cheiruridae, while the pygidium of Burlingia recalls the simple pygidium of Paradoxides, and the pygidium of *Schmalenseeia* recalls that of Amphion.

WALCOTT (Charles D.)—Continued

Albertella n. genus, Genotype *A. Helena* n. sp.

The genus should be compared with the genus Zacanthoides. The cephalons of the two genera are generically the same. The thoracic segments are the same type, but the third or fourth segment of the thorax of Albertella is extended into long pleural spines, and the thorax has seven instead of nine segments as in Zacanthoides. The pygidium has one pair of spines instead of many spines, as in Zacanthoides.

Albertella Bosworthi n. sp.

Oryctocare new genus, genotype *O. Geikiei* n. sp.

The cranidium of the cephalon of this genus is much like that of Oryctocephalus, but the thorax and pygidium are unlike. The pleurae are of the *Olenus* type, while the pygidium is broad and of the Bathyuriscus type.

Zacanthoides idahoensis n. sp. *Neolenus inflatus* n. sp., *N. intermedius* n. sp., *N. intermedius pugio* n. variety, *M. superbus* n. sp.

Bathyuriscus ornatus n. sp.

——— Middle Cambrian Merostomata.

Smithsonian Mis. Coll., vol. 57, No. 2, Washington, 1911.

In this paper two genera, Sidneyia and Amiella, are described.

Sidneyia inexpectans Walc. *Amiella ornata* Walc. *Neolenus serratus* Rominger. *Beltins Danai* Walc.

The new genera are placed in a new sub-order Limulava of the order Eurypterida.

Sidneyia with its four pairs of cephalo-thoracic appendages and simple antennae approaches the Trilobita, which has a similar scheme of cephalic appendages.

——— Cambrian Geology and Palæontology, No. 6. Olenellus and other genera of the Mesonacidæ.

Smithsonian Misc. Collections, vol. 53, No. 6, 1910, pp. 231-422, Pls. 22.

The author under the family Mesonacidae places:

1. Nevadia n. gen. genotype *N. Wetksi* n. sp.

In the type of this genus the posterior 11 segments have only the axial lobe and a spinose continuation on each side. The spinose extensions of the posterior segments are proportionally much rounder and smaller than those of the anterior 17 segments. The pygidium is small without pleural lobes and transverse furrows.

2. Mesonacis: This form is essentially the same as Elliptocephala, but it has an enlarged third segment in the adult, and a strong spine on the fifteenth segment.

The species referred to Mesonacis are *M. vermontana* Hall, *M. Mickwitzi* Schmidt, and *M. Torrelli* Moberg.

Elliptocephala Emmons, genotype *E. asaphoides* Emmons.

In the genus the posterior five segments are more highly developed than the primitive segments of Nevadia, but not as much so as the segments anterior to them.

Callavia Matthew, genotype *Olenellus (Holmia) bröggeri* Walcott.

This genus was proposed by Matthew, Am. Geol., vol. 19, p. 397, 1897, for *O. bröggeri* and *O. callavii* Lapw., on acccount of the glabella differing from that of *Olenellus (Holmia) Kjerulfi.*

Callavia has a trace of the constricted pleurae of the posterior portion of the thorax in the two last segments. The broad thorax of Callavia with the falcate extensions of the pleurae are unlike the narrow thorax of Holmia, with its spinos pleural extensions.

The glabella of Callavia is narrower and more primitive, and its intergenal spine is less primitive. The pleural furrow of Callavia is narrow and oblique, like that of Paradoxides, while the pleural furrow of Holmia and Wanneria is broad and straight.

The segments of Callavia appear to be nearer to Elliptocephala, than to those of Holmia.

WALCOTT (Charles D.)—Continued

The following species are referred to the genus: *Callavia bicensis* Walc., *C. brögger*i Walc., *C. burri* Walc., *C. callavei* Lapw., *C. cortlandi* Raw. Mss., *C. crosbyi* Walc. and *C. nevadensis* Walc.

Holmia Matthew genotype *Paradoxides Kjerulfi* Linnarsson, 1871.

The species referred to Holmia are *H. kjerulfi, H. lundgreni* and *H. rowei* Walc., the only American species.

Wanneria new genus. Genotype *W. Walcottanus* Wanner.

This genus has a uniform series of thoracic segments, with pleurae terminating in broad falcate extensions beyond the body line, without the spinose ends as in Holmia.

The species referred to Wanneria are: *W. Walcottanus* Wanner, *W. gracile* Walc. and *W. Halli* Walcott.

Paedeumias n. gen. Genotype *P. transitans* Walcott.

The distinctive characters of the genus are in the presence of the rudimentary segments and pygidium.

Olenellus Hall. Genotype *O. Thompsoni* Hall.

The author remarks that *Olenellus Thompsoni* passes through a *Holmia* and *Paedeumias* stage before becoming a true *Olenellus.*

The American species are *Olenellus Thompsoni* Hall and variety *O. crassimarginatus* Walcott, *O. gilberti* Meek, *O. fremonti* Walc., *O. canadensis* Walc., *O. claytoni* Walc., *O. argentus* Walc., *O. walcotti* S. & F.

The European species are *O. gigas* Peach, *O. lapworthi* Peach, *O. reticulatus* Peach and *Olenellus* n. sp. undt.

All these species have telsonated pygidia and may be classed under the family name of Olenellidae.

Peachella new genus. Genotype *P. iddingsi* Walcott.

The genus is only known by the head, which has blunt, tumid genal spines; elongated, narrow glabella; small eyes and marked convexity.

Olenelloides Peach. Genotype *O. armatus* Peach.

This genus is clearly defined by its large cephalon and primitive thorax and pygidium. The author remarks it is essentially a larval form of *Olenellus.* The author diagrammatically represents these Lower Cambrian genera under the family of *Mesoncidae.* Left-hand branch Nevadia, Callavia, Holmia, Wanneria,—Paradoxides. Right-hand branch Nevadia, Mesonacis, Elliptocephala, Paedeumias, Olenellus, Peachella—Ollenoides.

——— Cambrian Geology and Palæontology, No. 7. Cambro-Ordovician boundary in British Columbia, with description of Fossils.

Smithsonian Mis. Coll., vol. 57, No. 7, 1912.

The author describes *Certopyge canadensis* n. sp.

This species differs from *C. forficula* Sars in the greater length of the frontal limb of the cranidium, longer palebral lobes and narrower fixed cheeks, etc.

——— Cambrian Geology and Palæontology—2, No. 6. Middle Cambrian Brachiopoda, Malacostraca Trilobita and Merostoma, with plates 24 to 34.

Smithsonian Misc. Coll., vol. 57, No. 6, 1912.

Under the class Malacostraca, the author describes the following species:

Hymenocaris circularis n. sp., *H. obliqua* n. sp., *H. ovalis* n. sp., *H. parva* n. sp., *H. perfecta* n. sp., *H. vermicauda.*

Trilobita: *Neolenus serratus* Rominger. *Ptychoparia cordillerae* Rominger. *Marrella* n. gen., *M. spendens* n. sp.

WALCOTT (Charles D.)—Continued

Merostomata: *Sidneyia inexpectans* Walc.

Habelia n. gen., *H. optata* n. sp. Emeraldella n. gen., *E. brocki* n. sp., *E. micrura* n. sp. Molaria n. gen., *M. spinifera* n. sp.

Family undetermined. Nathorstia n. gen., *N. transitans* n. sp.

The specific name transitans to this species was given on account of its suggesting a transition between Merostone-like form, such as Molaria spinifera and the trilobites.

Class Crustacea: Order Anostraca—Calman Opabinidae, new family. Opabinia n. gen., *O. regalis* n. sp., *O. media* n. sp. *Leanchoilia* n. gen., *L. superlata* n. sp. Yohoia n. gen., *Y. tenuis* n. sp., *Y. plena* n. sp. Bidentia n. gen., *B. difficilis* n. sp.

Order Notostraca—Calman Naraoidae n. fam. Naraoia n. gen., *N. compacta* n. sp. Burgessidae new fam. Burgessia n. gen., *B. bella* n. sp.

Genus Anomalocaris Whiteaves, *A. gigantea* n. sp.

Waptidae: Waptia n. gen., *W. fieldensis* n. sp.

Hurdia n. gen. *H. victoria* n. sp., *H. triangulata* n. sp.

Tuzoia n. gen., *T. retifera* n. sp.

Odaraia n. gen., *O. alata* n. sp. *Fieldia* n. gen., *F. lanceolata* n. sp.

Carnarvonia n. gen., *C. venosa* n. sp.

Mollisonia n. gen., *M. symmetrica* n. sp., *M. gracilis* n. sp., *M. rara* n. sp.

Tontoia n. gen., *T. kwaguntensis* n. sp.

——— Cambrian Geology and Palæontology—2, No. 8. The Sardinian Cambrian genus Olenopsis in America.

Smithsonian Misc. Coll., vol. 57, No. 8, 1912, with plate 36.

The author describes and figures *Olenopsis zoppii* Meneghini, *O. agnesensis* n. sp., *O. americanus* n. sp., *O. roddyi* n. sp.

Dr. Bornemann distinguishes Olenopsis from Olenus, on account of its having a small, rounded tail shield, with unsegmented axis; by the particularly semicircular outline of the cephalon; the conic, nearly smooth, glabella, and 14 or 15 body segments.

——— Cambrian Geology and Palæontology—2, No. 9. New York Potsdam, Hoyt Fauna, with plates 37-49.

Smithsonian Misc. Collection, vol. 57, No. 9, 1912.

Crustacea:

Ptychoparia minuta Bradley, *P. matheri* n. sp. *Conocephalina whitehallensis* n. sp. *Pagodia seelyi* n. sp. *Agraulos saratogensis* Walc. This species was described as *Bathyurus armatus* Billings (Walcott, 32 Ann. Rep. N. Y. State Mus., p. 131) and as *Ptychoparia (A.) saratogensis* Walcott (Bull. No. 30, U. S. Geol. Sur., p. 21). *Lonchocephalus calcifernus* Walcott, previously described under the genus Conocephalites and Ptychoparia.

The species is closely related to *Lonchocephalus wisconsensis* Owen. It differs in having a relatively shorter frontal limb and longer palpebral lobes.

Ptychaspis speciosus Walcott.

Dicellocephalus Hartti Walcott. This was the *Conocephalites hartti* Walc. (32 Ann. Rep. N. Y. State Mus., p. 130).

The species differs from *Dicellocephalus minnesotensis* in details, but it appears to come within the limits of the genus.

Dicellocephalus tribulis n. sp. allied to *D. misa* Hall.

The author also describes and illustrates several tracks of crustaceans under Owen's gen. Protichnites. The author remarks that the particular trilobite that left tracks on the beaches of Potsdam sandstone time were undoubtedly species of the genus Dicellocephalus.

WALCOTT (Charles D.)—Continued

The author does not consider Climactichnites as the trail of a trilobite.

He describes *Protichnites septemnotatus* Owen and *P. Logananus* Marsh.

The author remarks that many of the impressions made by Protichnites tracks were trifid, and made by a crustacean having legs terminating in a joint that had three strong, narrow terminal spines.

On plate 45, the author illustrates *Neolenus serratus* from Burgess Pass, in which figure 4 shows the trifid arrangement of the short, strong spines of the terminal joint of the cephalic legs.

——— Cambrian Geology and Palæontology—2, No. 11. New Lower Cambrian subfauna.

Smithsonian Misc. Coll., vol. 57, No. 11, 1913.

The author describes from Robson Peak District the following new species of Crustacea:

Holmia macer n. sp. The species resembles *Holmia Kjerulfi,* but differs in details of the head and thorax.

Wanneria occidens n. sp. The species differs from *Olenellus Gilberti* in its small, short, palpebral lobe and strong marginal rim; also in the presence of an occipital spine.

Callavia eucharis n. sp. The species has 23 segments in the thorax.

Callavia perfecta n. sp. This species has 17 thoracic segments. It differs from *C. crosbyi* in having a more tapering glabella, smaller palpebral lobes, and in the absence of a strong occipital spine.

Olenellus Truemani n. sp. This species differs from *O. Thompsoni* in having shorter palpebral lobes and eyes, and smaller and shorter plural lobes of the third thoracic segment.

——— The Cambrian faunas of China.

Carnegie Inst., vol. 3, Aug. 1, 1913, 375 pp. and 29 plates.

The Trilobites are described and illustrated on pp. 99-228, pls. 1-24. Genus Agnostus Brongniart.

Agnostus chinensis Dames, very much like *Agnostus Pic Aoraghi,* 1902, p. 5, pl. 1, f. 28. *A. douvillei* Bergeron. The author places *A. koerferi* Monke, 1903, as a syn., *A. kushanensis* Walcott, *A. parvifrons latelimbatus* Lorenz, *A.* sp. undt.

Genus Microdiscus Emmons.

Microdiscus orientalis Walcott. The author remarks that the head and the occipital spine are much like those of *M. convexus* Walc. The transverse furrow of the glabella recall those of *M. speciosus* Ford.

Genus Redlichia Cossmann, 1902, to replace Hoeferia Redlich, 1901.

The author places the *Olenellus Forresti* Foord, Geol. Mag., Dec. 3, vol. 7, 1890, p. 99, pl. 4, figs. 2, 2a-b, under this genus.

Redlichia chinensis Walcott, differs slightly from the type. *R. noetlingi,* Redlich, 1901.

R. finalis Walcott, *R. nobilis* Walc., *R.* sp. undt. three species.

Genus Albertella Walcott, 1908.

Albertella pacifica Walcott.

The author compares the pygidium of this species with *A. bosworthi* Walc. and *Paradoxides desideratus* Barrande.

The genus Dorypyge Dames, 1883.

The author does not include Olenoides Walc., under the genus Dorypyge, remarking that it differs in the glabella expanding toward the front, while that of Dorypyge

WALCOTT (Charles D.)—Continued

contracts in front of the pits in the dorsal furrow; also that the pleural lobes of the pygidium of Olenoides have broad, shallow furrows, with sharp, narrow ridges separating them; while those of Dorypyge have narrow furrows, with broad, rounded ridges between them. Type *D. richthofeni Dames,* 1883.

Dorypyge bispinosa Walc., *D. richthofeni* Dames, *D. richthofeni laevis* Walc.

Genus Teinistion Monk, 1903.

The genus is characterized by the peculiar glabella, narrow frontal margin and spinose pygidium. Type *T. lansi* Monke.

Teinistion alcon Walc., *T. lansi* Monke, *T. sodeni* Monke, *T. typicalis* Walcott, described under the genus Dorypygella by Walcott, 1905.

Genus Stephanocare Monke, 1903, syn. Damesella Chione Walcott, 1905.

Stephanocare Monkei Walcott, *S. richthofeni* Monke, syn., *D. chione* Walc., *S. sinensis* Bergeron, *S.* sp. undt.

Genus Blackwelderia Walcott, 1906.

The genus differs from Teinistion in the character of the associated free cheeks and pygidia, and the frontal limb of the cephalon; from Dorypyge in the form of the glabella and free cheeks. The thoracic segments are alike in the two genera, and the pygidia are of the same type.

Blackwelderia alastor Walc., described under Dorypygella in 1905, *B. cilix* Walc., described under Olenoides ? in 1905, *B. sinensis* Bergeron described under Calymmene ? in 1899.

Genus Damesella Walcott, 1905. Type *D. blackwelderi* Walc.

The author remarks that in Damesella and Stephanocare the facial suture cuts the posterior lateral margin outside of the genal angle, so as to leave the genal angle on the fixed cheeks, and at the same time the spine, corresponding to the genal spine in other genera of the order Proparia, on the free cheek, so Beecher's classification should be modified in relation to the exceptions made in these genera.

Damesella bellagranulata Walc., *D. blackwelderi* Walc., *D. brevicaudata* Walc., *D.* sp. undt.

Genus Drepanura Bergeron, 1899, Genotype *D. premesnili* Berg.

Drepanura ketteleri Monke, *D. premesnili* Bergeron. *Ptychoparia* Corda, 1847.

In this memoir the genus is restricted to species having the characteristic of *Ptychoparia striata* Emmrich.

Ptychoparia axlis Walc., *P. granosa* Walc., *P. impar* Walc. and var., *P. kochibei* Walc., *P. ligea* Walc., *P. lilia* Walc., *P. tolus*, *P. typus* Dames.

Subgenus Ptychoparia (Emmrichella) Walcott, 1911.

Genotype *Ptychoparia theano* Walc.

The subgenus differs from the following genera:

1. Ptychoparia in its smooth glabella and larger palpebral lobe.

2. Liostracus in having an arched or nearly flat frontal limb and rim and more convex cranidium.

3. Conokephalina in its smoother glabella and wider fixed cheeks.

4. Anomocare in its smoother glabella and distinct palpebral ridge, and proportionately shorter eye-lobes and glabella.

The author described under this subgenus the following species:

Ptychoparia (Emmerichella) bromus Walc., *P. (E.) constricta* Walc., *P. (E.) eriopia* Walc., *P. (E.) mantoensis, P. (E.) theano* Walcott.

Genus Liostracus Angelin, 1854. Genotype *L. aculeatus.*

Two species which the author classes under the subgenus Emmrichella—*mantoensis* and *constricta*—approach most nearly to the genus Liostracus.

Genus Conokephalina Brögger, 1886. Genotype *C. ornatus* Brögger, 1877.

WALCOTT (Charles D.)—Continued

The genus occupies an intermediate position between Dikelocephalus and Ptychoparia, characterized by its elongated palpebral lobes, narrow free cheeks and elongated glabella, narrowing more or less slightly towards the broadly rounded front.

The Chinese species are: *Conokephalina vesta* Walc., *C. belus* Walc., *C. dryope* Walc., *C. maia* Walc. and *C.* sp. undt.

Genus Crepicephalus, Owen, 1852. Genotype *C. Iowensis* Owen.

Crepicephalus damia Walc. This species, which is nearly related to *C. Iowensis*, differs by the form of the frontal limb and rim of the glabella and other details.

C. convexus Walc. and *C. magnus* Walc.

Genus Lonchocephalus Owen, 1852. Genotype *L. hamulus* Owen.

The author refers the *Ptychoparia tellus* Walc., 1905, to this genus.

Genus Liostracina Monke, 1903. Genotype *L. krausei* Monke.

Genus Proampyx Frech, 1902. Genotype *Anomocare acuminatum* Ang.

Walcott remarks that Dr. Frech appears to have overlooked the fact that the spine of the genus Ampyx is a spinose extension of the front of the glabella, while the nasute projection of the frontal rim of *Anomocare acuminatum* is from an entirely different division of the head.

Proampyx burea Walc.

Genus Pterocephalus Roemer, 1852. Genotype *P. sancti-sabae* Roemer.

The author describes *Pterocephalus asiaticus* Walc., *P. busiris* Walc. and *P. liches* all from fragments of the head and tails.

Genus Shantungia Walcott, 1905. Genotype *S. spinifera* Walc.

The genus is characterized by the large palpebral lobes, nearly smooth truncato-conical glabella, and the long, spinose extension of the front, which is unlike that of Ampyx, as the latter proceeds from the glabella; while the spine of Shantungia is from the frontal rim, in the same manner as that of *Proampyx acuminatum* Ang., but differs in the character of the glabella and palpebral lobes.

The only species described is that of the type.

Genus Inouyia Walcott, 1911.

The species referred to this genus have a swollen, tumid frontal limb; small palpebral lobes; a convex subrectangular glabella; strong dorsal furrows about the glabella, and marked glabellar furrows.

Genotype *Agraulos Capax* Walc., 1906. In addition to the type the author describes *Inouyia abaris* Walc., *I. ? acalle* Walc., *I. ? armata* Walc., *I. divi* Walc., *I. ? inflata* Walc., *I. melie* Walc., *I. ? regularis* Walc., *I. thisbe* Walc. and *I. titiana.*

Genus Agraulos Corda, 1847.

The author refigures the type of the genus and describes the following:

Agraulos abrota Walc., *A. dirce* Walc., *A. dolon* Walc., *A. dryas* Walc., *A. nitida* Walc., *A. obscura* Walc., *A. sorge* Walc., *A. uta* Walc. and *A. vicina* Walc.

Genus Pagodia Walcott, 1905. Genotype *P. lotos* Walc.

The author remarks that the genus differs from Dolichometopus and from the type in the narrowing instead of widening of the glabella in front, in the presence of small instead of large eye-lobes, short instead of long postero-lateral limbs and obscure glabella furrows.

The species referred to this genus are *Pagodia bia, P. dolon, P. lotos* and *P. macedo* Walcott.

Genus Lisania Walcott, 1911. Genotype Anomocarella ? bura Walc.

The species referred to the genus are all small, represented by cranidia and associated free cheeks and pygidia.

Lisania agonius Walc., *L. ajax* Walc., *L. alala* Walc., *L. belemus, L. bura* Walc. and *L.* cf. *bura* Walc.

WALCOTT (Charles D.)—Continued

Genus Solenopleura Angelin, 1854.

Walcott figures pl. 17, figs. 12, *Solenopleura holometopa* Angelin for comparison, and describes as new the following species:

Solenopleura agno Walc., *S. beroe* Walc., *S. chalcon* Walc., *S. intermedia* Walc., *S. pauperata* Walc., *S.* sp. undt.

Genus Chuangia Walcott, 1911. Genotype *Ptychoparia batia* Walc.

The genus proposed for a group of Upper Cambrian Trilobites in which the cephalon has a truncato-conical or subquadrangular glabella; a narrow concave frontal limb and smooth test.

Three species are described: *Chuangia nitida, C. mais* and *C. framenta.*

Genus Menocephalus Owen, 1852.

Doctor Owen proposed this genus for Trilobites having a highly convex hemispherical glabella, with a narrow border and broadly rounded front cheeks, tumid surface pustulate.

The genotype of Menocephalus was destroyed by fire many years ago.

Dr. Walcott does not include in the genus the species described by Billings under the names of *Menocephalus sedgwicki* and *M. glabosus,* which he refers to Solenopleura, and remarks that *M. salteri* Devine, is the type of an undescribed genus.

The author describes *Menocephalus abderus,* the *Solenopleura abderus* Walc., 1905, *M. acanthus* Walc. *(Solenopleura acantha* Walc. 1905), *M. acerius* Walc., *M. acidalia (Solenopleura acidalia* Walc., 1905), *M. acis* Walc. and *M. admeta* Walc., *M. agave* Walc., *M. depressus* Walc., *M.* sp. undt.

Genus Levisia Walcott. Genotype *Agraulos agenor* Walc.

In this genus the cranidium is strongly convex, glabella truncato-conical, tumid and with only a trace of glabella furrows; occipital ring narrow, at the sides broadening rapidly toward the center, convex and extending backward into an obtuse spine; frontal limb narrow; fixed cheeks tumid, one-half as wide as the glabella and with small palpebral lobes midway of their length; postero-lateral limbs rather short and marked by deep, narrow intermarginal posterior furrow, that separates a narrow, rounded margin. The author describes *Levisia adrastia* Walc. (under the genus of Menocephalus Walc., 1905), *Levisia agenor* Walc. under the genus Agraulos Walc., 1905) and *Levisia nasuta* Walc., *Levisia richardsoni* Walc. The last two species are from the Upper Cambrian at Point Levis, Canada.

Genus Ptychaspis Hall, 1863. Genotype *Dikelocephalus miniscoensis* Owen.

The author describes from China, *Ptychaspis baubo* Walc., *P. bella* Walc., *P. brizo* Walc., *P. causu* Walc., *P. cadmus* Walc., *P. calchas* Walc., *P. callisto* Walc., *P. calyce* Walc., *P. campo, P. ceto* Walc. and *P.* sp. undt. Walc.

Genus Anomocare Angelin, 1854. Genotype *A. laeve* Ang.

The author describes fourteen species under this genus, all new except three species, which he refers to Dames.

Anomocare alcinoe, A. convexa, A. daulis, A. ephori, A. flava, A. latelimbatum Dames, *A. lisani, A. megalurus* Dames, described under the genus Liostracus; *Anomocare minus* Dames, *A. nereis* Walc., described in 1906 under the genus Ptychoparia, *A. subquadratum* Dames *(Concephalus subquadratus* Dames), and Anomocare sp. undt. several forms.

Genus Anomocarella Walcott, 1905. Genotype *A. chinensis* Walcott.

This genus differs from Anomocare in the absence of glabella furrows and the presence of a relatively narrow flattened frontal rim, etc.

The author places twenty-two species under this genus.

Anomocarella albion, A. baucis, A. bergioni, A. bigsbyi, A. biston, A. butes, A. chinensis, A. comus (Ptychoparia comus Walc., 1906), *A. hermias, A. irma, A. macar,*

WALCOTT (Charles D.)—Continued

A. smithi, A. speciosa Lorenz (described by Lorenz under the genus Anomocare). Anomocarella *subrugosa* Walc. *(Ptychoparia (Liostracus) subrugosa* Walc., 1906).

Anomocarella tatian Walc., *A. temenus* Walc., *A. tenes* Walc. *(Ptychoparia tenes* Walc., 1905), *A. thraso* Walc., *A. toxes,* Walc., *A. tutia, A. undata* Walc.

The last five species were described by Walcott in 1905, and six under the genus Ptychoparia.

Genus Cossia Walcott, 1911. Genotype *C. superba* Walc.

The author refers to his type for the generic description, and includes five species under the genus.

Coosia bianos, C. carme, C. daunus, C. decelus.

All previously described in 1905 under Anomocare, except *Coosia carme,* which was originally included under Anomocarella.

Coosia robusta and *C. superba* Walcott.

Genus Dolichometopus Angelin, 1854. Genotype *D. svecicus* Ang.

Walcott places Amphoton Lorenz, 1906, as a syn.

The author describes five species from China.

Dolichometopus alceste Walc., *D. deois* Walc., syn. *Bathyriscus asiaticus* Lorenz and *Amphoton steinmanni* Lorenz, *D. derceto* Walc., *D. dirce* Walc., *D. hyrie* Walc.

Genus Hysterolenus Moberg, 1898.

The author only includes one species, Hysterolenus ? sp. undt.

Genus Bathyuriscus Meek, 1873.

Bathyuriscus manchuriensis Walc.

Genus Asaphiscus Meek, 1873.

Asaphiscus iddingi Walc.

Genus Illaenurus Hall, 1863.

Illaenurus canens Walc., *I. ceres, I. dictys* Walc.

Ostracoda:

Genus Aluta Matthew.

The author includes under this genus six species previously described under the genus Bradoria.

Aluta bergeroni Walc., *A. enyo* Walc., *A. eris* Walc., *A. fragilis* Walc., *A. sterope* Walc., *A. woodi* Walc.

Merostoma.

Genus Amiella Walcott, 1911.

Amiella yunnanensis Mansuy (MSS.).

——— Cambrian Geology and Palæontology—2, No. 13. Dikelocephalus and other genera of the Dikelocephalinae.

Smithsonian Misc. Collections, vol. 57, No. 13, 1914.

The author includes under the family Dikelocephalina Beecher, 1897, the following genera:

Dikelocephalus Owen, 1852.

Referring to the restricted genus the following species:

Dikelocephalus minnesotensis Owen, and a variation *D. dalyi* n. sp. The palpebral lobe of *D. dalyi* is shorter than in typical Dikelocephalus, in this respect, resembling some species of Anomocare, but not the typical species *Anomocare laeve* Angelin, *D. Texanus* n. sp.

Dikelocephalus hartti Walcott. This is the *Conocephalutes hartti* Walc., 1879.

D. limbatus Hall, *D. tribulis* Walc., 1912, and *D. vanhornei* n. sp. The cranidium is much like the genotype, but it has a shorter glabella and wider fixed cheeks.

2. Conokephalina Brögger, 1886, genotype *C. ornatus* Brögger.

WALCOTT (Charles D.)—Continued

Walcott refers *Dikelocephalus misa* Hall to this genus. The other species referred by Brögger to the genus, such as *Dikelocephalus osceola* Hall, are referred by Walcott to a new genus Osceolia, and *Dikelocephalus spiniger* to the new genus Calvinella.

3. Saukia, new genus. The genus has a narrow frontal border about the cephalon, and a glabella proportionately more elongated than in Dikelocephalus. The pygidium is less expanded and more elongate than that of Dikelocephalus. Genotype *Dikelocephalus lodensis* Whitf.

The author describes *Saukia coloradoensis* n. sp., *S. crassimarginata* Whitfield, 1882, *S. fallax* n. sp., *junia* n. sp., *S. leptaenarum* Wiman, 1907; *S. leucosia* n. sp., *S. lodensis* Whitf. the type *S. marica* Walc., 1886; *S. pepinensis* Owen, 1852; *S. pyrene* n. sp., *S. rustica* n. sp., *S. stosei* n. sp., *S. wardi* n. sp.

4. Osceolia, new genus. This genus is characterized by its concave frontal limb, palpebral lobes, narrow fixed cheeks and transverse pygidium with its anterior segment extended beyond the margin as a long spine. Genotype *Dikelocephalus oseola* Hall, 1863.

5. Calvinella, new genus. Genotype *Dikelocephalus spiniger* Hall, 1863. This genus is like Saukia, but differs in form of the glabella, presence of strong occipital spine, and proportionally more elongated pygidium. It differs from Osceola in frontal limb of cephalon, presence of occipital spine and character of pygidium.

The author refers to the genus *Dikelocephalus newtonensis* Weller, 1903; *Calvinella ozarkensis* n. sp. *Dikelocephalus spiniger* Hall, 1863, and *Calvinella tenuisculpta* n. sp.

——— Cambrian Geology and Palaeontology, Part 3, No. 1. The Cambrian faunas of Eastern Asia.

Smithsonian Misc. Coll., vol. 64, No. 1, 1914.

The author gives a historical review with a summary of the genera and species.

A new genus, Tsinania, with *Illaenurus canen* for the genotype, is given on page 43. The genus differs from Illaenurus Hall, in having the cranidium rounded in front, by the incurving of the facial sutures, and short postero-lateral limbs. He refers several species to the new genus previously included under Hall's genus, viz: *Tsinania canens, T. ceras, T. cleora* and *T. dictys.*

——— Cambrian Geology and Palaeontology, No. 3. Cambrian Trilobites.

Smithsonian Misc. Coll., vol. 64, No. 3, 1916.

The author, under the Order Proparia, describes several new genera.

Family Menomonidae—Menomonia a new genus with *Conocephalites, calymenoides* Whitfield as the genotype.

Millardia, a new genus with *M. semele* as genotype. Refers one new species *M. avitas* and *Conocephalites optata* Hall, also, to the genus.

Dresbachia, a new genus with *D. anata* as the genotype.

Norwoodidæ, a new family with a new genus, Norwoodia, with five new species: Genotype *N. gracilis,* also *N. ponderosa, N. Saffordi, N. simplex* and *N. tenera.*

The cranidium, with its Ptychoparia-like glabella and small eyes and broad pleural furrows, are primitive, while the few thoracic segments (8 or 9) and relatively large tail, suggests the sub-family Phacopinae. Under the order Opisthoparia, he describes *Agraulos stator* n. sp.; also Acrocephalites Wallerus, with a translation of that author's description of the genus, with nine new species. Refers *Solenopleura ? stenometopa* Ang. and *Conocephalites vulcanus* Bill. to the genus.

Compares the new species *A. Haynesi* and *tutus* with the genotype, *Acrocephalites insignis* has narrower fixed cheek and frontal limb of *A. stenometopus, A. Americanus*

WALCOTT (Charles D.)—Continued

is a larger species than the genotype. *A. aster* has a frontal boss much like the type. *Acrocephalites multisegmentus* has 25 thoracic segments. *A. aoris,* a species much like *A. tutus;* also *A. glomeratus,* a species like *A. ? majus.*

The author describes seven species under Lorenz's genus Alokistocare, of which *A. althea, A. ? labrosun, A. pomona* and *A. ticida* are new. He refers *Ptychoparia ? Linnarssoni* and *P. ? prospectense* to the genus, and includes a figure and description of the genotype *Conocephilites subcornatus* Hall and Whitfield, which he compares with the new species *A. althea.*

The author includes under the genus Lonchocephalus eight species, five of which are described as new: *Lonchocephalus appalachia, L. bunus, L. pholus, L. plena, L. sospita.*

Describes and illustrates the genotype *L. Chippewaensis* Owen. Refers Shumard's *Conocephalites minor* and *C. minutus* Bradley to the genus.

Dr. Owen, plate 1-A, fig. 15, Geol. Sur. Wis., Iowa and Minnesota, 1852, p. 624, refers to Lonchocephalus ? a pygidium with lateral spines, similar to *Dikelocephalus Iowensis,* which Walcott places as the genotype of Crepicephalus.

The author remarks that Lonchocephalus is most nearly related to Liostracus Angelin, with only the cranidium for comparison. The difference between them is in the frontal limb and rim, and the absence of well-defined glabella furrows in Liostracus.

The author uses the *Conocephalites calciferous* for the genotype of a new genus Saratogia. placing under it six species, four new: *S. arses, S. aruno, S. hera* and *S. volux,* with *Crepicephalus Wisconsensis* Owen; including as syn. *Dikelocephalus latifrons,* described by Hall, also by Shumard, under this genus.

In the family Ceratopygidae, genus Crepicephalus Walcott (not Owen), the author includes some 20 species.

Walcott uses *Dikelocephalus ? Iowensis* Owen, for the genotype.

Owen's genus, as the name implies, was for a slipper-shaped, tapering glabella, a true Ptychoparia species, which Corda named in 1847. Dr. Owen used the term Dikelocephalus for the mattock-shaped heads, and refers to Dikelocephalus such species as Walcott genotype, although Owen referred to Lonchocephalus, a form like *Crepicephalus Iowensis* Walcott, on p. 624, pl. 1-A, fig. 15.

Lonchocephalus might replace in part Anomocare, and Crepicephalus be referred to Lonchocephalus for Owen's Lonchocephalus, p. 624, pl. 1-A, fig. 15.

Walcott divides the pygidae into two groups:

1. The *Crepicephalus Iowenis* group.

In which the postero-lateral margins of the pygidium extend backward on each side from a broad base into a sharp, narrow spine. Test nearly smooth. Upper Cambrian.

2. *Crepicephalus Texanus* group.

In which the postero-lateral spines are long, slender, and attached to the side of the pleural lobe above the margin. Test granulated. Lower Cambrian.

The author describes and figures *Crepicephalus angusta, C. camiro, C. comus, C. cossensis, C. coria, C. dis, C. Iowensis* (Owen) *A. Liliana, C. Texanus* (Shumard) var. *danace* and *elongatus, C. thoosa, C. tripunctatus* (Whitfield) also var. *magnispinus, C. tumidus, C. unca, C. unzia, C. upis,* and two doubtful species.

Under the Family Oryctocephalidae, the author includes the new genus Vanuxemella. This genus, represented by *V. contracta* and *V. nortia,* from the Lower Cambrian, has a simple form, with some features suggesting Albertella. It differs in absence of glabellar furrows, shorter eye lobes, absence of prolonged third segment of thorax, with only four thoracic segments. The long spines of the tail spring from about the fifth segment, while in Albertella they appear to be the extension of the first or second anterior segment.

Walcott includes under his genus Karlia the genotype *K. minor* and *Menocephalus*

WALCOTT (Charles D.)—Continued

Salteri ? Rominger, which he refers to *Karlia Stephensis.* Dr. Matthew, 1899, refers the genus to Dorypyge, and the species to *Dorypyge Dawsoni.*

The author describes a new genus Hanburia with its genotype *H. gloriosa.* Remarks the large pygidium and few thoracic segments suggest the order Opisthoparia and family Asaphidae. From Burgess Pass above Field, B. C.

Under Tsinania, the *Illaenurus canens* Walc., as the genotype, Walcott, includes the new species *T. cleora* and *T. elongata.*

Plate 38 gives figures of *Wanneri Walcottana,* figs. 1 and 2.

——— Cambrian Geology and Palæontology—3, No. 5. Cambrian Trilobites.

Smithsonian Misc. Collections, vol. 64, No. 4, pp. 303-456, plates 45-67, 1916.

The author describes and illustrates the following Cambrian Trilobites:

Corynexochus bornholmiensis Grönwall, *C. brennus* Walc., *C. bubaris* Walc., *C. capito* Walc., *C. clavatus* Walc., *C. delagei* Miquel., *C. minor, C. senectus* (Billings), *C. spinulosus* Ang., *C. stephenensis* (Walc.).

Refers *Corynexochus romingeri* Matt. to *C. stephensis, Corynexochus ? umbonatus* Angelin to the genus Æglina.

The new subgenus Bonnia is proposed as a subgenus to Corynexochus, with *Bathyurus parvulus* as the genotype.

The author includes *Corynexochus (Bonnia) busa* nov., *C. (Bonnia) fieldensis,* the *Protypus fieldensis* Walcot, 1908.

Corynexochus (Bonnia) parvulus the *Bathyurus parvulus* Billings, 1861.

Sub-family Dolichometopinae.

Bathyuriscus adaeus nov., *B. anax* nov.

The *Bathyuriscus productus* (H. & W.) Walc., in part, 1886, Bull. U. S. Geol. Sur., No. 30, pl. 30, fig. 1, 1a, 1b, 1g and 1h.

Bathyuriscus atossa nov., *B. bantius* nov., *B. batis* nov., *B. belesis* nov., *B. belus* nov., *B. ? bithus* nov., *B. Haydeni* Meek, *B. Howelli* Walc., *B. Manchuriensis* Walc., *B. ornatus* Walc., *B. rotundatus* Rominger, *B. Stoliczkai* Reed, *B.* sp. undetermined, Nos. 1 and 2.

Bathyuriscus (Poliella) new subgenus.

Most of the species of Poliella are small, with from seven thoracic segments to eleven segments and a small pygidium.

The genotype *Bathyuriscus (Poliella) anteros* Walcott.

The author includes eight species under the subgenus: *Bathyuriscus (Poliella) anteros* nov., *B. (P.) powersi, B. (P.)occidentalis* nov., *B. (P.) primus, B. (P.) caranus* nov., *B. (P.) sylla, B. (P.) balus* nov., *B. (P.) probus.*

Dolichometopus.

Dr. Walcott refers eleven species to this genus: *Dolichometopus acadicus* Matt., *D. ? alceste* Walc., *D. baton* Walc., *D. ? bessus* Walc., *D. bion* Walc., *D. boccar* Walc., *D. ? deois* Walc., *D. ? derceto* Walc., *D. ? dirce* Walc., *D. ? expansus* (Walc.), *D. productus* (H. & W.), *D. suecicus* Ang., *D. tontoensis* Walc.

The other species of Dolichometopus, such as *Dolichometopus ? convexus* Billings, referred to Bolbocephalus, *D. ? gibberulus* Bill., to Platycolpus, *D. hyie* Walc., to Anomocare, *D. occidentalis* Matt. to Bathyuriscus, *D. ? rarus* Bill. to Bolbocephalus, *D. tatei* Woodw. to Redlichia.

The author forms a new subgenus, for certain species with a small palpebral lobe, that lack genal spines on the free cheek, with *Dolichometops (Housia) varro* Walcott as the genotype.

Family Asaphidae, sub-family Ogygiocarinae.

WALCOTT (Charles D.)—Continued

Ogygopsis Klotzi (Rominger).

Orria new genus, with *Orria elegans* Walcott, as the genotype. Both Orria and Ogygopsis suggest a stage of development between Bathyuriscus and Ogygiocaris. The form is Ogygopsis-like, but differs in that the cephalon is smaller in proportion to the thorax and the pygidium; fixed cheeks nearly absent between palpebral lobes and glabella; palpebral lobes large and close to glabella; postero-lateral limbs long and narrow antro-lateral limbs; only a narrow space between the glabella and facial sutures; pleural grooves of thorax segments broad and straight, instead of narrow and diagonal.

Asaphiscus the author refers to the genus.

Asaphiscus calenus Walc., *A. camma* Walc., *A. ? capella* Walc., *A. ? granulatus* Walc., *A. Iddingsi* Walc., *A. ? minor* Walc., *A. ? unispinus* Walc., *A. Wheeleri* Meek, the genotype; also *A. agatho* Walc., *A ? anaxis* Walc., *A. calanus* Walc., *A. ? duris* Walc., with three sp. undt., and *A. ? florus* nov.

Blainia new subgenus.

The species referred to Blainia have nine thoracic segments and from six to eleven distinct anchylosed segments in the pygidium. Genotype *Asaphiscus (Blainia) gregarius* Walc.

Dr. Walcott includes four new species under the subgenus:

Asaphiscus (Blainia) elongatus, A. (B.) glabra, A. (B.) paula.

Blountia new genus.

The author refers seven species to this genus. Genotype *Blountia minula* Walc., *Blountia ? alemon* Walc., *B. alethes* Walc., *B. alexas* Walc., *B. amage* Walc., *B. andreas* Walc., *B. anser* Walc., and *B. mimula* from the Upper Cambrian.

Maryvillia new genus. Genotype *M. Arion* and *M. Ariston* nov.

The pygidia associated with the cranidae of these species are elongate, with about fourteen segments, which suggest transition from Blountia to Tsinania, as represented by such species as *Tsinania canens* Walc., etc.

Family Olenidae: Marjumia new genus. Genotype *M. typa* Walc.

This genus appears to unite characters found in several genera. The cephalon is essentially that of Asaphicus, the thorax that of Ptychoparia, and the pygidium that of *Peltura scaraboides* and *Parabolina megalops.*

In addition to the type the author describes *Marjumia callas* nov. Lisania Walc. genotype *Anomocarella bura* Walc. and *L. ? breviloba* nov.

Illaenurus quadratus Hall.

Mesonacis Gilberti Meek.

Proparia, Family Eodiscidae: Pageti new genus. Genotype *P. bootes* Walc. The new genus was proposed for the forms of Eodiscidae, in which the eye, the free cheeks and facial sutures are developed. Two species described *Pagetia bootes* and *P. clytia.*

——— Cambrian Geology and Palæontology IV, No. 2. The Albertella fauna in British Columbia and Montana.

Smithsonian Misc. Coll., vol. 67, No. 2, 1917, May 9, 1917.

The author describes from this formation the following Crustacae:

Agraulus stator Walc.

Ptychoparia candance nov.

The elongated body and small pygidium suggest *Agraulos stator,* but the cranidium is that of Ptychoparia, and there are 16 thorax segments, while *A. stator* has 22, a middle Cambrian form.

Ptychoparia ? charax nov.

This species is probably a subgenus with a Ptychoparia-like cranidia, with a broad concave frontal border and rim, that will undoubtedly be placed in a subgenus.

WALCOTT (Charles D.)—Continued

Ptychoparia ? cilles nov. *P. pylas* nov., from Gordon Creek, Montana.
Crepicephalus chares nov., related to *C. camiro.*
Vanuxemella nortia Walc. *Olenopsis* cf. *Americanus* Walc.
Albertella Bosworthi Walc., *A. Helena* Walc., *A. levis* nov.
Zacanthoides charilla nov. compares *Z. idahoensis Z. ? cimon* nov., *Z. cnopus* nov., the thorax has the great median spine on the 8th segment instead of the 5th as in *Z. Idahoensis.*
Neolenus constans nov.
Bathyuriscus Rossensis nov., characterized by the very much produced genal spines extending backwards to the pygidium.
Bathyuriscus cf. *Rossensis* nov. The glabella is longer and more slender proportionally than that of *Rossensis.*
but differs in many details.
Bathyuriscus (Poliella) chilo nov.
Differs from *B. (P.) sylla* of the Chetang formation in the nearly straight sides of the glabella, and narrower and shorter associated pygidium. Related to *B. (P.) primus,*

Wallereus (Iran D.) Undersokungen ofver zonen med *Agnostus laevigatus* 1, Vestergotland Jämte en inledande ofversikt af Vestergotlands samtliga Paradoxideslager Lund, 1895, 72 pp., plate.

Agnostus laevigatus Dalm. also var. *armata* Linrs., *A. exsculptus* Ang., also forma *sulcifera, integra, Agnostus planicauda* Ang.; also forma *vestgothica, A. pisiformis* Linné *A. fallax* Linrs. forma *ferox* Tulb. and var. *insignis* n. var.
Conocephalus suecicus n. sp.
Acrocephalites stenometopus n. gen. for Angelin's *Solenopleura ? stenometopus.* It is characterized by a suture running inwards to the rim of the head shield in front of the eyes, a pointed front to this shield, and a small knob in front of the glabella.
Liostracus costatus Ang. *Proceratopyge conifrons* n. gen. et sp. This genus, as its name indicates, is the typical species of the Ceratopyge. It differs in its conical glabella, its four pairs of glabella furrows and the triangular front fold of the rim.
Toxotis pusilla n. gen. et sp. This is a remarkable genus, which retains several embryonic or early larval characters, as the narrow glabella, and three swellings on the front of the shield.
Paradoxides sp. *Leperditia primordalis* Linrs. This paper was reviewed by G. F. Matthew, Amer. Geol., vol. 17, 1896, pp. 49-50.

Walther (Karl). Das Unterdevon zwischen Marburg a L. und Herborn Nassau.

Neues Jahrb. Mineralogie, Beil, vol. 17, 1903, pp. 1-75, 4 plates.
Cryphaeus laciniatus F. R., *C. Lethaeae* Kays. *Cryphaeus* sp. *Homalonotus armatus* Burm., *H. gigas* A. Roem., *H. crassicauda* Sandb. *Homalonotus* sp. *Lichas* cf. *Haueri* Barr. *Phacops* sp.
Ostracoda: *Beyrichia strictisulcata* (Sand.) Jones. *Bollia varians* (Sand.) Jones.

——— Beitrage zur Geology and Palæont des älteren Paläoz in Ostthuringen.

Neues Jahrb. für Mineral, etc., 1907, Bd. XXIV.

Ward (J.) Contributions to the geology and palæontology of North Staffordshire, No. vi. Palæontology of the Cheadle Coalfield.

Stone Rep. N. Staff, F. Cl. 40, 1906, pp. 102-137, pl. 2.

Wanner (Arteus). A new species of Olenellus from the Lower Cambrian of York County, Penn.

Proc. Washington Acad. Sci., vol. 3, 1901, pp. 276-272, plate.
Olenellus (Holmia) Walcottanus n. sp.
Dr. Walcott refers this to his new genus Wanneria.

Wenjukow (P. N.) Die Fauna der Silurischen Ablagerungen des Gouvernments Podolien.

Mater. Geol. Russ, vol. 19, 1899, pp. 21-266, plates 1-9.
Trilobita: *Encrinurus punctatus* Brunn., *E. ? obtusus* Ang. *Sphaerexochus mirus* Beyr. *Illaenus (Bumastus) barriensis* Murch., *I. Bouchardi* Barr. *Calymmene tuberculata* Brunn. *Phacops (Acaste) Downingiae* Murch., *P. (Odontochile) caudatus* Brunn. *Proetus concinnus* Dalm. *Eurypterus Fischeri* Eichw.
Ostracoda: *Leperditia tyraica* Schm. *Beyrichia inornata* Alth., *B. idonea* n. sp., *B. Buchiana* Jones, *B. inclinata* n. sp., *B. Reussi* Alth. *Entomis reinformis* n. sp. *Primitia concinina* Jones.

Weller (Stuart). Descriptions of the Cambrian Trilobites from New Jersey, with notes on the age of the Magnesian Limestone series.

Ann. Report Geol. New Jersey for 1899, pp. 47-53, plate.
The species described are *Olenellus Thompsoni* Hall. *Liostracus ? jerseyensis* n. sp. Referred to Solenopleura by the author in Palæontology New Jersey, vol. 3, p. 119.

——— Report on the Palæontology of New Jersey.

Geol. Sur. New Jersey, vol. 3, Trenton, 1903, 388 pp., 23 plates.
Cambrian Fauna: Olenellus Thompsoni Hall, *O.* sp. undet.
Ptychoparia Blairi n. sp., *P. Newtonensis* n. sp., *P. calcifera* Walc., *P.* sp. undet. *Agraulos saratogensis* Walc. *Solenopleura jerseyensis* n. sp. *Anomocare parvula* n. sp. *Dikelocephalus newtonensis* n. sp. Referred by Walcott to Calvinella.
Ordovician Fauna: *Asaphus canalis* Whitf. Referred to *Asaphella gryracanthus* by Raymond. *Illaenurus columbiana* n. sp. Referred to *Symphysurus convexus Bathyurus* sp. undet.
Trenton Fauna: *Harpina ottawensis* Bill. Referred to Eoharpes by Raymond. *Trinucleus concentricus* Eaton. *Isotelus gigas* DeKay. *Ptychoparia jerseyensis* n. sp. Referred to *Bathyurus longispinus* Walc., by Raymond. *Bumastus trentonensis* Emm. The author figures the small species described by Emmon under Illaenus, with eight thorax segments. This is taken for the type by Clarke, and described as Bumastus by Billings under the name of *Milleri.* Emmon's *Bumastus trentonensis* is a larger species; referred by Raymond to *Bumastus Billingsi. Bumastus tranversalis* n. sp. and *B. elongatus* n. sp. *Proetus latimarginatus* (name pre-occupied by H. & C.). *Proteus Welleri* nov., *P. brevimarginatus* n. sp. *Cyphaspis trentonensis* n. sp. *Bronteus lunatus* Bill. *Arges tuberculatus* n. sp. *Platymetopus trentonensis* Conrad. *Odontopleura parvula* Walc. *Encrinurus trentonensis* Walc. and *Calymmene senaria* Conrad. *Ceraurus pleurexanthemus* Green. *Pseudosphaerexochus trentonensis* Clarke. *Pterygometopus callicephalus* Hall, *P. intermedius* Walc.
Ostracoda: *Leperditia fabulites* Conrad, *L. ornata* n. sp. *Eurychilina oculifera* n. sp., *E. jerseyensis* n. sp.
Silurian Fauna: *Proetus pachydermatus* Barrett, *P. ? depressus* n. sp., *P. spinosa* n. sp. (a doubtful species of Proetus or Phacops). *Calymmene camerata* Conrad. *Dalmanites aspinosa* n. sp.
Ostracoda: *Leperditia altoides* n. sp. *Beyrichia sussexensis* n. sp., *B. Barretti* n. sp., *B.*

WELLER (Stuart)—Continued

perinflata n. sp., *B. jerseyensis* n. sp., *B. nearpassi* n. sp., *B. deckerensis* n. sp. *Bathocypris nearpassi* n. sp.

Devonian Fauna: *Dalmanites pleuroptyx* Green. *Proetus protuberans* Hall. *Lichas pustulosus* Hall. *Homalonotus Vauxemi* Hall. *Phacops Logani* Hall. *Dalmanites dentatus* Barrett. *Homalonotus DeKayi* Green. *Phacops rana* Green. *Dalmanites* sp. and *D. anchiops* Green.

Leperditia alta Conrad. *Beyrichia Kummelli* n. sp., *B. wallpackensis* n. sp., *B. montaguensis* n. sp., *B. Smocki* n. sp., *B. nanliensis* n. sp. *Leperditia elongata* n. sp., *L. gigantea* n. sp. (pre-occupied for a species by Roemer).

——— The Palæontology of the Niagaran Limestone in the Chicago area—The Trilobita.

Bull. Chicago Acad. of Sciences, No. iv, part 2, 1907, pp. 163-281, plates 16-25.

The author gives classification of the Trilobita and bibliographic list of the species of North American Silurian Trilobita; also a description of the following species:

Harpes Telleri n. sp. *Illaenus insignis* Hall, *I. Harrisi* n. sp., *I. niagarensis* Whitf., *I. armatus* Hall, *I. ioxus* Hall, *I. graftonensis* M. & W., *I. transversalis* n. sp., *I. imperator* Hall, *I. cuniculus* Hall, *I. chicagoensis,* n. sp.

Illaenoides n. gen. Similar to Illaenus, but with the head more strongly trilobed, with longer and stronger dorsal furrows. The eyes are small and situated much farther forward than in Illaenus. Thorax and pygidium as in Illaenus.

Illaenoides triloba n. sp. *Proetus channahonensis* n. sp., *P. Handwerki* n. sp. *Cyphaspis intermedia* n. sp. *Bronteus acamas* Hall.

Lichas: *Corydocephalus phlyctainodes* Green. *Dicranopeltis decipines* W. & M., *D. nasuta* n. sp., *D. Telleri* n. sp. *Metopolichas pugnax* W. &. M., *M. Ferrisi* n. sp.

Arctinurus occidentalis Hall, *A. chicagoensis* n. sp. *Acidaspis Vanhornei* n. sp. *Odontopleura illinoisensis* n. sp. *Ceratocephala goniata* Warder. *Encrinurus Egani* Miller, *E. tuberculifrons* n. sp. *Calymmene niagarensis* Hall. *Ceraurus niagarensis* Hall, *C. Hydei* n. sp. *Sphaerexochus Romingeri* Hall. *Deiphon americanus* n. sp. *Staurocephalus obsoleta* n. sp. *Phacops Handwerki* n. sp. *Dalmanites platycaudatus* n. sp., *D. illinoisensis* n. sp., *D. vigilians* Hall, *D. arkansanus* Van Ingen, *D. verucosus* Hall.

——— Kinderhook faunal studies. The Fauna of the Fern Glen Formation.

Bull. Geol. Soc. Amer., vol. 20, pp. 265-332, pls. 10-15, 1909.

Proetus fernglenensis n. sp.

The author compares this with *Proetus missouriensis,* but that species is proportionately longer, with a glabella which is somewhat broader and subtruncate in front.

——— Descriptions of new species of Ordovician fossils from China.

Proc. U. S. Nat. Mus., vol. 32, No. 1549, 1907, pp. 557-563.

The Trilobites described are *Ampyx chinensis* n. sp. *Asaphus blackwelderi* n. sp., *A. asiaticus* n. sp., *A. taningensis* n. sp., *A. laevis* n. sp., *A. chinensis* n. sp. *Megalaspis minor* n. sp. *Illaenus bronteoides* n. sp. These species were afterwards figured in Researches in China, Carnegie Inst. of Washington, vol. 3, 1913.

——— A report on Ordovician fossils collected in Eastern Asia in 1903-04.

Research in China, vol. 3, 1913, pp. 279-294, plates 25-26.

The author describes Ampyx chinensis allied to *A. nasutus* Dalman. Ampyx sp. cf. *A. costatus* Boeck. Bathyurus sp. undt.

Asaphus blackwelderi n. sp. The Chinese species may be distinguished from *A. expanus* Dalman, on account of its obsolete glabella.

WELLER (Stuart)—Continued

Asaphus taningensis n. sp., *A.* sp. cf. *A. expansus* Dalman, *A. asiaticus, A. laevis* Weller, *A. chinensis* Weller.

The author also describes several species of the Asaphus without identification.

Megalaspis minor Weller. *Illaenus bronteoides* Weller. *Proetus* sp. undt. *Calymmene* sp. undt. *Pterygometopus* sp. undt.

The author remarks, that among the Trilobites the most conspicuous feature in the Chinese fauna is the great variety of Asaphidae belonging to the genera Asaphus, Megalaspis and Isotelus.

Westergärd (A. H.) Index to N. P. Angelin's Palæontologia Scandinavica, with notes, Lund, 1910.

Meddelande från Lund's Geologiska Fältklubb, Ser. B, No. 5.

The author remarks that the first fasciculus of the work, which is printed in quarto and written in Latin, (the copy I have bears no date. Plate 22 was not issued in this edition), but published in Fasc. 2, was issued in 1851 with pp. 1-24, and plates 1-xxiv, under the title, "Palæontologia Svecica."

Lindström's edition, 1878, states that this appeared in 1852.

The second fasciculus, containing plates xxv-xli and pp. 25-92 (or rather pp. 21-92, because the latter part of the third sheet of fasc. 1 was reprinted in essentially altered form), appeared in 1854, when the title of the work was also altered into "Palæontologia Scandinavica," for the evident reason that there are a great number of species from Norway and Bornholm cited in this fasciculus. Pages l-lx were added, containing an account of Silurian stratigraphy, and one page of "Addenda et Corrigenda," besides which plates xx and xxii were enchanged for new ones.

In 1878 the entire work was re-edited by G. Lindström, under the title of "Pars 1 Iconographia Crustaceorum Formationis Transitionis." In this work facs. 1 and 2 form only the first part of the projected work.

In 1855 Angelin got a public subvention for editing fasc. 3. This was not published, but several of the plates, intended for this fasc. were printed. Two of these plates, A and B, reproductions exclusively of Crustacea, have probably been appended to privately distributed copies of Palæontologia Scandinavica. Some of these plates distributed in some way are cited in literature, Grönwall Danm. Geol. Unders. 11 Raekke, No. 13, p. 107 (note at foot of page), quotes Table XLIII, on which *Paradoxides Davidis* Salter is reproduced under the name *Paradoxides Pingelli* Beck MS.

Before Angelin set to work writing "Palæontologia Scandinavica," he sold collections of Swedish fossils, several of which he had himself named. A list of these collections, embracing five decades, was printed under the title "N. P. Angelini Mus. Pal. suecicum, Sectio prima, Petrefacta formationis s. d. transitionis superiors centuria, l ma."

When Angelin in "Palæontologia Scandinavica" cites one of these new species he puts "nob" after the name and not new species.

The notes on pp. 12-48, contain notes and corrections to Angelin's work. Lorenz, since the issue of this Index, has referred *Solenopleura branchymetopus* Ang. to the genus to *Ptychoparia.*

These notes are supplementary to page 1, Occasional Paper iv, Cal. Acad. of Science, 1893.

In a note to the author from Dr. Sv. Læonh. Törnquist, who was a student under Angelin, he remarks, that "as to the plates XLIII-XLV of 'Palæontologia Scandinavica,' Angelin seems himself to have rejected them. Be this as it may, when after the author's death the work was re-edited by the Academy of Science, it was decided that the said plates, owing to their incorrectness, should be maculated, and all the copies were accordingly destroyed, in order to prevent their being cited. Some proof sheet may,

however, have escaped destruction since, and Angelin's memory will certainly be best served if they are not mentioned."

Whitborne (C. F.) Descriptions of the Fossils from the Morte Slates.

Quart. Jour. Geol. Soc. London, vol. 53, 1897, pp. 445-462, plate 31.

Dalmanites (Cryphaerus) laciniatus F. Rom. *Dalmanites* sp. *Homalonotus* sp.

Whiteaves (J. F.) Preliminary list of fossils from the Silurian (Upper Silurian) rocks of the Ekwan River and Sutton Mill Lake. Keewatin collection by D. B. Dowling in 1901, with descriptions of such species as appear to be new.

Report Bureau of Mines, 1912, vol. 21, part 2, pp. 157-168.

Crustacea Isochilinina or Leperditia sp. indet.

Calymmene Niagarensis Hall. *Illaenus* sp. indet. *Bronteus Ekwanensis* sp. nov., *B. aquilonaris* sp. nov. *Ceraurus Tarquinius* Billings.

These species were also described in Geol. Sur. Canada, Ann. Report, new ser., vol. 14, 1901, F. Appendix I, pp. 38-60.

White (David). Fossil Flora of the Coal Measures of Brazil.

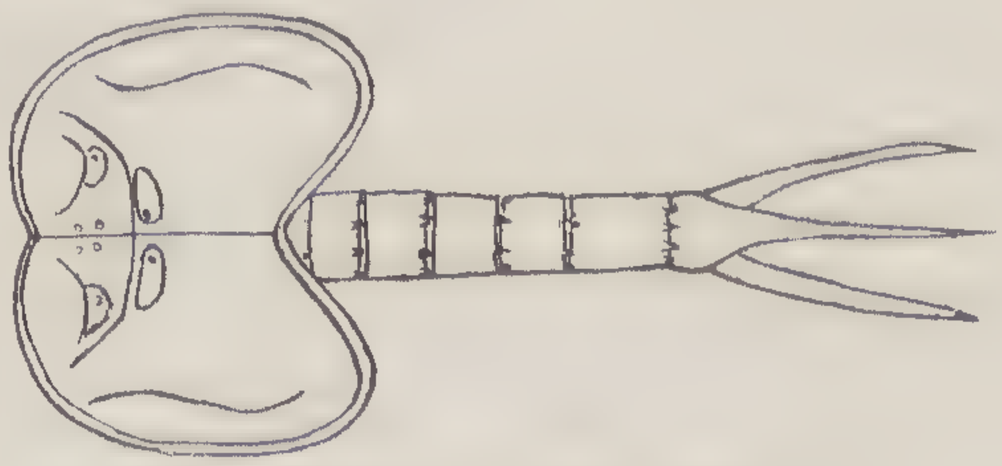
Commissäo de Estudos das Minas de Carväo de Pedra do Brazil. Final Report by I. C. White, 1908.

David White describes under the name of *Hastimima whiteri* certain fragmentary remains from the Carbonic plant beds of Santa Catherinia—a doubtful plant, referred by palæontologists to the Eurypteridae as the genus Hastimima White.

Whitfield (R. P.) Contributions to the Palæontology of Ohio.

Geol. Survey Ohio, vol. 7, 1893, pp. 407-494, plates 1-13.

Eurypterus Eriensis Whitf.. *Leperditia alta* Conrad. *Echinocaris sublevis* Whitf., *E. pustulosa* Whitf., *E. multinodosa* Whitf. *Palaeopalaemon Newberryi* Whits. *Aristozoe Canadensis* n. sp.



Echinocaris Punctatus Whitfield

——— Observations on the fauna of the rocks at Fort Cassin, Vermont, with descriptions of a new species.

Bull. Amer. Museum Nat. Hist., vol. 5, 1980, pp. 25-39, plates.

Bolbocephalus Seelyi n. gen. et sp., *B. truncatus* n. sp. *Bathyurus (Bathyurella) planicephalus* n. sp.

——— Notice and description of new species and new genus of Phyllocardæ.

Bull. Amer. Museum Nat. Hist., vol. 7, 1896, pp. 299-304.

Entomocaris Telleri n. gen. et sp. *Ceratiocaris Monroei* n. sp., *C. poduriformis* n. sp.

——— Note on the hypostoma of *Lichas* (*Terataspis*) *grandis*, Hall.

Bull. Amer. Museum Nat. Hist., vol. 9, 1897, pp. 41-42, figures.

WHITFIELD (R. P.)—Continued

——— and **Hovey** (E. C.) Catalogue of the type and figured specimens in the Palæontological collection of the Geological Department American Museum Natural History.

Bull. Amer. Museum Nat. Hist., vol. xi, 1900, 356 pp.

Williams (H.) assisted by **Breger** (C. L.) The Fauna of the Chapman Sandstone of Maine.

U. S. Geol. Sur. Prof. Papers No. 89, 1916.

The authors describe *Homalonotus laticaudatus* nov., distinguished from *H. delphinocephalus* by its broader pygidium, very much like the Rheinish Devonic sp., *H. crassicaeda* Sandb. *Homalonotus Vanuxemi* Hall. *Phacopidella Chapmani* nov., compares *P. anceps* and *P. mylanderi* Dalmanites ? (Synphoria) a and b sp. nov.

Ostracoda: *Ctenobolbina ? cornuta.*

Zygobeyrichia nov. gen. Genotype *Z. devonica* Jones and Woodward, 1889. The new generic name is proposed for a group of large Beyrichidae that seems to represent a departure from the type from the Silurian stock.

Zygobeyrichia apicalis nov. and *Z. extrema* nov. This is distinguished from *Z. apicalis* by its shorter and more gibbous form; and from species of Kloedenia it differs by the complete loss of the posterior lobe, the greater depth and length of the sulcus and the ventral prolongation, etc.

Williams (N. Y.) An Eurypterid Horizon in the Niagara Formation of Ontario.

Canada Dept. of Mines Mus. Bull. No. 20, Geol. ser. No. 29, 1915, pp. 51, pls. 5.

Wiman (Carl). Studien ueber das Nordbaltische Silurgebiet. 1.

Geol. Instit. Upsala, No. 11, vol. vi, part 1, 1902, with 4 plates and map.

Olenellus sp. *Paradoxides* sp. *Arionellus balticus* n. sp. *Ellipsocephalus latus* n. sp. *Ellipsocephalus* sp.

Aparchites ? Anderssoni n. sp., *A. ? fennicus* n. sp. *Beyrichona gevalensis* n. sp., *B. faba* n. sp., *B. ? alta* n. sp. *Ostracod* sp. *Sellula fallax* n. sp. *Bradorona nitida* n. sp. *Indiana ? minima* n. sp. *Hipponicharion Matthewi* n. sp.

Acerocare norvegicum Mbg. *Geratopyge forficula* Sars. *Shumardia oelandica* Mbg., *S. bottnica* n. sp. *Trilobite.*

The author gives a bibliography of the literature on the Baltic Silurian, with quotations and figures from Roberg's Dissertatio academica de fluviatili astaco ejusque usu medico, Upsala, 1715, p. 32; and refers his figure 1 to *Megalaspis limbata* Sars and Boeck; figure 2 to the pygidium of an *Asaphus.*

——— Ein Shumardiaschiefer dei Lanna in Nerike.

Arkiv. for Zoologi K. Svenska Vet. Ak. ad Stockhölm, Bd. 2, No. 11, 1905.

Apatocephalus pecten n. sp. *Megalaspis planilimbata* Ang., *M. nericiensis* n. sp. *Niobe laeviceps* Dalm. *Niobe* sp. Nos. 1 and 2. *Symphysurus breviceps* Ang. *Ampyx brevicauda* n. sp. *Agnostus glabratus* Ang., *A. glabratus* Ang. var. *ingricus* Fr. Schmidt, *A. lentiformis* Ang., *A.* sp. *Shumardia nericiensis* n. sp. *Orometopus* sp.

Wilson (Alice E.) and **Mather** (Kirtley F.) Appendix 11. Synopsis of the common fossils of the Kingston area.

25th Ann. Rep. Ontario Bureau of Mines, 1916, pp. 45-66, plates 1-3.

The authors illustrate as Black River fossils, Ordovician species. *Bumastus Milleri* (Bill.) and *Isotelus gigas* DeKay. *Bathyurus extans* Hall. *Onchometopus simplex* R. & N.

Ostracoda:
Isochilina armata Walc. *Leperditia fabulites* Conrad and *L. tumida* Ulrich.
Trenton Fossils:
Calymmene senaria Conrad. *Ceraurus dentatus* R. & B. and *Isotelus gigas* DeKay.

*Wood. On the classification of Trilobites. (Not seen.)
The Cambridge Natural History, vol. 4, 1909.

Wood (Elvira). Marcellus (Stafford) Limestone Erie County, N. Y.
Bull. New York State Mus., No. 49, 1901, pp. 139-181.
Phacops rana Green. *Cryphaerus Boothi* Green, *C. craspedota* Hall. *Primitopus punctulifera* Hall.

Woods (Henry). The Cambridge History. The Crustacea and Arachnids Eurypteridæ, 1909.
Vol. 4, Chapter xi, pp. 283-294.

Woodward (Henry). On some points in the structure of the Xiphosura, having reference to their relationship with the Eurypteridæ.
Quart. Jour. Geol. Soc. London, vol. 22, 1867, p. 28.
On page 32 the author uses the term Prestwichia for a new genus with *Prestwichia anthrax* Prest. for the type. This generic name was used by Lubbock in 1863, therefore it is a syn. and the genus *Euproops* Meek is available for the genus.

——— On the discovery of Trilobites in the Upper Green (Cambrian) slates of the Penrhyn Quarries, North Wales.
Quart. Jour. Geol. Soc. London, vol. 44, 1888, p. 74, pl. 6.
Concoryphe viola nov.
Its peculiar facial sutures suggest a new generic name.

——— Note on a collection of Carboniferous Trilobites from the Banks of the Hodder near Stonyhurst, Lancashire.
Geol. Mag., Dec. iv, vol. 1, 1894, p. 481, plate 14.
Phillipsia van-der-Grachtii n. sp., *P. Polleni* n. sp.
The author also gives figures of the pygidia of *Phillipsia Derbiensis* Martin and *P. gemmulifera* Phillips.

——— Contributions to our knowledge of the genus Cyclus from the Carboniferous formation of various British localities.
Cyclus Jonesianus H. W., *C. radialis* Phil., *C. Scottii* H. W., *C. Johnsoni* H. W., *C. Rankini* H. W.
Geol. Mag., Dec. iv, vol. 1, 1894, pp. 530-539, plate 15.
The curious little shield-like Crustaceans, classed under Cyclus, were first noticed by de Koninck in 1841—Descript. des Animaux Foss. Carb. de Belg. 1842, p. 591, plate 53—and have been subsequently illustrated and described by various authors.

——— On a collection of Trilobites from Coddon Hill beds, Lower Culm Measures near Barnstaple, Devon, and one from Glamorganshire.
Geol. Mag., Dec. iv, vol. 9, 1902, pp. 481-487, plate 20.
Griffithides Barksi n. sp. *Phillipsia spatulata* n. sp. *Proetus Coddonensis* n. sp.
For previous papers on the Culm Trilobites see: Henry Woodward, on the discovery of Trilobites in the Culm Shales, Geol. Mag., 1884, pp. 534-545, pl. xvi; Woodward Carboniferous Trilobites, Mon. Pal. Soc., 1883-1884, p. 1-86, plates I-x; G. J.

WOODWARD (Henry)—Continued

Hinde and Howard Fox, The Radiolarian rocks in the Lower Culm-measures, Quart. Jour. Geol. Soc., 1895, vol. 51, pp. 609-668, plates 23-28; note on the Trilobites, by Henry Woodward, pp. 646-649, plate 28, figures 1-8.

——— The Canadian Rockies. Part 1. On a collection of Middle Cambrian fossils obtained by Edward Whymper from Mount Stephen, B. C.

Geol. Mag., Dec. iv, vol. 9, 1902, pp. 529-544, 17 figures.

Ogygopsis Klotzi Rom. *Bathyuriscus Howelli* Walc., *B. (Kootenia) Dawsoni* Walc., *B. pupa* Matth. *Neolenus serratus* Rom., *N. granulatus* Matth. *Ptychoparia Cordillerae* Walc. *Zacanthoides (Olenoides) spinosus* Walc. *Oryctocephalus Walkeri* Matth., *O. Reynoldsi* F. R. Cowper Reed.

Conocephalites (Conaspis ?) cf. *perseus* Hall. *Corynexochus Roemeringeri* Matth. *Dolichometopus occidentalis* Matth. *Agnostus interstrictus* White, *A. montis* Matth. *Anomalocaris Canadensis* Whiteaves.

Dr. Henry Woodward, one of the best authorities on recent and fossil Crustacea, retains Rominger's genus Ogygopsis, and remarks that *Ogygopsis Klotzi* differs from Ogygia proper in having a well-defined ocular ridge and a narrow palpebral lobe. It seems convenient to separate this Rocky Mountain form generically from the other examples of Ogygia.

——— On two Trilobites from the Devonian Slates of Cornwall, obtained by Walter Barratt, Esq.

Geol. Mag., Dec. iv, vol. 10, 1903, pp. 28-31.

The author figures *Homalonotus Barratti* n. sp., and gives a list of English Devonian species of Devon and Cornwall.

Phacops latifrons ? Bronn—a fragment—is referred to this genus.

——— Note on some fragmentary remains of fossils from the upper part of Mount Noyes (Cambrian Rockies).

Geol. Mag., Dec. iv, vol. 10, 1903, pp. 297-299, three figures.

Olenellus Thompsoni Hall. *Olenellus* sp.

——— Notes on a series of Trilobites obtained by Mr. Howard Fox from the Devonian of Cant Hill, St. Minver, Cornwall.

Geol. Mag., Dec. v, vol. 2, 1905, pp. 151-154, plate 5.

Phacops latifrons Bronn., *P. granulatus* Münster, *P. (Cryphaeus) punctatus* Stein.

——— On a collection of Trilobites from the Upper Cambrian of Shantung, North China.

Geol. Mag., Dec. v, vol. 2, 1905, pp. 211-215—continued on p. 251-255, plate 13.

This article contains an abstract of Herr H. Monke's paper, entitled, "Contributions to the Geology of Shantung—1. Upper Cambrian Trilobites from Yen-tsy-yai," Jahrb. d. k., Preeuss Geol: Landesanstalt and Bergakademie, 1902, vol. 23, pp. 103-151, pl. 3-9.

The author illustrates *Drepanura Premesnili* Bergeron (which, like *D. Ketteleri* Monke, is founded upon pygidia and separate and imperfect head shields, also with elongated cheek-spines. The lateral caudal spines are very much more elongated in *D. Ketteleri* and remind one of the very long lateral cheek and caudal spines of *Bathynotus holopyga* Hall).

Stephanocare Richthofeni Monke, referred to the genus Olenoides in the text, p. 254, fig. 2.

WOODWARD (Henry)—Continued

——— Notes on some Crustaceans and two Myriopods from the Lower Coal measures near Colne, Lancashire.

Geol. Mag., Dec. v, vol. 2, 1905, pp. 437-44.

Decapoda: Macroura *Anthrapalaemon serratus* n. sp., *A. Woodwardi* R. Etheridge, *A. Traquairii ?* Peach.

——— Further note on *Cyclus Johnsoni* from the Coal Measures Dudley.

Geol. Mag., Dec. v, vol. 2, 1905, pp. 490-492.

——— Two new species of Eurypterus from the Coal Measures Ilkeston.

Geol. Mag., Decade v, vol. 4, 1907, pp. 277-282, plate 13.

Eurypterus Moyseyi n. sp., *E. Derbiensis* n. sp.

The author gives a sketch of the Carboniferous Euryptidae.

——— On the genus Pygocephalus (Huxley), a primitive Schizopod Crustacean from the Coal Measures.

Geol. Mag., Decade v, vol. 4, 1907, pp. 400-407, plate xviii.

Pygocephalus Cooperi Huxley, *P. (Anthrapalaenon) Parkeri* n. sp., fig. 2, in text.

——— Further notes on the Arthropoda of the British Coal Measures.

Geol. Mag., Decade v, vol. iv, 1907, pp. 539-549.

Bellinurus Baldwini n. sp., *B. longicaudatus* n. sp.

——— Note on the genus Hastimima from Brazil and Cape.

Geol. Mag., Decade v, vol. 6, 1909, pp. 486-88.

——— On a pygidium of Bronteus from the Devonian of Gerolstein Eifel, preserved in the collection of the late Mr. Townshend M. Hall, in the Athenaeum, Barnstaple.

Geol. Mag., Decade v, vol. 7, 1910, pp. 407-410, figures.

The author figures *Bronteus Halli* sp. nov., *B. thysanopeltis* Barr., *B. speciosus* Corda.

——— Note on a new species of Caryocaris (*C. Kilbridensis*) from the Arenig rocks of the Kilbride Peninsula.

Quart. Jour. Geol. Soc. London, vol. 68, p. 99, 1912.

The species approaches the *Caryocaris wrightii* Salter.

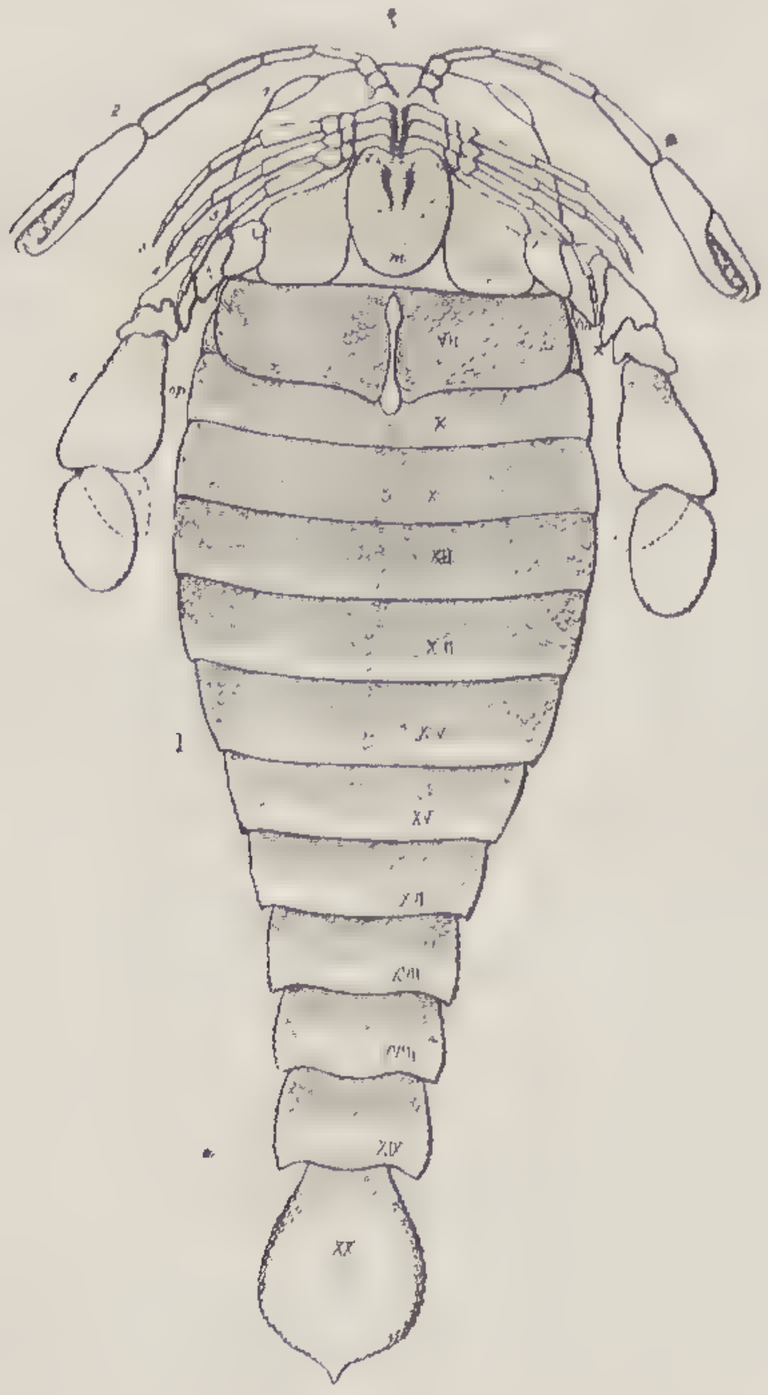
The author notes near the centre of the carapace two round bodies which appear to be eggs, and may possibly be homologous with the pair of ephippial eggs so often observed in Daphnia.

WOODWARD (Henry)—Continued

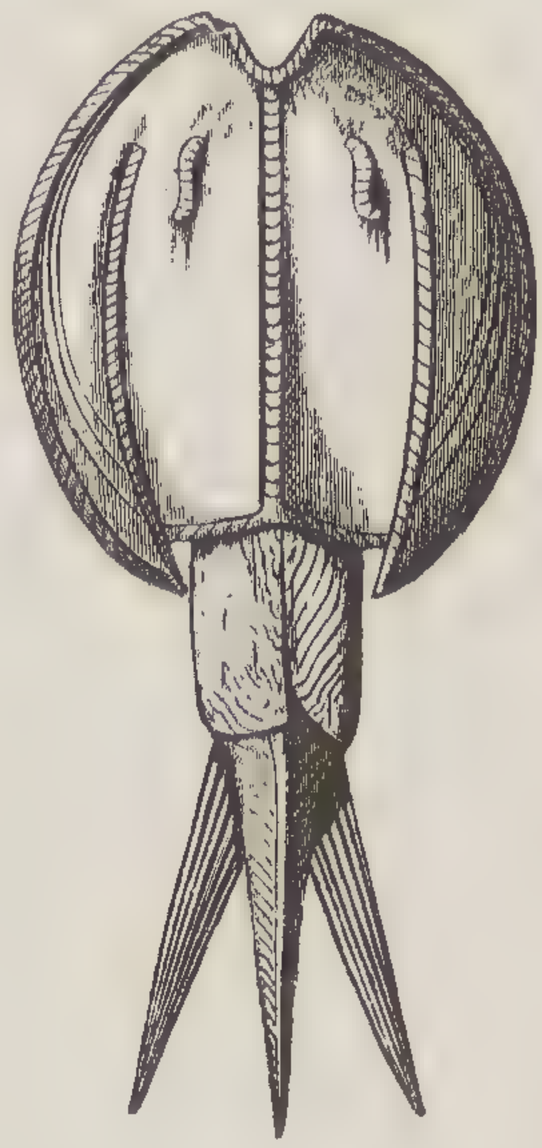
——— The position of the Merostomata.

Geol. Mag., Decade v, No. 7, July, 1913, p. 293, two text figures.

The author gives a sketch of the genus from McCoy's weird restoration of *Pterygotus problematicus,* in fifth edition of Lyell's Manual of Elementary Geology, 1855, p. 420.



Pterygotus Anglicus.



Dithyrocaris Scouleri

Also the further discoveries of Pterygotus, made by Robert Slimon in the Geol. Sur. Memoir in 1859, illustrated by 16 plates and text figures.

Salter contributed a restoration of *Pterygotus anglicus* to Murchison's Siluria, 1859, edition. He gives only two pairs of appendages to the head. The operculum is placed in front of the mouth, and the lower lip or metastoma is absent.

Dr. Nieszkowski, in his paper on *Eurypterus remipes,* gives restorations of the upper and under sides of Eurypterus, showing the appendages of the mouth in situ and the thoracic plates on the under side of the body.

Other restoration of several forms of Pterygotus Stylonurus Eurypterus, without descriptions, are given in David Page's Advanced Text Book of Geology, 1859, all more or less correct.

Excellent descriptions and figures of American species of Eurypterus and Pterygotus are given by James Hall in Palæont. New York, vol. 3, pt. 1, pp. 382-419, 80 plates and 10 additional plates, the accuracy of which still remains unchallenged.

Mr. J. W. Salter, in the Quart. Jour. Geol. Soc., 1862 and 1863, contributed descriptions of Eurypterus and allied form of Pterygotus.

Dr. Henry Woodward figured and described a very complete example of *Slimonia acuminata* in the Intellectual Observer, 1863, vol. 4, p. 229; also of *Eurypterus lanceolatus* in the Geol. Mag., 1864, vol. 1, p. 107, pl. 5, figs. 7-9. In 1865 he figured and described *Stylonurus scoticus, S. Poweriei, S. Symondsi Hemiaspis limuloides* in the

WOODWARD (Henry)—Continued

Quart. Jour. Geol. Soc., vol. 21, pp. 482-92, plates 13-14. The same author, in 1866, commenced a Monograph of the British Crustacea of the Order Merostomata, published in the Palæont. Soc., 1866-1878, in which 14 genera and 83 species are recorded, described and illustrated.

The author does not include in this historical sketch the paper by DeKay, 1825, who gave the generic name of Eurypterus, or reference to Mitchell's paper in the Am. Monthly Mag., vol. 3, 1888, p. 291, in which he describes the now well-known *Eurypterus remipes* DeKay, as a fossil fish.

Woodward quotes the well-known paper by Dr. Holm, St. Petersburg Academy, 1896, and his investigations of *Eurypterus fischeri* from the Island of Oesel. In this locality the fossils are not metamorphosed into carbonaceous film, as in other deposits, and he was able to elaborate its organization in such detail that *E. fischeri* has really become the most completely known of all extinct animals.

Woodward's paper includes two full-page figures of *Eurypterus fischeri,* from Holm's paper.

The paper closes with a notice of Dr. Clarke and Ruedemann's memoir on the Eurypterida of New York, noted in this Bibliography.

——— *Rochdalia Parkeri* by Henry Woodward.

Geol. Mag., Decade v, No. 8, vol. 10, p. 352, 1913.

This new genus and species from the Coal Measures of Rochdale, the author places with the Branchiopoda in the order Anostraca.

Zelizoko (J. V.) Geologisch—palæontologische Verhältnisse der nächsten Umgebung von Rozmital in Bohemen.

Bull. Acad. Sci. de Bohéme, 1906, 2 plates.

Trinucleus Alfredi nov. *Dionide formosa* Barr. *Phacops (Chasmops) Bohemicus* nov. Calymmene sp. Dalmanïa sp.

Zimmermann (Hugo). Trilobiten aus dem devonkalk des Rittberg bie Czellechowitz.

Verhandl. des Naturf. Vereins in Brünn, Bd. xxx, 1891, plate.

Dechenella rittbergensi n. sp., p. 119, pl. 1, fig. 4. Referred by Richter to the subgenus Eudechenella.

The author figures and describes *Bronteus alutaceus* Goldf. *Dechenella Verneuli* Barr. Referred by Richter to *D. Rittbergensis.*

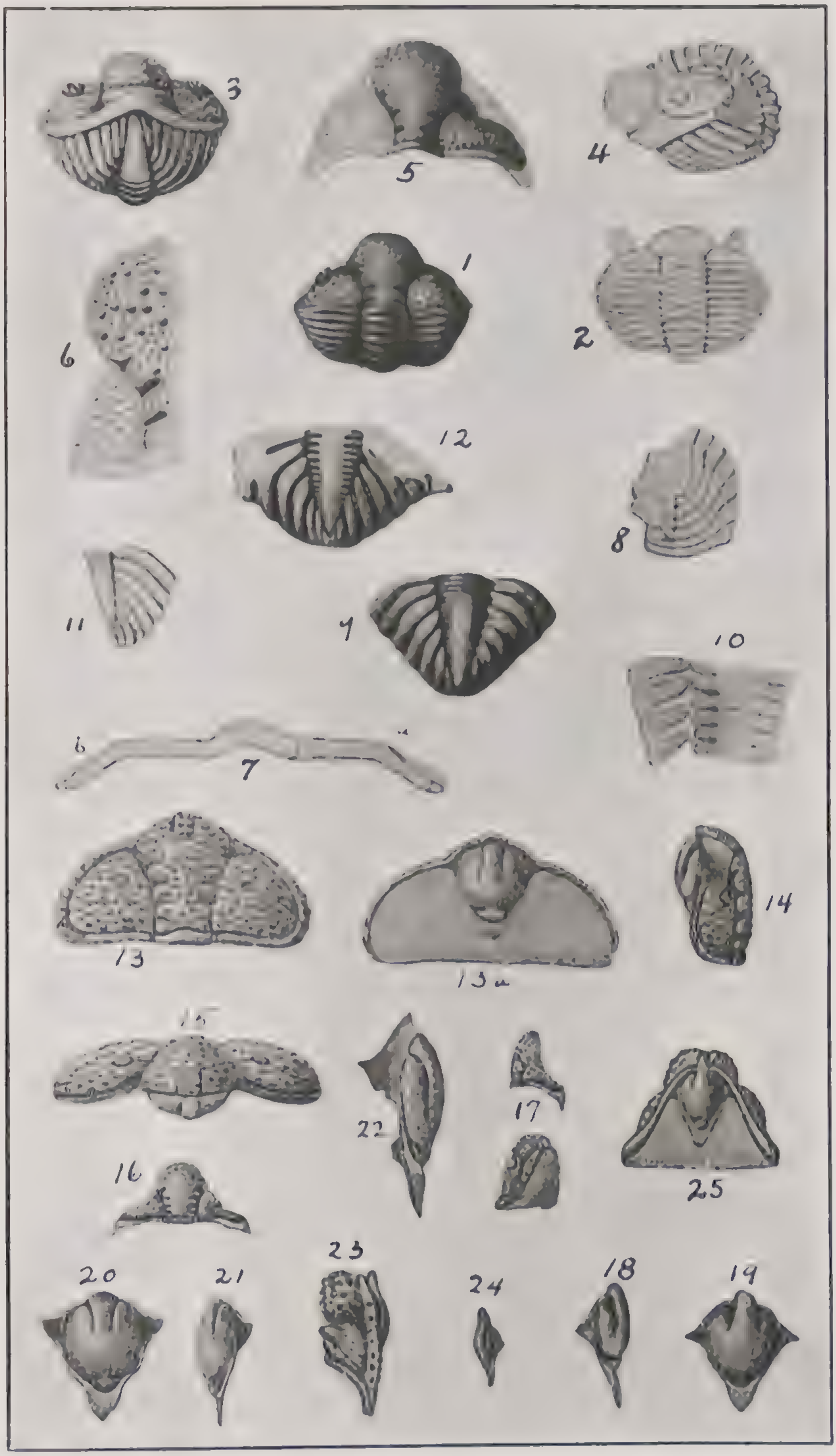
Cyphaspis granulosus Steininger and Proetus sp. Referred by Richter to *Schizoproetus celechovicensis* Smycka.

Zuber (Rudolf). Najdawniejszy swiat organiczny i najstarsze formacye osadowe Napisal.

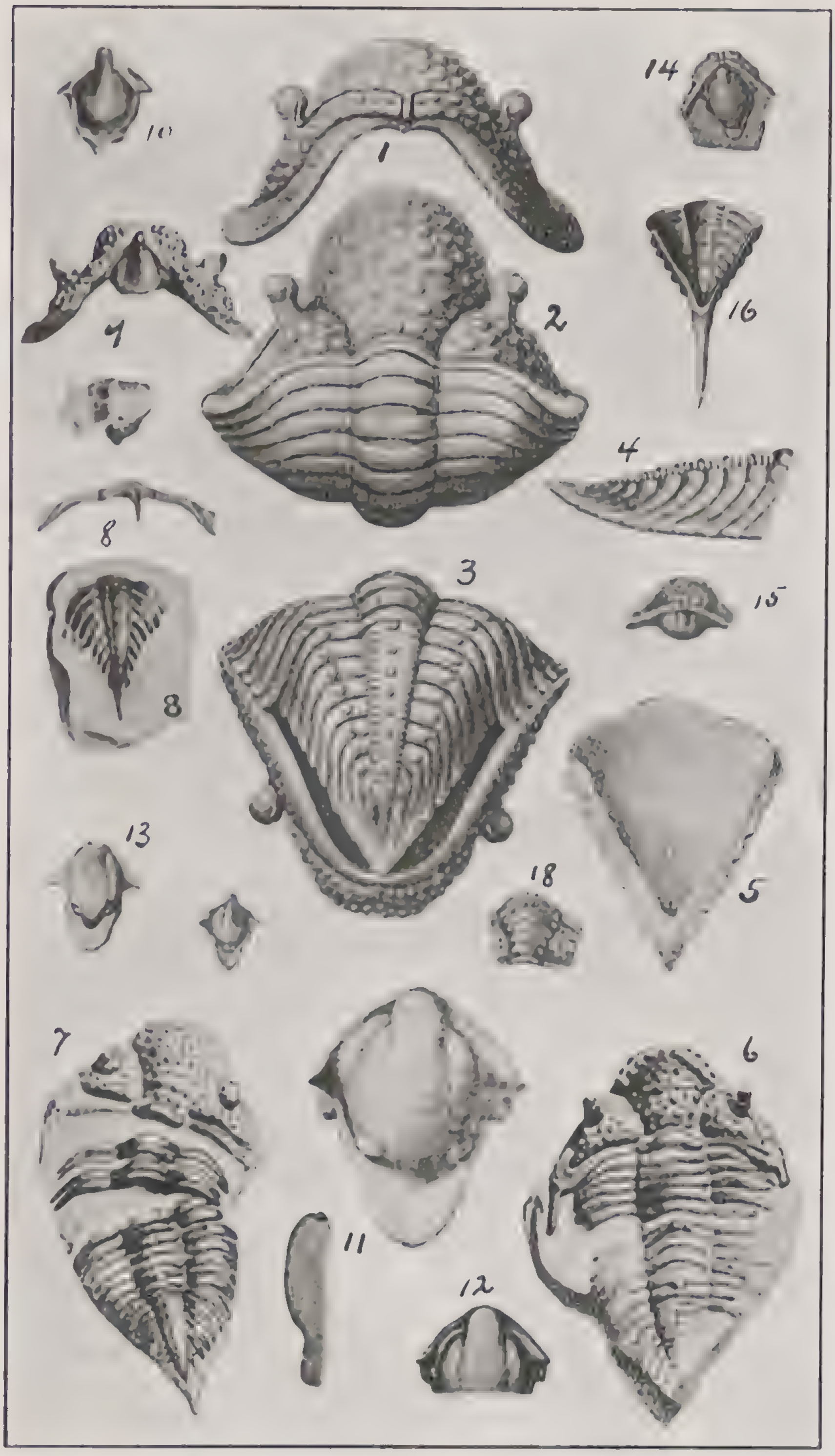
Kosmos polski, vol. 23, 1899, pp. 12-24.

The author illustrates *Olenellus Thompsoni* and *Mesonacis vermontana.*

Plate 1



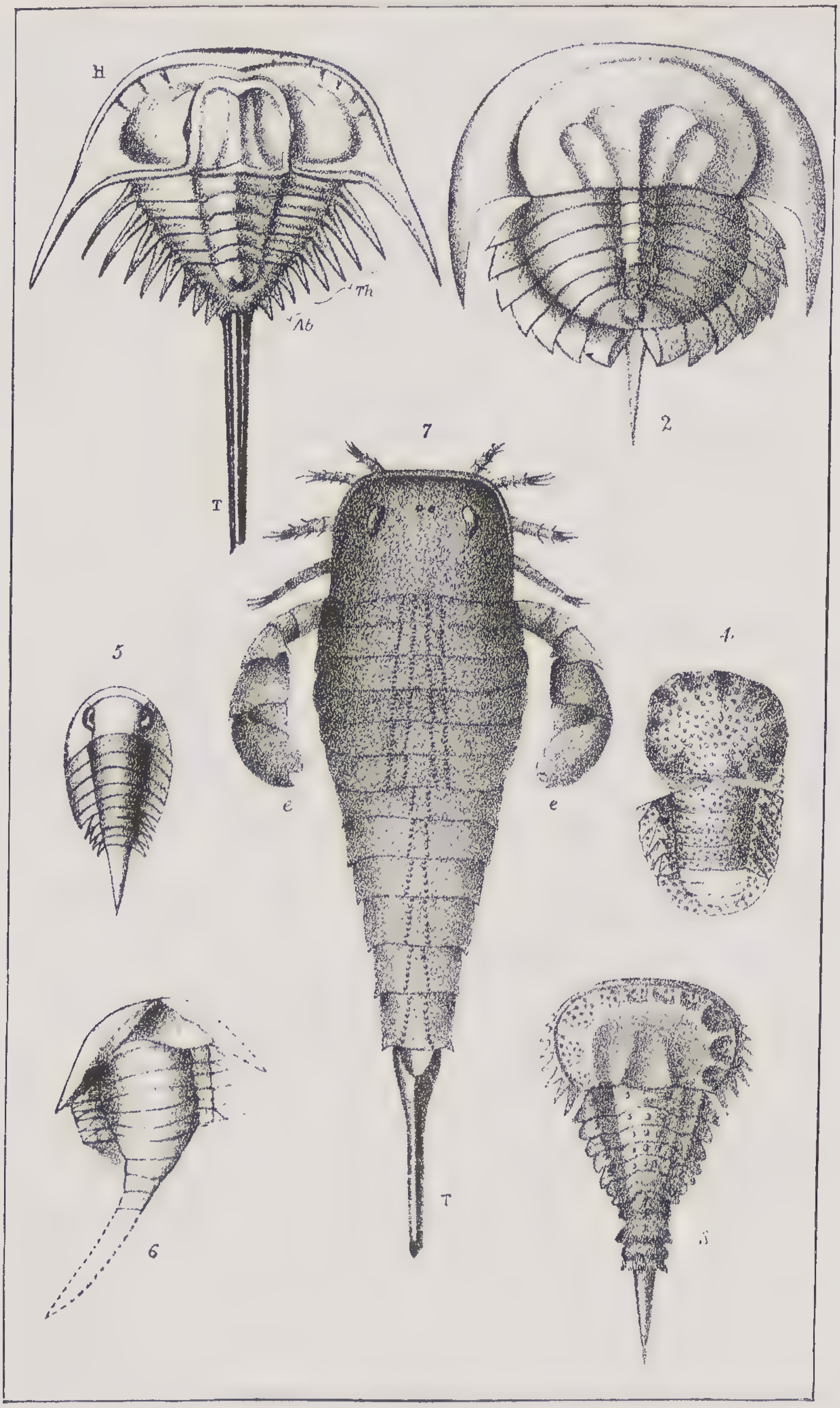
Figs. 1-12. Encrinurus sex-costatus.
Figs. 13-15. Encrinurus (Cromus), Beaumonti.
Figs. 16-19. E. (Cromus) transiens.
Figs. 20-22. E. (Cromus) Bohemicus.
Figs. 23-24. Encrinurus punctatus.



Encrinurus punctatus.

Plate 3

Figs. 1-10. Cryptonymus variolaris.
Fig. 11. Linne's fig. of pygidium.
Fig. 12. Pygidium Encrinurus multi-segmentatus.
Fig. 13. E. Eagani.
Fig. 14. E. obtusus.
Fig. 15. E. ornatus.
Fig. 16. E. laevis.
Fig. 17. Cybele vigilans.



(The figures copied after Dr. Henry Woodward's plate, Proc. Geol. Soc., vol. 23, 1867.)

Fig. 1. Belinurus reginae Baily Coal Measures, Ireland.
Fig. 2. Euproops rotundata Prestwich Coal Measures, Eng.
Fig. 3. Hemiaspis linuloides. H. Woodward, Ludlow, Eng.
Fig. 4. Bunodes limula Eichwald Silurian, Baltic.
Fig. 5. Pseudoniscus aculeatus Nieszkowski Sil., Baltic.
Fig. 6. Exapinurus Schrenkii Nieszkowski Silurian, Baltic.
Fig. 7. Eurypterus remipes De Kay Silurian, New York.

Plate 5

(The figures are copied after T. Rupert Jones's plate, Monthly Microscopical Jour., 1870.)

Fig. 1. Bairdia curta McCoy.
Fig. 2. Thlipsura corpulenta Jones & Holl.
Fig. 3. Cythere Jukesiana J. & H.
Fig. 4. Cytherella brevis Jones.
Fig. 5. Cytherellina siliqua Jones
Fig. 6. Æchmina cuspidata J. & H.
Fig. 7. Carbonia Agnes Jones.
Fig. 8. Cypridina Phillipsiana Jones.
Fig. 9. Cypridella Koninckiana Jones.
Fig. 10. Cyprella subannulata Jones.
Fig. 11. Entonoconchus Scouleri McCoy.
Fig. 12. Entomis divisa Jones.
Fig. 13. Entomis biconcentrica Jones.
Fig. 14. Primitia renulina J. & H.
Fig. 15. Kirkbya Urei Jones.
Fig. 16. Moorea silurica J. & H.
Fig. 17. Leperditia Balthica Hisinger.
Fig. 18. Isochilina gracilis Jones.
Fig. 19. Beyrichia Wilckenziana Jones.
Fig. 20. Beyrichia Kloedeni McCoy.
Fig. 21. Beyrichia complicata Salter.
Fig. 22. Leaia Leidyi Lea.
Fig. 23. Estheria membranacea Patch.
Fig. 24. Estheria tenella Jordan.

28.176

AN ANNOTATED LIST OF THE BIRDS OF SAN DIEGO COUNTY, CALIFORNIA

By FRANK STEPHENS

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OF THE
Birds of San Diego County, California

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Water Birds

Order PYGOPODES. Diving Birds.

Excellent divers, obtaining their food principally under water; the food consisting of small fishes, water beetles, larvæ and other aquatic life. They prefer escaping from their enemies by diving rather than by flight. Innocuous, with the possible exception of consuming small quantities of young fish.

Family COLUMBIDÆ. Grebes.

1. WESTERN GREBE. **Æchmorphus occidentalis.**

Rather common winter residents (Sept. to April) on the ocean and bays along the coast. A few are found in winter on the larger fresh water ponds and reservoirs.

2. HORNED GREBE. **Colymbus auritus.**

Occasional winter visitants off shore, rare on bays and inland waters. Immature birds are difficult to distinguish from immature birds of the next species.

3. EARED GREBE. **Colymbus nigricollis californicus.**

Common winter residents on salt and fresh waters of the county. A few remain through the summer on tule-bordered fresh water ponds and breed. Not as abundant as they were before plume hunters began killing them for the skins of their breasts.

4. PIED-BILLED GREBE. DABCHICK. **Podilymbus podiceps.**

Present in small numbers all the year. Breed about tule-bordered marshes and ponds. Also found on salt water in winter. The winter residents go north in spring and are replaced by newcomers from the south.

Family GAVIIDÆ. Loons.

5. COMMON LOON. **Gavia immer.**

Common winter residents (October to April) along the coast and on the bays, occasional on reservoirs and lakes containing fish.

6. PACIFIC LOON. **Gavia pacificus.**

Rather common at the same time and places as the preceding, except that they are not known to go any distance inland.

7. RED-THROATED LOON. **Gavia stellata.**

Rather rare winter visitant. Found only on salt water.

Family ALCIDÆ. Auks, Murres. Puffins.

8. RHINOCEROS AUKLET. **Cerorhinca monocerata.**
Rather common winter residents off shore. Occasionally dead birds are found washed ashore on beaches.

9. CASSIN AUKLET. **Pytocramphus aleuticus.**
More or less abundant at sea all the year. Breed on the Coronado Islands. Dead birds wash ashore occasionally.

10. ANCIENT MURRELET. **Sinthliboramphus antiquus.**
Found occasionally off shore in winter. A dead bird was found on the beach at Pacific Beach.

11. XANTUS MURRELET. **Brachyramphus hypoleucus.**
Rather common at sea all the year. Breed on the Coronado Islands.

Order LONGIPENNES. Long-winged Swimmers.

Birds of this order feed on fish swimming near the surface of the water and on offal floating on the surface, occasionally on material picked up on land. Fish are obtained by plunging down on them from the air. The fish are mostly small species but little used for human food.

Family STERCORARIDÆ. Jægers.

12. POMARINE JÆGER. **Stercorarius pomarinus.**
Occasional off shore, principally in the migrations.

13. PARASITIC JÆGER. **Stercorarius parasiticus.**
Occasional along the coast in fall and winter.

14. LONG-TAILED JÆGER. **Stercorarius longicaudus.**
One taken at Pacific Beach Sept. 19, 1904.

Family LARIDÆ. Gulls and Terns.

15. PACIFIC KITTIWAKE. **Rissa tridactyla pollicaris.**
Occasional off shore in winter.

16. GLAUCOUS-WINGED GULL. **Larus glaucescens.**
Occasional along the coast in winter.

17. WESTERN GULL. **Larus occidentalis.**
Abundant residents of bays and coasts. Rare inland. Breed on the Coronado Islands.

18. HERRING GULL. **Larus argenteus.**
Rather common winter residents of the coast and bays. Occasional about fresh waters.

19. CALIFORNIA GULL. **Larus californicus.**
Common winter residents (Sept. to May) of coast and bays, and rather common on fresh waters. Sometimes follows the plow to pick up larvæ and worms.

20. RING-BILLED GULL. **Larus delawarensis.**
Common winter residents of coast and bays (Sept. to May). Occasional inland.

21. SHORT-BILLED GULL. **Larus brachyrhynchus.**
Rare winter visitant along the coast.

22. HEERMANN GULL. **Larus heermanni.**
Rather common on bays and along the coast in summer, fall and winter. Contrary to the custom of most birds Heermann Gulls go south in spring to breed, on the islands off the Mexican coast.
23. BONAPARTE GULL. **Larus philadelphia.**
Rather common migrant, both along the coast and in the interior. A few remain along the coast in winter.
24. CASPIAN TERN. **Sterna caspia.**
Rare migrant. Has been taken at San Diego.
25. ROYAL TERN. **Sterna maxima.**
Rather rare winter residents along the coast. Go in small flocks.
26. ELEGANT TERN. **Sterna elegans.**
Rare or irregular winter visitant along the coast.
27. FORSTER TERN. **Sterna forsteri.**
Found sparingly along the coast nearly all the year. Common in the migrations when they also appear inland.
28. COMMON TERN. **Sterna hirundo.**
Occasional along the coast in the migrations.
29. LEAST TERN. **Sterna antillarum.**
Common summer residents, breeding at several places on the beach. Apparently not found inland.
30. BLACK TERN. **Hydrochelidon niger surinamensis.**
Rather common about fresh waters containing small fish in summer. Migrates along the coast.

Order TUBINARES. Tube-nosed Swimmers.

Marine, many species being found far at sea. Food and habits similar to those of gulls.

Family DIOMEDIIDÆ. Albatrosses.

31. BLACK-FOOTED ALBATROSS. **Diomedea nigripes.**
32. SHORT-TAILED ALBATROSS. **Diomedea albatrus.**
Frequently seen off the coast at all times of the year. Dead birds occasionally wash ashore.

Family PROCELLARIDÆ. Fulmars and Shearwaters.

33. PACIFIC FULMAR. **Fulmaris glacialis glupischa.**
Common at sea in winter. Dead birds frequently wash ashore. Dichromatic; the black phase is most often found here.
34. RODGERS FULMAR. **Fulmaris rodgers .**
Found with the Pacific Fulmar, but in smaller numbers.
35. PINK-FOOTED SHEARWATER. **Puffinus creatopus.**
Rather common at sea in summer and fall.
36. BLACK-VENTED SHEARWATER. **Puffinus opisthomelas.**
More or less abundant at sea in summer after the close of the breeding season; occasionally seen near the b ach. They leave for their breeding grounds on islands off the Mexican coast in March.

37. SOOTY SHEARWATER. **Puffinus griseus.**
Common at sea all the year. Most common in summer.
38. SLENDER-BILLED SHEARWATER. **Puffinus tenuirostris.**
Occasional at sea in winter.
38a. FORK-TAILED PETREL. **Oceanodroma furcata.**
I found a dead Fork-tailed Petrel washed up on the beach at Ocean Beach December 23, 1918. This is the southermost record for this Petrel. Their range is the north Pacific Ocean.
39. SOCORRO PETREL. **Oceanodroma socorroensis.**
Common at sea throughout the year. Breeds on the Coronado Islands.
40. BLACK PETREL. **Oceanodroma melania.**
Common at sea all the year. Breeds on the Coronado Islands.

Order STEGANOPODES. Totipalmate Birds.

Fish eating birds, mostly marine in distribution, but a few species frequent fresh waters. The fish eaten are usually small, but some are young fish that would be of economic importance full grown. The Cormorants usually pursue their prey under water, but the Pelecans scoop theirs up from the surface or plunge down on them from the air. Most species of this order are social in habit, particularly in the breeding season.

Family PHALACROCORACIDÆ. Cormorants.

41. FARALLONE CORMORANT. **Phalacrocorax auritus albociliatus.**
Common resident along the coast. Occasional inland on fresh waters. Breed on rocky cliffs over the water.
42. BRANDT CORMORANT. **Phalacrocorax penicillatus.**
Common resident along the coast. Not found on fresh waters. Breeds on the Coronado Islands.
43. BAIRD CORMORANT. **Phalacrocorax pelagicus resplendens.**
Resident along the coast and on the islands, but not as abundant as either of the other species. Found only about salt water.

Family PELECANIDÆ. Pelecans.

44. WHITE PELECAN. **Pelecanus erythrorhynchus.**
Occasionally seen in this county, in flight or about fresh waters, in fall or winter.
45. CALIFORNIA BROWN PELECAN. **Pelecanus californicus.**
Abundant at sea, along shore and on bays. Not found on fresh waters. Breeds on the Coronado Islands.

Family FREGATIDÆ. Man-o'-war Birds.

46. MAN-O'-WAR BIRD. **Fregata aquila.**
Stragglers from Mexican waters occasionally appear along the coast.

Order ANSERES. Lamellirostral Swimmers.

Swimming birds of wide distribution, mostly on fresh waters. The feeding habits vary greatly; some species being vegetarian, while others eat animal food or combine it with vegetation in some form. Most of the species are edible, and being of medium or large size furnish an important amount of human food. The order is a large one containing numerous genera, mostly belonging to one family.

Family ANATIDÆ. Ducks, Geese and Swans.

47. AMERICAN MERGANSER. **Mergus americanus.**
48. RED-BREASTED MERGANSER. **Mergus serrator.**
49. HOODED MERGANSER. **Lophodytes cucullatus.**

The Mergansers are rare winter visitors, and are mostly found on salt waters. They are fish eaters and are not edible.

50. MALLARD. **Anas platyrhynchos.**

Common winter residents, principally on fresh waters. Occasional summer residents, breeding about lakes and in marshes.

51. **Chaulelasmas streperus.**

Rather common winter residents on fresh waters. More plentiful in the migrations.

52. BALDPLATE. WIDGEON. **Mareca americana.**

Common winter residents, principally on fresh waters.

53. GREEN-WINGED TEAL. **Nettion carolinense.**

Common winter residents, principally on fresh waters.

54. BLUE-WINGED TEAL. **Querquedula discors.**

Rare winter visitants.

55. CINNAMON TEAL. **Querquedula cyanoptera.**

Common spring migrants. A few remain through the summer and breed about lakes and in marshes. Found only on fresh waters.

56. SHOVELER. SPOONBILL DUCK. **Spatula clypeata.**

Abundant winter resident, principally on fresh waters.

57. PINTAIL. SPRIGTAIL. **Dafila acuta.**

Abundant winter residents, principally on fresh waters.

58. WOOD DUCK. **Aix sponsa.**

Rare winter visitant. Two specimens taken in this county are in museums.

59. **Marila americana.**

Common winter residents, principally on fresh waters.

60. CANVASBACK. **Marila valisneria.**

Rather common winter residents along the seacoast. Rare in the interior. Redhead Ducks are often mistaken for Canvasbacks

61. SCAUP DUCK. BLUE-BILL. **Marila marila.**

Rare winter visitants along the seacoast.

62. LESSER SCAUP DUCK. BLUE-BILL. **Marila affinis.**

Common winter residents on salt and fresh waters.

63. RING-NECKED DUCK. **Marila collaris.**

Occasional winter visitant.

64. BUFFLEHEAD. BUTTER-BALL. **Charitonetta albeola.**
Common winter residents (Nov. to March), principally on salt waters.

65. OLD SQUAW. **Harelda hyemalis.**
Occasional winter visitant.

66. WHITE-WINGED SCOTER. **Oidemia deglandi.**
Common winter residents on bays and at sea. A few non-breeding birds remain through the summer.

67. SURF SCOTER. **Oidemia perspicillata.**
Abundant winter residents on bays and at sea. Both species of Scoters are fish and shell eating ducks and are not edible.

68. RUDDY DUCK. **Erismatura jamaicensis.**
Abundant winter residents and common in summer. Frequent both fresh and salt waters.

69. LESSER SNOW GOOSE. **Chen hyperboreas.**
Formerly abundant winter residents, now much less plentiful. Usually seen in flocks of considerable size. The food is mostly green vegetation, such as growing grain and grass.

70. WHITE-FRONTED GOOSE. **Anser albifrons gambeli.**
Formerly common winter residents. Usually found in small flocks and sometimes singly.

71. HUTCHINS GOOSE. **Branta canadensis hutchinsi.**
Formerly common winter residents, now much diminished in numbers.

72. CACKLING GOOSE. **Branta canadensis minima.**
This small "Honker" probably comes this far south in winter, but I know of no example from this county in any collection.

73. BLACK BRANT. **Branta nigricans.**
Formerly rather common winter residents, now rare. Seldom found on fresh waters.

74. FULVOUS TREE DUCK. **Dendrocygna bicolor.**
Rather common spring migrant. Rare winter visitant. Stragglers may remain through the summer and breed. Found on fresh waters.

75. WHISTLING SWAN. **Olor columbianus.**
Rare winter visitants.

Order HERODINES. Herons, Ibises, etc.

Wading birds frequenting marshes or the borders of ponds, lakes and bays for food, catching frogs, minnows, insects or other aquatic forms of life of no economic importance except in a very general way. Most species are not edible.

Family IBIDIDÆ. Ibises.

76. WHITE-FACED GLOSSY IBIS. **Plegadis guarauna.**
Rather common spring migrants. Breed in small numbers about suitable marshes in the warmer valleys. Edible, the only species of the order found here that is edible. This is the "Black Curlew" of sportsmen. While externally they resemble curlews technically they are not at all closely related.

Family CICONIIDÆ. Storks.

77. WOOD IBIS. **Mycteria americana.**

Irregular or casual summer visitors, mostly young birds that have straggled from their breeding grounds on the shores of the Gulf of California.

Family ARDEIDÆ. Herons.

78. AMERICAN BITTERN. **Botaurus lentiginosus.**

Rather common winter residents of marshes. Probably a few remain in summer and breed.

79. LEAST BITTERN. **Ixobrychus exilis.**

Very secretive and seldom seen. Probably rather common summer residents in tule marshes.

80. GREAT BLUE HERON. **Ardea herodias.**

Present through the year in small numbers.

81. AMERICAN EGRET. **Herodias egretta.**

Formerly a rather common resident, but now almost exterminated by plume hunters. Seen occasionally in the migrations.

82. SNOWY EGRET. SNOWY HERON. **Herodias candidissima.**

Formerly rather common winter residents. So nearly exterminated by plume hunters that none have been seen in this county for several years.

83. LOUISANA HERON. **Hydranga tricolor ruficollis.**

One taken at the south end of San Diego Bay in January, 1914.

84. ANTHONY GREEN HERON. **Butorides virescens anthonyi.**

Common migrants. Rare summer residents.

85. BLACK-CROWNED NIGHT HERON. **Nycticorax nycticorax nævius.**

Common migrants. Rare summer residents. More common in winter.

Order PALUDICOLÆ. Cranes and Rails.

Family GRUIDÆ. Cranes.

Large, heron-like birds frequenting plains and open ground. The food is frogs, grasshoppers, beetles, seeds, etc. Edible.

86. LITTLE BROWN CRANE. **Grus canadensis.**

87. SANDHILL CRANE. **Grus mexicana.**

The Cranes migrate in considerable flocks in fall and spring, often without stopping in the county. Occasional in winter on grass or grain fields.

Family RALLIDÆ. Rails, Gallinules, Coots.

Medium or small sized birds inhabiting marshes or ponds with grassy shores. Most species are shy and hide in grass, tules or weeds. The food is frogs, minnows, water beetles, larvæ, etc. The larger rails are edible.

88. LIGHT-FOOTED RAIL. CALIFORNIA CLAPPER RAIL. **Rallus levipes.**

Formerly common residents of the salt marshes along the coast. Now nearly exterminated by persistent hunting.

89. VIRGINIA RAIL. **Rallus virginianus.**

Rather common migrants. Rare summer residents of fresh water marshes.

90. CAROLINA RAIL. SORA. **Porzana carolina.**

Rather common migrants. Occasional throughout the year.

91. CALIFORNIA BLACK RAIL. **Creciscus coturniculus.**

Rare residents of salt marshes along the coast.

92. FLORIDA GALLINULE. **Gallinula galeata.**

Rather rare residents of tule bordered ponds.

93. COOT. MUD HEN. **Fulica americanus.**

Abundant residents of fresh water lakes and ponds.

Order LIMICOLÆ. Shore Birds.

Family PHALAROPIDÆ. Phalaropes.

A small family of rather small birds with feet partly webbed, thus connecting the swimmers with the shore birds. Their habits are also intermediate as they feed partly on insects picked up on shores of streams and ponds and also take part of their food while swimming on the surface of the water. Most species breed in the arctic regions.

94. RED PHALAROPE. **Phalaropus fulicarius.**

Abundant migrants at sea. Common migrants inland. Considerable numbers remain off shore all winter.

95. NORTHERN PHALAROPE. **Lobipes lobatus.**

Rather common migrants along the coast and inland.

96. WILSON PHALAROPE. **Steganopus tricolor.**

Rare migrants in this county.

Family RECURVIROSTRIDÆ. Avocets and Stilts.

A small family of medium sized, very long-legged birds, that frequent the shores of ponds and lakes, feeding on the insect life found in the water or on the shores. Although the webs at the base of the toes are quite small these birds are good swimmers, though they prefer wading. Edible.

97. AVOCET. **Recurvirostra americana.**

Rather common migrants.

98. BLACK-NECKED STILT. **Himantopus mexicanus.**

Rather common migrants. Probably rare summer residents, as I have found the species breeding in Orange county.

Family SCOLOPACIDÆ. Snipe, Sandpipers, Curlews, etc.

This is a large family of rather small birds that frequent the shores of streams, ponds, lakes and ocean beaches, feeding on the great variety of small animal life found at the waters edge, or in wet places. Many species wade more or less; none are habitual

swimmers. Most species large enough to be worth while are edible. None of the species are directly harmful to man's interests.

99. WILSON SNIPE. JACK SNIPE. **Gallinago delicata.**

Common spring and fall migrants. Occasional winter residents of wet grassy localities. Occur in small companies.

100. LONG-BILLED DOWITCHER. **Macrorhamphus scolopaceus griseus.**

Common spring and fall migrants along the coast. Winter residents in small numbers. Uusually found in flocks with other shore birds.

101. KNOT. **Tringa canutus.**

Rather common migrants along the coast and occasional winter residents.

102. BAIRD SANDPIPER. **Pisobia bairdii.**

Migrates principally through the Colorado valley and eastward. One bird has been taken at Pacific Beach.

103. LEAST SANDPIPER. **Pisobia minutilla.**

Abundant migrants and common winter residents along the coast, also common migrants in the interior.

104. RED-BACKED SANDPIPER. **Pelidna alpina sakhalina.**

Abundant migrants along the coast. A few remain through the winter.

105. WESTERN SANDPIPER. **Ereunetes mauri.**

Abundant migrants and common winter residents along the coast.

106. SANDERLING. **Calidris leucophæa.**

Rather common winter residents of the coast and bays.

107. MARBLED GODWIT. **Limosa fedoa.**

Common spring and fall migrants along the coast.

108. GREATER YELLOW-LEGS. **Totanus melanoleucus.**

Rather common migrants in the interior. Comparatively rare in the coast region.

109. WESTERN SOLITARY SANDPIPER. **Heleodromas solitarius cinnamomeus.**

Rather common migrants. Found on fresh and salt waters. Often found singly.

110. WESTERN WILLET. **Catoptrophorus semipalmatus inornatus.**

Rather common winter residents along the coast. Abundant migrants. Occasional about fresh waters.

111. WANDERING TATTLER. **Heteractitis incanus.**

Occasionally seen in the migrations or in the winter on rocky shores.

112. SPOTTED SANDPIPER. **Actitis macularius.**

Rather common winter residents around fresh and salt waters. Prefers rocky shores. Found singly or in small companies.

113. LONG-BILLED CURLEW. **Numenius americanus.**

Formerly abundant in the migrations, now moderately common. Most often seen on the sea beaches and bay shores, but also found on fresh waters.

114. HUDSONIAN CURLEW. **Numenius hudsonius.**
Common migrants along the coast, occasionally seen around fresh waters.

Family CHARADRIIDÆ. Plovers.
Medium and small sized birds similar in form and habits to those of the preceding family, except that the birds have shorter and heavier bills and are not as closely restricted to the neighborhood of water. Edible.
115. BLACK-BELLIED PLOVER. **Squatarola squatarola.**
Rather common in fall and spring and small numbers remain through the winter along the seacoast.
116. AMERICAN GOLDEN PLOVER. **Charadrius dominicus.**
Rare coastwise migrants.
117. KILLDEER. **Oxyechus vociferus.**
Common residents. Found in pairs or families. A portion of their food is insects picked up on dry ground.
118. SEMIPALMATED PLOVER. **Ægialitis semipalmata.**
Rather common coastwise migrants. Occasional at other seasons. In summer sometimes seen on fresh waters.
119. SNOWY PLOVER. **Ægialitis nivosa.**
Abundant residents on sandy beaches near the surf. Occasionally found about fresh water lakes in summer.
120. WILSON PLOVER. **Ochthodromus wilsonius.**
Rare stragglers. One taken at Pacific Beach June 27, 1894.
121. MOUNTAIN PLOVER. **Podasocys montanus.**
Rather common winter residents in open plains. Apparently does not go near water.

Family APHRIZIDÆ. Surf Birds and Turnstones.
A small family of rather small sized birds inhabiting rocky shores and islands in the sea. They are usually seen singly or in small flocks. The food is marine life found at the waters' edge, usually on or under rocks.
122. SURF BIRD. **Aphriza virgata.**
Rare migrants or winter residents. I took one at Point Loma.
123. RUDDY TURNSTONE. **Arenaria interpres morinella**
Rather common coastwise migrants.
124. TURNSTONE. **Arenaria melanocephala.**
Rather common winter residents of rocky seashores.

Family HÆMATOPIDÆ. Oyster-catchers.
A very small family of medium sized birds inhabiting rocky seashores and islands in the sea. They feed on molluscs, such as bivalves, which their knife-like bills are peculiarly adapted for opening.
125. FRAZAR OYSTER-CATCHER. **Hæmatopus frazari.**
Rare summer visitants to rocky shores along the seacoast.
126. BLACK OYSTER-CATCHER. **Hæmatopus bachmani.**
Uncommon residents of rocky seashores and islands.

Land Birds

Order GALLINÆ. Gallinaceous Birds.

An important order including such domestic poultry as chickens and turkeys. The family to which these belong (PHASANIDÆ) is not represented by native species in California.

Family TETRAONIDÆ, Grouse, Quail, etc.

A large family of considerable economic importance, as all the species are edible, and many are large enough to furnish a considerable amount of food. The family has a wide distribution, from seacoast to mountain top. Some species are found in forests; others in open country, providing brush or weeds or other cover is available in emergencies. The food is varied, including insects, seeds, leaves, etc. and is mostly gleaned from the ground. A few species feed on fruits, buds and leaves of trees, etc.

127. PLUMED QUAIL. MOUNTAIN QUAIL. **Oreortyx pictus plumiferus.**

Common residents of brushy forests in the mountains. Not migratory.

128. VALLEY QUAIL. **Lophortyx californicus vallicola.**

Abundant residents of foothills and valleys. The ranges of the Plumed and Valley Quails overlap somewhat. Not migratory. No Grouse or Pheasants are native to this county.

Order COLUMBÆ. Pigeons.

Family COLUMBIDÆ

A rather large family of medium sized birds. They are birds of strong flight, and the species found in cool climates are migratory. The food is mainly vegetable, seeds, nuts, fruits, buds and leaves. Edible.

129. BAND-TAILED PIGEON. **Columba fasciata.**

Irregular visitants, occasionally abundant. Found principally in the mountains as acorns are more abundant there. Some "off years" for acorns few or no Pigeons appear in this county. Formerly a few bred here.

130. WESTERN MOURNING DOVE. **Zenaidura macroura marginella.**

Abundant residents of the foothills and valleys. Less common in winter and probably all the individuals migrate, being insensibly replaced by new comers. Beneficial through eating so many seeds, and rarely, if ever, doing any harm.

131. WHITE-WINGED DOVE. **Melopelia asiatica trudeaui.**

Rare stragglers from Lower California. One has been taken at Escondido.

132. MEXICAN GROUND DOVE. **Chamæpelia passerina pallescens.**

Two or three stragglers from Lower California have been taken in this county.

Order RAPTORES. Birds of Prey.

Family CATHARTIDÆ. Vultures.

A family of very large birds, of general distribution, but in most cases found sparingly. The food of most species is exclusively carrion and the birds are very useful as scavengers and should be rigidly protected.

133. CALIFORNIA VULTURE. CALIFORNIA CONDOR.
Gymnogyps californianus.

Fairly common when the country was first settled by Americans. When the sheep industry was at its height the shepherds poisoned many carcasses of dead sheep to lessen the numbers of troublesome coyotes. Vultures also ate the carcasses and were poisoned, with the result that Vultures became very scarce. Irresponsible hunters also shot every large bird that came near and this magnificent and useful Vulture was nearly exterminated. A state law now imposes a heavy penalty for killing a Vulture and under this protection the species is slowly increasing in numbers. This species should not be called a Condor, as the true Condor is a South American bird of another genus.

134. TURKEY VULTURE. TURKEY BUZZARD.
Cathartes aura septentrionalis.

Common spring, summer and fall residents, less common in winter. Occasionally seen gathered in flocks about some carcass. Very beneficial and should never be killed.

Family FALCONIDÆ. Hawks, etc.

Mostly large, powerful birds, feeding on mammals, birds or fish killed by themselves; or insects in the case of some of the smaller or more sluggish species. A few species are injurious through capturing poultry or game birds, but the majority prey on mice or other noxious animals and should be thoroughly protected. The general practice of shooting all hawks and owls cannot be too strongly condemned. Kill no predaceous bird not positively known to be harmful.

135. WHITE-TAILED KITE. **Elanus leucurus.**

Formerly occasional residents, now very rare or completely exterminated in this county. The food is mice, lizards, snakes, grasshoppers, etc.

136. MARSH HAWK. **Circus hudsonius.**

Common residents of the valleys, where they hunt over meadows, grassy valleys and marshes. They prey on meadow mice almost exclusively.

137. SHARP-SHINNED HAWK. **Accipeter velox.**

Rather common fall, winter and spring residents. This active little Hawk is the terror of small birds, on which it principally preys, but it catches some poultry and many quail. It is able

to carry off quail or young poultry heavier than itself. It is one of the few hawks that should be killed whenever possible.

138. COOPER HAWK. **Accipeter cooperi.**

Rather common winter residents of the valleys. Occasional summer residents and breed in the mountains. Very destructive of poultry and game birds. This is the Hawk principally responsible for the bad name given all hawks. It deserves no mercy.

138a. WESTERN GOSHAWK. **Astur atricapillus striatulus.**

One shot by Rudolph Wueste at the Lower Otay Reservoir (about five miles from the Lower California line) November 9. 1916, is now in the Museum of Natural History at San Diego,

139. HARRIS HAWK. **Parabuteo unicinctus harrisi.**

Stragglers from the Colorado valley or Lower California. One shot in Mission Valley now in the Natural History Museum, others have been seen.

140. WESTERN RED-TAILED HAWK. **Buteo borealis calurus.**

Common residents throughout the county, least common in winter. Often called "Chicken Hawk" and "Hen Hawk." Occasionally a young Hawk in its first autumn will catch a chicken, but this rarely happens and after the young Hawk becomes expert in hunting it does not bother poultry, but subsists on ground squirrels, rabbits, mice and grasshoppers, and is far more beneficial than injurious.

141. RED-BELLIED HAWK. **Buteo lineatus elegans.**

Rather rare residents of the valleys, generally only in those containing willow or cottonwood groves. The food is meadow mice, frogs and insects.

142. ZONE-TAILED HAWK. **Buteo abbreviatus.**

Rare stragglers from Lower California. Several have been taken in the county.

143. SWAINSON HAWK. **Buteo swainsoni.**

Rather common summer residents of the valleys and foothills. Migrates in flocks. The food is principally grasshoppers and beetles, with some mice. Never harm poultry. Probably the most beneficial of our hawks. Should never be killed.

144. FERRUGINEOUS ROUGH-LEG HAWK. CALIFORNIA SQUIRREL HAWK. **Archibuteo ferrugineus.**

These large hawks are rather rare winter residents; formerly they were more common. They frequent open valleys and prey on ground squirrels and mice. They are highly beneficial.

145. GOLDEN EAGLE. **Aquila chrysaetos.**

Uncommon residents of foothills and mountains. Food is rabbits, squirrels and waterfowl.

146. BALD EAGLE. **Haliæetos leucocephalus.**

Rare residents of the seacoast and islands. Their food is mostly fish.

147. PRAIRIE FALCON. **Falco mexicanus.**

Rare residents of the foothills. Food mostly squirrels, rabbits, quail, etc. but occasionally poultry.

148. DUCK HAWK. **Falco peregrinus anatum.**

Rather rare residents of the seacoast and islands. Occasional inland in winter. Preys principally on waterfowl. A powerful falcon, swift of flight and bold.

149. PIGEON FALCON. PIGEON HAWK. **Falco columbarius.**

Rather common winter residents of the valleys and foothills. Their food is principally small birds.

150. RICHARDSON FALCON. **Falco richardsoni.**

Apparently about as common about San Diego as the preceding species. Habits, food and season much the same.

151. SPARROW HAWK. **Falco sparverius.**

Common residents throughout the county. This very small falcon feeds on mice, grasshoppers, beetles, etc. and is beneficial.

152. OSPREY. **Pandion haliætus canadensis.**

Rare residents of the seacoast. More common in the Santa Barbara Islands. Their food is fish.

Family ALUCONIDÆ. Barn Owls.

A small family of rather large owls differing in technical characters from the **Strigidæ.** Habits, etc. similar. Nocturnal.

153. AMERICAN BARN OWL. **Aluco pratincola.**

Common residents of the valleys and foothills. Often called "Monkey-faced Owls." They frequently inhabit barns and other buildings. They do not harm poultry and should be encourgaed to live about farm premises. The principal item of their food is gophers; they also catch many field mice. Barn Owls are the greatest friend the farmer has among birds.

Family STRIGIDÆ. Horned Owls.

A rather large family of rapacious birds. They vary in size from the large Great Horned Owls to the little bird owls the size of a sparrow. Their food varies in size also, from rabbits to beetles. With but one or two exceptions owls are beneficial and some are among the farmers' best friends. Nocturnal or crepuscular.

154. LONG-EARED OWL. **Asio wilsonius.**

Rather common residents of willow groves in the valleys and of oak forests in the foothills and lower mountains. They like rather thick cover. Their food is almost exclusively injurious rodents.

155. SHORT-EARED OWL. **Asio flammeus.**

Rather rare winter residents of open ground, such as salt marshes along the seacoast, meadows and alfalfa fields and grassy marshes inland. Hide in tufts of grass in the daytime. Often hunt on cloudy days over grass or weeds making cover for mice and gophers. Very beneficial.

156. SPOTTED OWL. **Strix occidentalis.**

Rare residents of oak forests in the foothills and pine forests up to 5,000 feet altitude. Habits but little known.

157. SOUTHERN CALIFORNIA SCREECH OWL. **Otus asio quercinus.**

Common residents of wooded localities from seacoast to high mountains. Most common in the foothills. The food is mice, beetles and other insects.

158. GREAT HORNED OWL. **Bubo virginianus pacificus.**

Common residents of all parts of the county except the open mesas. This large owl has strength enough to kill and carry away a jack rabbit or a full grown hen. They are the only owls that destroy poultry. Those living in the eastern part of the county along the border of the desert are probably of the subspecies **pallescens.**

159. BURROWING OWL. **Speotyto cunicularia hypogæa.**

Common residents in open ground from the seashore to the higher foothills. Live in burrows dug by themselves or enlarged from squirrel holes. Hunt principally at twilight. The food is grasshoppers, beetles, mice and gophers.

160. CALIFORNIA PIGMY OWL. **Glaucidium gnoma californicum.**

Rare residents of the mountains, occasionally found in the foothills. This little sparrow-sized owl feeds mainly on insects, but also catches some mice.

Order COCCYGES, Cuckoos, Trogons, Kingfishers, etc.

Family CUCULIDÆ. Cuckoos.

This family contains two distinct groups of birds, the Ground Cuckoos, and the true Cuckoos. The Ground Cuckoos are long of leg, weak of wing and catch their food on the ground. The Cuckoos are strong of flight, inhabit trees and shrubbery and catch their insect prey among the foliage. Both groups have the toes arranged alike, two in front and two behind. The Ground Cuckoos are mostly inhabitants of warm climates, one species coming north into the southwestern United States.

161. ROAD-RUNNER. **Geococcyx californianus.**

Common residents of valleys and foothills. The food is lizards, beetles, grasshoppers, snakes, mice and occasionally the eggs of other birds. They have been known to take young from the nests of other birds and eat them. They run rapidly and spend much of their time on the ground.

162. CALIFORNIA CUCKOO. **Coccyzus americanus occidentalis.**

Summer residents of willow thickets in the valleys. Apparently not very common. As they are very shy they are not often seen. Their food is insects, including a large proportion of caterpillars in season.

Family ALCIDINIDÆ. Kingfishers.

163. BELTED KINGFISHER. **Ceryle alcyon.**

Rather common residents along the seacoast. As their food is fish the Belted Kingfishers are not often seen far from the coast

in this county. The nests are placed in burrows in banks near water.

Order PICI.

Family PICIDÆ. Woodpeckers.

A large family of wide distribution. The food is varied, but with many species the principal item is wood-boring larvæ, dug from trees in more or less rotten places. Other items of food are ants, beetles and other insects, acorns and other nuts, fruits and seeds.

164. CABANIS WOODPECKER. **Dryobates villosus hyloscopus.**

Rather common residents of wooded localities throughout the county.

165. WILLOW WOODPECKER. **Dryobates pubescens turati.**

Rather rare residents of willow groves. This seems to be about the southern limit of this woodpecker.

166. NUTTALL WOODPECKER. **Dryobates nuttalli.**

Rather common residents in the foothills and lower mountains.

167. WHITE-HEADED WOODPECKER. **Xenopicus albolarvatus gravirostris.**

Rare residents of the higher mountains.

168. RED-BREASTED SAPSUCKER. **Sphyrapicus varius daggeti.**

Occasional winter residents of the foothills and mountains. These woodpeckers drill numerous small holes in the bark of trees in the latter part of the winter and drink the sap that flows from the holes, hence the name.

169. RED-NAPED SAPSUCKER. **Sphyrapicus varius nuchalis.**

Rare winter residents in the foothills.

170. CALIFORNIA WOODPECKER. **Melanerpes formicivorus bairdii.**

Abundant residents in the mountains in oak timber and mixed oak and pine forests. This is the Woodpecker that drills small holes in the bark of trees and drives an acorn in each hole in the fall. This is done to store the acorns for the purpose of eating the acorn meat in the coming winter.

171. LEWIS WOODPECKER. **Asyndesmus lewisi.**

Rather common winter residents of the foothills and mountains. Frequently catches insects on the wing like a flycatcher.

172. RED-SHAFTED FLICKER. **Colaptes cafer collaris.**

Common residents of wooded localities in the coast region and foothills and summer residents in the mountains. Eats many ants, mostly picked up on the ground.

Order MACROCHIRES. Goatsuckers, Swifts, Hummingbirds.

Family CAPRIMULGIDÆ. Goatsuckers.

A rather small family of long-winged, short-legged, medium sized birds. The food is insects caught on the wing. Nocturnal and crepuscular. Beneficial.

173. DUSKY POORWILL. **Phalænoptilus nuttalli californicus.**

Rather common summer residents of the foothills and mountains. Present in the lower valleys in winter in small numbers.

174. PACIFIC NIGHTHAWK. **Chordeiles virginianus hesperis.**

Occasional in the eastern part of the county in the migrations.

175. TEXAS NIGHTHAWK. **Chordeiles acutipennis texensis.**

Rather common summer residents of the coast region and foothills.

Family MICROPODIDÆ. Swifts.

Small swallow-like birds, and usually confused with swallows, but technically quite different. The flight is very swift. The food is insects caught on the wing. Beneficial. Nests are placed in crevices of rocks or in holes in trees; one eastern species now frequently places its nests in chimneys.

176. BLACK SWIFT. **Cypseloides niger borealis.**

Rare spring migrants.

177. VAUX SWIFT. **Chætura vauxi.**

Rather common migrant. Similar to the eastern Chimney Swift.

178. WHITE-THROATED SWIFT. **Aeronautes melanoleucus.**

Summer residents, common locally. Present irregularly in winter. Nests in steep cliffs.

Family TROCHILIDÆ. Hummingbirds.

A large family (over 400 species), exclusively American in distribution, and mainly tropical. The smallest known birds are hummingbirds and the largest species are not as large as ordinary sparrows. The food is mostly minute insects, frequently taken from tubular flowers, many species add honey also. The nests are beautiful, warm, thick-walled, often outwardly stuccoed with bits of lichens. The eggs are plain white, two in a set. Some species are quarrelsome and all are fearless. Most species have a variety of notes and some have a low sweet song.

179. BLACK-CHINNED HUMMINGBIRD. **Archilochus alexandri.**

Common summer residents from the coast to the lower edge of the pine forests.

180. COSTA HUMMINGBIRD. **Calypte costæ.**

Common summer residents. Nest preferably on hillsides. A few winter in the foothills at the edge of the Colorado Desert.

181. ANNA HUMMINGBIRD. **Calypte anna.**

Common winter residents from the sea to the foothills, and present in fall and spring in smaller numbers. After the breeding season in the coast region many migrate to the mountains, remaining there to the end of the season of bloom of flowers.

182. RUFOUS HUMMINGBIRD. **Selasphorus rufus.**

Common spring migrants in the coast region and common late summer and fall migrants in the mountains. None breed here. I took a nest and two eggs in Alaska in June. Quarrelsome, even driving hawks away.

183. ALLEN HUMMINGBIRD. **Selasphorus alleni.**

Rather common spring migrants in the coast region. Common fall migrants in the mountains. Residents in the Santa Barbara Islands.

184. CALLIOPE HUMMINGBIRD. **Stellula calliope.**

Rather common spring migrants through the foothills. Our smallest hummingbird.

Order PASSERES. Perching Birds.

The largest order of birds, containing many families of medium or small sized birds.

Family TYRANNIDÆ. Flycatchers.

A large family of wide distribution. The Flycatchers are of small size. Their food is insects, mostly caught in flight. Some of the species frequent shrubbery; others occur in forests, or in more or less open country where they can watch for passing insects from some perch. All are beneficial, with the exception of certain species that catch honey bees at times.

185. WESTERN KINGBIRD. **Tyrannus verticalis.**

Common summer residents except in the higher mountains. Eats drone bees occasionally.

186. CASSIN KINGBIRD. **Tyrannus vociferans.**

Rather rare residents of the coast region.

187. ASH-THROATED FLYCATCHER. **Myiarchus cinerascens.**

Rather common summer residents of the foothills and lower mountains. Occasional in the coast region. Nests in knotholes in trees.

188. SAY PHŒBE. **Sayornis sayus.**

Common winter residents of the coast region, rare summer residents there but more common in the lower mountains, particularly on the desert slope. Nests are built on ledges of rock walls in canons, usually but a few feet from the bottom.

189. BLACK PHŒBE. **Sayornis nigricans.**

Common residents from the sea to the pine forests. Most often found near water. The nests, made principally of mud, are placed under bridges, on beams in barns, etc.

190. OLIVE-SIDED FLYCATCHER. **Nuttalornis borealis.**

Summer residents of high mountains. Rare in this county be-

cause of lack of suitable conditions, which are present here only on the summits of Cuyamaca and Palomar. The nests are usually placed on the upper branches of fir trees.

191. WESTERN WOOD PEEWEE. **Myiochanes richardsoni.**

Common summer residents of canons and forests. Migrates through the coast region. Eats bees to some extent.

192. WESTERN FLYCATCHER. **Empidonax difficilis.**

Rather common summer residents of the forests and canons of the foothills and mountains. Migrates through the coast regions.

193. TRAILL FLYCATCHER. **Empidonax trailli.**

Generally distributed in the migrations. Rather common residents of willow thickets, principally in the lower valleys.

194. HAMMOND FLYCATCHER. **Empidonax hammondi.**

Rather common migrants in the spring through the lower part of the county, in the fall through the mountains also.

195. WRIGHT FLYCATCHER. **Empidonax wrighti.**

Rather common migrants in the foothills and mountains and breed in small numbers in the higher mountains.

196. VERMILLION FLYCATCHER. **Pyrocephalus rubineus mexicanus.**

Rare winter stragglers from the Colorado valley.

Family ALAUDIDÆ. Larks.

A small family of small birds, widely distributed in the north temperate and arctic zones. They are represented in America by the introduced skylark and one native genus. The food is insects. They are mostly ground dwellers. Beneficial.

197. CALIFORNIA HORNED LARK. **Otocoris alpestris actia.**

Abundant residents of valleys and plains. They run about on the ground picking up insects and are often seen in the roads. The nests are placed on the ground under weeds or grass. They frequently sing while fluttering high in the air like a skylark.

198. MOHAVE HORNED LARK. **Otocoris alpestris ammophila.**

Winter residents of mountain valleys, usually in flocks mixed with the preceding subspecies.

Family CORVIDÆ. Crows, Jays and Magpies.

A rather large-sized family of wide distribution. The birds are of medium or rather large size. They perch on trees or walk or hop around on the ground as occasion arises in hunting for food. The food is almost anything eatable either animal or vegetable. Some of the species are beneficial but the balance in general turns the other way.

199. BLUE-FRONTED JAY. **Cyanocitta stellari frontalis.**

Common residents of the pine forests, occasionally descending in winter to the oak forests. Usually seen in companies of half a dozen or so. Noisy. Wary.

200. CALIFORNIA JAY **Aphelocoma californica.**

Common residents of wooded localities from the coast to the lower edges of the pines. Sometimes troublesome about farm yards near brush by eating hens' eggs. Sometimes eat the eggs and young from the nests of other birds.

201. RAVEN. **Corvus corax sinuatus.**

Generally distributed through the county in open ground. Now not often seen in the more thickly settled parts of the county.

202. WESTERN CROW. **Corvus brachyrhynchos hesperis.**

Rather common residents, but local. They nest in willow groves and are more often seen near willows all the year. They do not seem to pull up young corn much in this county, and generally do more good than harm.

203. CLARKE NUTCRACKER. **Nucifraga columbiana.**

Transient winter visitants to the eastern slope of the mountains.

204. PINON JAY. **Cyanocephalus cyanocephalus.**

Irregular winter visitants in the pinon and juniper groves on the desert slopes of the mountains. Go in flocks, sometimes of considerable size.

205. NEVADA COWBIRD. **Molothrus ater artemesiæ.**

Stragglers or rare migrants in the desert along the eastern edge of the county.

Family ICTERIDÆ. Troupials, Orioles.

A large family, peculiar to America, and most abundant in South America. Some species are arboreal, others are terrestrial and some inhabit reeds and tules in swamps. The habits are quite varied, as also is the food and the quality of the song.

206. DWARF COWBIRD. **Molothrus ater obscurus.**

Rare stragglers. Have been taken at San Diego.

207. YELLOW-HEADED BLACKBIRD. **Xanthocephalus xanthocephalus.**

Common migrants and breed in small colonies in tule marshes. Occasional elsewhere.

208. SAN DIEGO REDWING BLACKBIRD. **Ægelaius phœniceus neutralis.**

Abundant migrants. Common summer residents in tule marshes. Irregularly common locally in winter. Sometimes destructive of grain crops, but beneficial at other times.

209. TRICOLOR BLACKBIRD. **Ægelaius tricolor.**

Formerly abundant winter residents and locally common summer residents of tule marshes. Now less common. More abundant north in the San Joaquin Valley. Habits similar to those of the preceding species.

210. WESTERN MEADOWLARK. **Sturnella neglecta.**

Abundant winter residents and common summer residents of valleys throughout the county. While the species is present throughout the year the winter residents go north in spring and are replaced by others coming from Mexico. Fine songsters. Not true larks, which belong in another family.

211. SCOTT ORIOLE. **Icterus parisorum.**

Rather common spring migrants in the eastern part of the county and probably breed there in the foothills at the edge of the desert. Rare summer residents at San Diego. Have a sweet song.

212. ARIZONA HOODED ORIOLE. **Icterus cucullatus nelsoni.**

Common summer residents from the seacoast to about 3,000 feet altitude. Preferably nest in palm trees.

213. BULLOCK ORIOLE. **Icturus bullocki.**

Common residents of all wooded localities from the seacoast up to the pine forests.

214. BREWER BLACKBIRD. **Euphagus cyanocephalus.**

Abundant residents in most of the valleys of the county. Often seen in parks and on lawns in the city.

Family FRINGILLIDÆ. Sparrows.

This is the largest and best known family of birds. Of world wide distribution, and occur in all kinds of localities except on water, in fact, wherever seeds may be found. The food is seeds, buds, leaves and fruit, with more or less insects added by many species. An occasional species does some harm to fruit or grain at times, but many species are beneficial in eating quantities of weed seeds. Most species have a pleasant song. Some species are ground dwellers; others live in trees; many inhabit shrubs. In fact any kind of location furnishing sufficient food may have its peculiar species of sparrow inhabitant.

215. CALIFORNIA PURPLE FINCH. **Carpodacus purpureus californicus.**

Rather rare summer residents of pine forests. Irregular winter residents of the valleys and mesas.

216. HOUSE FINCH. "LINNET." **Carpodacus mexicanus frontalis.**

Abundant residents throughout the county. Sometimes destroys peaches and other fruits and grain.

217. WILLOW GOLDFINCH. **Astragalinus tristis salicamans.**

Rather common residents of the valleys; in summer principally found around willow thickets.

218. GREEN-BACKED GOLDFINCH. **Astragalinus psaltria hesperophila.**

Common residents. In summer most common in valleys in the foothills, in winter generally distributed but most plentiful in the lower valleys and mesas.

219. LAWRENCE GOLDFINCH. **Astragalinus lawrencei.**

Rather common summer residents of the foothills and mountains. Irregular winter visitants. Some winters none are seen.

220. PINE SISKIN. PINE LINNET. **Spinus pinus.**

Rather common spring migrants in wooded regions. May breed in the highest mountains, but I know of no breeding record for the county.

221. ENGLISH SPARROW. **Passer domesticus.**

Though common in other cities this pest has appeared in San Diego in but small numbers yet, and if persistently hunted it can be kept in check.

222. ALASKA LONGSPUR. **Calcarius lapponicus alascensis.**

One shot by me near Mission Bay, Oct. 2, 1909. But one other record for the state.

223. WESTERN VESPER SPARROW. **Pooecetes gramineus affinis.**

Rather common winter residents in the valleys.

224. WESTERN SAVANNA SPARROW. **Passerculus sandwichensis alaudinus.**

Common winter residents in the valleys. Likes grassy localities.

225. BELDING MARSH SPARROW. **Passerculus beldingi.**

Abundant residents of the salt marshes.

226. LARGE-BILLED MARSH SPARROW. **Passerculus rostratus.**

Common fall and winter residents along the seacoast. Frequents wharves, lumber yards and similar places along the water front and sea beach. Breeding locality unknown, probably further south.

227. WESTERN GRASSHOPPER SPARROW. **Ammodramus savannarum bimaculatus.**

Irregular residents of grassy valleys, seldom common. They may be absent from a locality one year where they may be found other years. Summer residents migrate and are replaced by others in the warmer valleys and mesas.

228. WESTERN LARK SPARROW. **Chondestes grammacus strigatus.**

Common residents of mesas and foothills and breed up to the pines. Frequent orchards and vineyards, Beneficial.

229. WHITE-CROWNED SPARROW. **Zonotrichia leucophrys.**

Rather common spring migrants through the mountains.

230. INTERMEDIATE SPARROW. **Zonotrichia leucophrys gambeli.**

Abundant winter residents from the seacoast to the pine region. Frequently damages gardens, but seldom troublesome in grain fields.

231. GOLDEN-CROWNED SPARROW. **Zonotrichia coronata.**

Rather common winter residents in brush from the seacoast to the lower mountains.

232. WESTERN CHIPPING SPARROW. **Spizella passerina arizonæ.**

Rather common summer residents and occasional in winter.

233. BREWER SPARROW. **Spizella breweri.**

Rather common migrant along the eastern slope of the mountains and a few breed there. Occasional winter residents near the seacoast.

234. BLACK-CHINNED SPARROW. **Spizella atrogularis.**
Infrequent summer residents of brushy localities in the foothills and lower mountains.
236. SLATE-COLORED JUNCO. **Junco hyemalis.**
Casual in winter.
237. THURBUR JUNCO. **Junco oreganus thurburi.**
Abundant winter residents of the foothills and lower mountains, and more or less common in the coast region. Rare summer residents of the higher mountains, where a few breed.
238. DESERT BLACK-THROATED SPARROW. **Amphispiza bilineata deserticola.**
Common spring migrants through the foothills bordering the desert. A few breed there.
239. BELL SPARROW. **Amphispiza belli.**
Rather common summer residents of brush-covered mesas from the coast to the foothills and occasional in winter.
240. NEVADA SAGE SPARROW. **Amphispiza nevadensis**
241. CALIFORNIA SAGE SPARROW. **Amphispiza nevadensis canescens.**
Rather common winter residents of brushy localities in mesas and foothills of both sides of the mountains.
242. RUFOUS-CROWNED SPARROW. **Aimophila ruficeps.**
Rather common local residents of higher mesas and foothills.
243. SAN DIEGO SONG SPARROW. **Melospiza melodia cooperi.**
Common residents of tule patches and mixtures of weeds and brush in wet places in the lower country and summer residents of the mountains.
244. LINCOLN SPARROW. **Melospiza lincolni.**
Rather common winter residents of the valleys. Prefers damp localities.
245. FORBUSH SPARROW. **Melospiza lincolni gracilis.**
Occasional winter residents of the valleys.
246. SHUMAGIN FOX SPARROW. **Passerella iliaca unalaschcensis.**
247. YAKATUT FOX SPARROW. **Passerelia iliaca meruloides.**
Occasional in winter in the mountains.
248. SAN DIEGO TOWHEE. **Pipilo maculatus megalonyx.**
Common residents of thick brush from the seacoast to the mountains and part way down the eastern slope.
249. ANTHONY TOWHEE. **Pipilo crissalis senicula.**
Abundant residents of brush from the seacoast to the higher mountains.
250. GREEN-TAILED TOWHEE. **Oreospiza chlorura.**
Rather common migrants through the mountains.
251. PACIFIC BLACK-HEADED GROSBEAK. **Zamelodia melanocephala capitalis.**
Common summer residents of the foothills and mountains. Do some damage to fruit in small orchards situated near timber.

252. CALIFORNIA BLUE GROSBEAK. **Guiraca caerulea salicarius.**

Rather common summer residents of valleys in the foothills.

253. LARK BUNTING. **Calmospiza melanocorys.**

Casual spring migrants in the coast region. Usually migrate in flocks.

Family TANGARIDÆ. Tanagers.

A family of rather small birds confined to America and most numerous in the tropics. The males are brightly colored but the females are comparatively plain. The food is insects and fruit.

254. WESTERN TANAGER. **Piranga ludoviciana.**

Common, but irregular, spring migrants throughout the county. Rare summer residents in the highest mountains. Occasionally the migrating birds do considerable damage to cherry crops.

Family HIRUNDINIDÆ. Swallows.

A rather large family of small birds, cosmopolitan in distribution. The food is exclusively insects, caught while on the wing. Very few remain in temperate climates through the winter. Very beneficial.

255. WESTERN MARTIN. **Progne subis hesperia.**

Infrequent or irregular summer residents of timbered localities.

256. CLIFF SWALLOW. **Petrochelidon lunifrons.**

Common to abundant summer residents of suitable localities throughout the county.

257. BARN SWALLOW. **Hirundo erythrogaster.**

Infrequent summer residents along the seacoast.

258. TREE SWALLOW. **Iridoprocne bicolor.**

Rather common migrants. Infrequent summer residents of the coast region.

259. NORTHERN VIOLET-GREEN SWALLOW. **Tachycineta thalassina lepida.**

Common migrants. Breed in small numbers in the mountains in knot holes of trees.

260. BANK SWALLOW. **Riparia riparia.**

Rather common migrants.

261. ROUGH-WING SWALLOW. **Stelgidopteryx serripennis.**

Rather common migrants and breed in small numbers in the coast region.

Family BOMBYCILLIDÆ. Waxwings.

A small family inhabiting the temperate and arctic zones of the northern hemisphere. They are small birds, frequenting trees and shrubbery. The food is soft fruits and insects. Occasionally they eat cultivated fruits. Songless.

262. CEDER WAXWING. **Bombycilla cedrorum.**

Irregular winter residents. Occasionally appear in considerable numbers.

Family PTILOGONATIDÆ. The Silky Flycatchers.

A small family inhabiting Central America and Mexico, with one species in the United States. Their food is insects and berries.

263. PHAINOPEPLA. **Phainopepla nitens.**

Rather common summer residents and occasionally seen in winter. Their food is insects and such fruits as pepper tree berries and mistletoe berries. Not known to eat cultivated fruits. The insects are caught flycatcher fashion.

Family LANIIDÆ. Shrikes.

A rather small family restricted to the northern hemisphere and represented in America by but two species. The food is large insects, small mammals, reptiles, etc.

264. WHITE-RUMPED SHRIKE. **Lanius ludovicianus excubitoroides.**

Rather common residents of the eastern slope of the mountains.

265. CALIFORNIA SHRIKE. **Lanius ludovicianus gambeli.**

Common residents from the seacoast to the higher mountains. Tyrannical toward other birds and sometimes in winter catch and eat small birds such as the Intermediate Sparrow. The greater part of the food is insects, such as Jerusalem crickets and grasshoppers; but lizards and small mammals are also eaten. On the whole Shrikes are more beneficial than injurious. A peculiar habit is that of impaling prey not immediately eaten, on thorns, probably in storage, but not often utilized, fresh food being preferred.

Family VIREONIDÆ. Vireos.

A family of small birds inhabiting temperate and tropical America. They frequent shrubs and trees, and feed mainly on insects; one species takes nothing else. The song is usually short but pleasant.

266. RED-EYED VIREO. **Vireosylva olivacea.**

Casual. One specimen has been taken here.

267. WESTERN WARBLING VIREO. **Vireosylva gilva swainsoni.**

Common summer residents in the mountains and common in the migrations in the coast region. Nests in oak forests.

268. CASSIN VIREO. **Lanivireo solitarius cassini.**

Generally distributed in the migrations. Rather common summer residents of timbered canons in the mountains.

269. HUTTON VIREO. **Vireo huttoni.**

Infrequent winter residents and occasional in summer

270. LEAST VIREO. **Vireo belli pusillus.**

Common summer residents of willow thickets.

271. GRAY VIREO. **Vireo vicinior.**

Summer residents of thick brush on mountain sides. Local in distribution, occasionally rather common.

Family MNIOTILTIDÆ. Wood Warblers.

This large family is American in distribution. The greater

number are of quite small size. Most of the species are arboreal, but a few are more or less terrestrial. The food is insects, picked from the leaves, branches, or bark of trees; occasionally caught in the air, flycatcher-like; sometimes picked up on the ground. Some species are good songsters, but the majority are rather poor singers. Most of our species migrate long distances. All the Warblers are beneficial birds and some species are particularly useful.

272. CALAVERAS WARBLER. **Vermivora ruficapilla gutteralis.**

Rather common migrants, principally through the mountains.

273. LUTESCENT WARBLER. **Vermivora celata lutescens.**

Abundant migrants throughout the county.

274. DUSKY WARBLER. **Vermivora celata sordida.**

Rather common winter residents along the seacoast. A few breed in thick brush within a mile or two of the sea. The summer home of this subspecies is the Coronado and Santa Barbara Islands and their migrations are very short for Warblers.

275. ALASKA YELLOW WARBLER. **Dendroica æstiva rubiginosa.**

Infrequent migrants through the mountains.

276. CALIFORNIA YELLOW WARBLER. **Dendroica æstiva brewsteri.**

Rather common summer residents in the foothills and mountains, and common migrants throughout the county.

277. AUDUBON WARBLER. **Dendroica auduboni.**

Abundant winter residents in the lower part of the county. Probably a few breed in the highest mountains. The food is insects, with a small proportion of weed seeds. Very beneficial because of the large proportion of injurious insects eaten.

275. BLACK-THROATED GRAY WARBLER. **Dendroica nigrescens.**

Common migrants through the mountains.

279. TOWNSEND WARBLER. **Dendroica townsendi.**

Rather common migrants through the mountains.

280. ALASKA WATER THRUSH. **Seiurus noveboracensis notabilis.**

Rare fall migrants. One has been taken at National City and another at San Diego.

281. MACGILLIVRAY WARBLER. **Oporornis tolmei.**

Rather common migrants, principally through the mountains.

282. WESTERN YELLOWTHROAT. **Geothlypis trichas occidentalis,**

Rather common migrants.

283. TULE YELLOWTHROAT. **Geothlypis trichas scirpicola.**

Rather common residents of tule marshes and wet places overgrown with weeds and brush.

284. LONG-TAILED CHAT. **Icteria virens longicauda.**

Rather common summer residents of willow thickets.

285. ALASKA PILEOLATED WARBLER.
Wilsonia pusilla pileolata.
Rather common migrants.
286. GOLDEN PILEOLATED WARBLER.
Wilsonia pileolata chryseola.
Common migrants. Breeds in small numbers in oak forests and in willow groves.

Family MOTACILLIDÆ. Wagtails.

A rather large family, principally European and Asiatic. Terrestrial, insectivorous, migratory and more or less gregarious. Most of the species have the habit of wagging their tails up and down as if balancing on uncertain footing.
287. AMERICAN PIPIT. TITLARK. **Anthus rubescens.**
Common winter residents from the seacoast to the foothills.

Family CINCLIDÆ. Dippers.

This is a small family of birds of peculiar habits for birds of this order, (**Passeres**) being exceptionally expert divers and obtaining their food under water. The family occurs in mountainous regions in northern Europe, northern Asia, western North America and western South America. They live along mountain streams and feed on aquatic insects and fish spawn. Their feet are not webbed but they fly through the water much as in flight in air. The food is picked from the gravel and stones in the beds of the streams.
288. AMERICAN DIPPER. WATER OUZEL. **Cinclus mexicanus unicolor.**
Rather rare migrants through the mountains or casual winter visitors. The lack of suitable permanent streams prevents the residence of this species in this country. They are more or less common in the mountain streams further north in this state.

Family MIMIDÆ. Mockers and Thrashers.

A moderate sized family peculiar to America. They are medium sized or rather small birds. Nearly all the species are fine songsters. Several species are excellent mimics of the songs of other birds. The food is insects and fruits.
289. SAGE THRASHER. MOUNTAIN MOCKINGBIRD.
Oroscoptes montanus.
Infrequent migrants through the coast region, but more common migrants in the eastern part of the county. Casual winter residents in the coast region.
290. WESTERN MOCKINGBIRD. **Mimus polyglottos leucopterus.**
Common residents from the seacoast to the foothills. Occasional in the lower mountains. Partial to orchards, parks and the suburbs of towns. The food is insects, berries and seeds They are fond of blackberries and figs, and are sometimes troublesome where these fruits are ripening. They eat weed seeds, elder-

berries and the pulpy seeds of poison oaks also. They eat many grasshoppers and other injurious insects. Probably the beneficial items of food overbalance the injurious ones. Their songs are partly composed of imitations of the songs of other birds, but a considerable part is their own, which is so varied that most people think it is also mimetic.

291. PASADENA THRASHER. **Toxostoma redivivum pasadenense.**

Common residents of brushy localities from the seacoast to the pine region. The food is insects and seeds in about equal quantities. Occasionally where a vineyard is bordered by brushland the birds come in from the brush and eat some grapes. They are fine singers, but do not imitate other birds.

292. LECONTE THRASHER. **Toxostoma lecontei.**

Rare or infrequent residents of the desert and foothills of the eastern part of the county. Taken by me in the San Felipe Valley ten miles east of Julian.

Family TROGLODYTIDÆ. Wrens.

A large family of small birds of world wide distribution, but most abundant in the American tropics. They are found in a variety of localities, such as thick underbrush in forests, shrubbery, tulle swamps, cactus patches, etc. The food is principally insects. The species found in cool climates are migratory. Many species are fine singers. Beneficial.

293. NORTHERN CACTUS WREN. **Heleodytes brunneicapillus couesi.**

Rather common locally in cactus thickets in the eastern part of the county.

294. BRYANT CACTUS WREN. **Heleodytes brunneicapillus bryanti.**

A considerable proportion of the Cactus Wrens living in the region from the seacoast to the foothills are **bryanti.** Others are **couesi,** while some are probably intermediates; material is lacking for positive determination. Formerly Cactus Wrens were abundant in the "cholla" cactuses, but persistent egg collecting by boys has nearly exterminated them. The big nests in the cactuses were too easily found.

295. ROCK WREN. **Salpinctes obsoletus.**

Common summer residents of canons and rocky hillsides throughout the county. Occasional in winter.

296. DOTTED CANON WREN. **Catherpes mexicanus punctulatus.**

Rather common residents of rocky hillsides and canons in the foothill region. Sweet singers. Fearless and occasionally enter open windows.

297. SAN DIEGO WREN. **Thryomanes bewicki charienturus.**

Common residents of brushy localities. In winter they come down from the higher mountains, and in summer most of them leave the coast region.

298. WESTERN HOUSE WREN. **Troglodytes ædon parkmanni.**

Common summer residents of the foothills and mountains. A few winter in the coast region.

299. TULE WREN. **Telmatodytes palustris paludicola.**

Rather common residents on tule swamps.

Family CERTHIDÆ. Creepers.

This is a small family living in the cooler parts of the northern hemisphere. They are restless little birds, found in forests, where they creep over the trunks of trees, picking insects from the crevices of the bark. Scarcely migratory.

300. SIERRA CREEPER. **Certhia familiaris zelotes.**

Infrequent residents of the coniferous forests of the higher mountains.

Family SITTIDÆ. Nuthatches.

A small family of wide distribution. The birds are small, active, expert climbers, running over the trunks and limbs of trees frequently head downward (which no other birds do habitually), searching the crevices in the bark for insects. They feed to some extent on seeds and nuts which they stick in cracks in the bark and hammer until broken, hence the name "Nuthatches," (nut-hack).

301. SLENDER-BILLED NUTHATCH. **Sitta carolinensis aculeata.**

Common residents of coniferous forests, coming lower down in winter.

302. PYGMY NUTHATCH. **Sitta pygmaea.**

Common residents of coniferous forests. Occasional in the foothills in winter. Usually seen in small flocks.

Family PARIDÆ. Titmice and Chickadees.

A rather large family inhabiting the northern hemisphere, most abundant in Europe and Asia. They are hardy birds and migrate but little. Usually seen in small flocks.

303. SAN DIEGO TITMOUSE. **Bæophilus inornatus murinus.**

Rather common residents of forests in the foothills and mountains. Not as gregarious as most members of this family. These Titmice eat some fruit, mostly fruit left on the trees in fall and winter, but they also eat many scale insects.

304. MOUNTAIN CHICKADEE. **Penthestes gambeli baileyæ.**

Rather common residents of coniferous forests, some descending to the oaks in winter.

305. LEAST BUSH-TIT. **Psaltriparus mimimus.**

Common residents of brushy localities from the seacoast to the pines. Usually seen in small flocks of half a dozen to a dozen. The nest is purse-shaped and large for so very small a bird.

306. VERDIN. **Auriparus flaviceps.**

Infrequent residents of mesquit thickets on the eastern slope of the mountains.

Family CHAMÆIDÆ. Wren-tits.

Probably the smallest family of birds, as it contains but one species, including several subspecies. The distribution is the seacoast and western slope of the mountains from northern Lower California to southern Oregon, a strip of country about 800 miles long by 10 to 100 wide.

307. PALLID WREN-TIT. **Chamæa fasciata henshawi.**

Common residents of chemisal and other brush thickets. Shy and difficult to see. The food is seeds and insects.

Family SYLVIIDÆ. Warblers, Kinglets, Gnatcatchers, etc.

A large heterogenous family most numerous in Europe and Asia. The birds are all small, those members of the family found here being scarcely larger than hummingbirds. The food is insects.

308. WESTERN RUBY-CROWNED KINGLET. **Regulus calendula cineraceus.**

Rather common winter residents of forests and groves. Rare summer residents of the highest mountains. The song is loud for so small a bird.

309. WESTERN GNATCATCHER. **Polioptila cærulea obscurus.**

Common summer residents of brush and forests in the foothills and mountains and common in winter in the lower country. The food is insects, mostly small species.

310. BLACK-TAILED GNATCATCHER. **Polioptila californica.**

Rather common local residents of brush from the seacoast to the foothills. Rare winter residents.

311. PLUMBEOUS GNATCATCHER. **Polioptila plumbea.**

Infrequent winter residents of the eastern slope of the mountains.

Family TURDIDÆ. Thrushes, etc.

A large cosmopolitan family of rather small birds. The species living in summer in cool climates migrate, usually in loose flocks. The food is varied and includes insects, seeds and fruit. Many species are good singers.

312. TOWNSEND SOLITAIRE. **Myadestes townsendi.**

Infrequent migrants and rare winter residents.

313. RUSSET-BACKED THRUSH. **Hylocichla ustulata.**

Rather common summer residents of brush along streams and in wet places in the foothills.

314. ALASKA HERMIT THRUSH. **Hylocichla guttata.**

Common winter residents in brush from the seacoast to the foothills.

315. MONTEREY HERMIT THRUSH. **Hylocichla guttata slevini.**

Infrequent winter residents in brush in the coast region. Rare migrants in the mountains.

316. SIERRA HERMIT THRUSH. **Hylocichla guttata sequoiensis.**

Rare winter residents in the mountains and infrequent migrants.

317. WESTERN ROBIN. **Planesticus migratorius propinquus.**

Irregular late winter visitants, sometimes abundant, but more often fail to get this far south.

318. NORTHERN VARIED THRUSH. **Ixoreus nævius meruloides.**

Occasional winter visitants, sometimes in numbers, to the coast region.

319. WESTERN BLUEBIRD. **Sialia mexicanus occidentalis.**

Common winter residents. A few breed in the mountains.

320. MOUNTAIN BLUEBIRD. **Sialia curracoides.**

Rather common winter residents on the mesas from the coast to the foothills.

NATURAL HISTORY MUSEUM,
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DECEMBER 10, 1918.

Index

Alaska Hermit Thrush....314
Longspur....222
Water Thrush....280
Yellow Warbler....275
Albatross. Black-footed....31
Short-tailed....32
Allen Hummingbird....183
American Barn Owl....153
Bittern....78
Dipper....288
Egret....81
Golden Plover....116
Merganser....47
Pipit....287
Ancient Murrelet....10
Anna Hummingbird....181
Anthony Green Heron....84
Towhee....249
Arizona Hooded Oriole....212
Ash-throated Flycatcher....187
Audubon Warbler....277
Auklet. Cassin....9
Rhinoceros....8
Avocet....97

Baird Cormorant....43
Sandpiper....102
Bald Eagle....146
Band-tailed Pigeon....129
Bank Swallow....260
Barn Owl....153
Swallow....257
Belding Marsh Sparrow....225
Bell Sparrow....239
Belted Kingfisher....163
Bittern. American....78
Least....79
Black-bellied Plover....115
Blackbird. Brewer....214
San Diego Redwing....208
Tricolor....209
Yellow-headed....207
Black Brant....73
Black-chinned Hummingbird....179
Black-chinned Sparrow....234
-crowned Night Heron....86
-footed Albatross....31
-headed Grosbeak....251
Oystercatcher....126
-necked Stilt....98
Petrel....40
Phoebe....189
Rail. California....91
Swift....176
-tailed Gnatcatcher....310
Tern....30
-throated Gray Warbler....278
Sparrow....238
Turnstone....124
-vented Shearwater....36
Bluebird. Mountain....320
Western....319
Blue-fronted Jay....199
Grosbeak. California....252
-billed Duck....61
-winged Teal....59
Bonaparte Gull....23
Brant. Black....75
Brewer Blackbird....214
Sparrow....235
Brown Crane. Little....86
Pelecan. California....45
Bufflehead....64
Bullock Oriole....213
Bunting. Lark....255
Burrowing Owl....159
Bush-tit. Least....305
Butterball....64
Buzzard. Turkey....134

Cabanis Woodpecker....164
Cackling Goose....72
Cactus Wren. Bryant....294
Northern....293
Calaveras Warbler....272
California Black Rail....91
Blue Grosbeak....252
Brown Pelecan....45
Clapper Rail....88
Condor....133
Cuckoo....162
Gull....19
Horned Lark....197
Jay....200

California Black Rail—
Pygmy Owl....160
Purple Finch....215
Sage Sparrow....241
Shrike....265
Squirrel Hawk....144
Vulture....133
Woodpecker....170
Yellow Warbler....272
Calliope Hummingbird....184
Canon Wren. Dotted....296
Canvasback....60
Carolina Rail....90
Caspian Tern....24
Cassin Auklet....9
Kingbird....186
Vireo....268
Cedar Waxwing....262
Chat. Long-tailed....284
Chickadee. Mountain....304
Chipping Sparrow. Western....232
Cinnamon Teal....55
Clapper Rail. California....88
Clarke Nutcracker....203
Cliff Swallow....256
Common Loon....5
Tern....38
Condor. California....133
Cooper Hawk....138
Coot....93
Cormorant. Baird....43
Brandt....42
Farralone....41
Costa Hummingbird....180
Cowbird. Dwarf....206
Nevada....203
Crane. Little Brown....86
Sandhill....87
Creeper. Sierra....300
Crow. Western....202
Cuckoo. California....162
Curlew. Hudsonian....114
Longbilled....113

Desert Black-throated Sparrow....238
Dipper. American....288
Dotted Canon Wren....296
Dove. Mexican Ground....132
Western Mourning....130
White-winged....131
Dowitcher. Long-billed....100
Duck. Buffiehead....64
Butterball....64
Canvasback....60
Fulvous Tree....74
Hawk....148
Redhead....59
Ringnecked....63
Ruddy....68
Scaup....61
Lesser....62
Wood....58
Eagle. Bald....146
Golden....145
Eared Grebe....3
Egret. American....81
Snowy....82
Elegant Tern....26
English Sparrow....221

Falcon. Pigeon....149
Prairie....148
Richardson....150
Farralone Cormorant....41
Finch. California Purple....215
House....216
Ferrugineous Roughleg Hawk....144
Flicker. Red-shafted....172
Florida Gallinule....92
Flycatcher. Ash-throated....187
Hammond....194
Olive-sided....190
Traill....193
Vermillion....196
Western....192
Wright....195
Forster Tern....27
Frazer Oyster-catcher....125
Fulmar. Pacific....33
Rodgers....34
Fulvous Tree Duck....74

Gadwell....51
Gallinule. Florida....92
Glaucous-winged Gull....16
Gnatcatcher. Black-tailed....310
Plumbeous....311
Western....309
Godwit. Marbled....107

Golden-crowned Sparrow....231
Eagle....145
Plover. American....116
Goldfinch. Greenbacked....218
Lawrence....219
Willow....217
Goose. Cackling....72
Hutchings....71
Lesser Snow....69
White-fronted....70
Goshawk. Western....138a
Grasshopper Sparrow Western....231
Gray Vireo....271
Warbler. Black-throated....278
Great Horned Owl....158
Grebe. Eared....3
Horned....2
Pied-billed....4
Western....1
Greater Yellowlegs....108
Green-backed Goldfinch....218
Heron. Anthony....84
-tailed Towhee....250
-winged Teal....53
Gull. Bonaparte....23
California....19
Glaucous-winged....16
Heermann....22
Herring....18
Ring-billed....20
Short-billed....21
Western....17

Hammond Flycatcher....194
Harris Hawk....139
Hawk. California Squirrel....144
Cooper....138
Duck....148
Ferrugineous Roughleg....144
Harris....139
Marsh....136
Pigeon....149
Red-bellied....141
Red-tailed, Western....140
Sparrow....151
Swainson....143
Western Red-tailed....140
Heermann Gull....22
Heron. Anthony Green....84
Black-crowned Night....85
Great Blue....80
Louisana....83
Snowy....82
Hooded Merganser....49
Horned Grebe....2
Lark. California....197
Mohave....198
Owl. Great....158
House Finch....216
Wren. Western....298
Hummingbird. Allen....183
Anna....181
Black-chinned....179
Calliope....184
Costa....180
Rufous....182
Hutchins Goose....71
Hutton Vireo....269

Jack Snipe....99
Jaeger. Long-tailed....14
Parasitic....13
Pomarine....12
Jay. Blue-fronted....199
California....200
Pinon....204
Junco. Slate-colored....236
Thurbur....237

Killdeer....117
Kingbird. Cassin....186
Western....185
Kingfisher. Belted....163
Kinglet. °Western Ruby-crowned 308
Kite. White-tailed....135
Kittiwake. Pacific....15
Knot....101

Lark Bunting....252
California Horned....197
Mohave Horned....198
Sparrow. Western....228
Large-billed Sparrow....226
Lawrence Goldfinch....219
Least Bittern....79
Bush-tit....305
Sandpiper....103
Tern....29
Vireo....270
Leconte Thrasher....292

Lesser Scaup Duck 62
Snow Goose 69
Lincoln Sparrow 244
Linnet 216
Pine 220
Little Brown Crane 86
Loon. Common 5
Pacific 6
Red-throated 7
Long-billed Dowitcher 100
-eared Owl 154
-tailed Chat 284
Jaeger 14
Longspur. Alaska 222
Louisana Heron 85
Lutescent Warbler 273

Macgillivray Warbler 281
Mallard 50
Man O'War Bird 46
Marbled Godwit 107
Marsh Hawk 136
Sparrow. Belding 225
Large-billed 226
Martin. Western 255
Meadowlark. Western 210
Merganser. American 47
Hooded 49
Red-breasted 48
Mexican Ground Dove 132
Mockingbird. Mountain 289
Western 290
Monterey Hermit Thrush 315
Mountain Bluebird 320
Chickadee 204
Plover 121
Quail 127
Mud Hen 93

Nevada Cowbird 205
Sage Sparrow 240
Nighthawk. Pacific 174
Texas 175
Night Heron. Black-crowned 86
Northern Cactus Wren 293
Phalarope 95
Varied Thrush 318
Violet-green Swallow 259
Nutcracker. Clarke 203
Nuttall Woodpecker 166

Old Squaw 65
Olive-sided Flycatcher 190
Oriole. Arizona Hooded 212
Bullock 213
Scott 211
Osprey 152
Owl. American Barn 153
Burrowing 159
Great Horned 158
Long-eared 154
Pygmy 160
Screech 157
Short-eared 155
Spotted 156
Oyster-catcher. Black 126
Frazer 125

Pacific Black-headed Grosbeak 251
Fulmar 33
Kittiwake 15
Loon 6
Nighthawk 174
Pallid Wren-tit 307
Parasitic Jaegar 13
Peewee. Western Wood 191
Pelecan. California Brown 45
White 44
Petrel. Black 40
Fork-tailed 38a
Socorro 39
Phainopela 263
Phalarope. Northern 95
Red 95
Wilson 96
Petrel, Fork-tailed 38a
Phoebe. Black 189
Say 188
Pied-billed Grebe 4
Pigeon. Band-tailed 129
Falcon 149
Hawk 149
Pileolated Warbler. Alaska 285
Golden 286
Pine Linnet 220
Siskin 220
Pink-footed Shearwater 35
Pinon Jay 204
Pintail 57
Pipit. American 287
Plover. American Golden 116

Plover—
Black-bellied....115
Mountain....121
Semipalmated....118
Snowy....119
Wilson....120
Plumbeous Gnatcatcher....311
Plumed Quail....127
Pomarine Jaeger....12
Poorwill. Dusky....173
Praire Falcon....147
Purple Finch. California....215
Pygmy Nuthatch....302
Owl....160

Quail. Plumed....127
Valley....128

Rail. California Black....91
Clapper....88
Carolina....90
Light-footed....88
Virginia....89
Raven....201
Red-backed Sandpiper....104
-bellied Hawk....141
-breasted Merganser....48
Sapsucker....168
-eyed Vireo....266
-naped Sapsucker....169
Phalarope....94
-shafted Flicker....172
-tailed Hawk....140
-throated Loon....7
Redhead....54
Redwing Blackbird, °San Diego....208
Rhinoceros Auklet....8
Richardson Falcon....150
Ring-necked Duck....63
Roadrunner....161
Robin. Western....317
Rock Wren....295
Rodgers Fulmar....34
Roughleg Hawk....144
-winged Swallow....261
Royal Tern....25
Ruby-crowned Kinglet....308
Ruddy Duck....68
Rufous-crowned Sparrow....242
Hummingbird....182
Russet-backed Thrush....313
Sage Sparrow. California....241
Nevada....240
Thrasher....289
Sanderling....106
Sand Hill Crane....87
San Diego Redwing Blackbird....208
Song Sparrow....243
Titmouse....303
Towhee....248
Wren....297
Sandpiper. Baird....102
Least....103
Redbacked....104
Spotted....112
Western....105
Solitary....109
Sapsucker. Red-breasted....168
-naped....169
Savanna Sparrow. Western....224
Say Phoebe....188
Scaup Duck....61
Scott Oriole....211
Screech Owl....157
Semipalmated Plover....118
Sharp-shinned Hawk....137
Shearwater. Black-vented....36
Pink-footed....35
Slender-billed....38
Sooty....37
Short-billed Gull....21
-eared Owl....155
-tailed Albatross....32
Shoveler....56
Shrike. California....265
White-rumped....264
Sierra Creeper....300
Hermit Thrush....316
Shumagin Fox Sparrow....246
Slate-colored Junco....235
Slender-billed Nuthatch....301
Shearwater....38
Snipe. Jack....99
Wilson....99
Snow Goose. Lesser....69
Snowy Egret....82
Heron....82
Plover....119
Socorro Petrel....39
Solitaire. Townsend....312

Song Sparrow. San Diego....243
Sooty Albatross....37
Sora....90
Sparrow. Belding Marsh....225
Bell....239
Black-chinned....234
Brewer....233
California Sage....241
Chipping, Western....232
Desert—Black-throated....238
English....231
Forbush....245
Golden-crowned....231
Grasshopper, Western....237
Intermediate....230
Hawk. California....151
Large-billed....226
Lincoln....224
Nevada Sage....240
Rufous-crowned....242
San Diego Song....243
Shumagin Fox....246
Vesper, Western....223
Western Chipping....234
Grasshopper....227
Lark....228
Savanna....224
Vesper....223
Yakatut....247
Spoonbill Duck....56
Spotted Owl....156
Sandpiper....112
Sprigtail....57
Squirrel Hawk. California....144
Stilt. Black-necked....98
Surf Bird....122
Scooter....67
Swallow. Bank....260
Barn....257
Cliff....256
Northern Violet-green....259
Rough-winged....261
Tree....258
Swan. Whistling....75

Tanager. Western....254
Tattler. Wandering....111
Teal. Blue-winged....54
Cinnamon....55
Green-winged....53
Tern. Black....30
Caspian....24
Common....38
Elegant....26
Forster....37
Least....29
Royal....24
Texas Nighthawk....175
Thrasher. Leconte....292
Pasadena....291
Sage....289
Thrush. Alaska Hermit....315
Monterey Hermit....315
Russet-backed....313
Sierra Hermit....316
Thurbur Junco....237
Titlark....287
Townsend Warbler....279
Solitaire....312
Traill Flycatcher....193
Tree Duck. Fulvous....74
Swallow....258
Tricolor Blackbird....209
Tule Wren....299
Turkey Buzzard....134
Vulture....134
Turnstone. Black....124
Ruddy....123

Valley Quail....128
Varied Thrush. Northern....318
Vaux Swift....177
Verdin....306
Vermillion Flycatcher....196
Vesper Sparrow. Western....223
Violet-green Swallow. Northern....259
Vireo. Cassin....268
Gray....271
Hutton....269
Least....270
Red-eyed....266
Warbling, Western....267
Vulture. California....133
Turkey....134

Wandering Tatler....111
Warbler. Alaska Pileolated....285
Golden....286
Yellow....275
Audubon....277

Warbler—
Black-throated Gray....278
Calaveras....272
California Yellow....275
Dusky....274
Lutescent....273
Macgillivray....281
Townsend....279
Warbling Vireo. Western....267
Water Ouzel....288
Thrush. Alaska....286
Waxwing. Cedar....262
Western Bluebird....319
Chipping Sparrow....232
Crow....202
Flycatcher....192
Gnatcatcher....309
Grasshopper Sparrow....227
Grebe....1
Gull....17
House Wren....298
Kingbird....185
Lark Sparrow....228
Martin....255
Meadowlark....210
Mockingbird....290
Mourning Dove....130
Red-tailed Hawk....140
Robin....317
Ruby-crowned Kinglet....308
Sandpiper....105
Savanna Sparrow....224
Tanager....254
Vesper Sparrow....223
Warbling Vireo....267
Wood Peewee....191
Yellow-throat....282
Whistling Swan....75
White-crowned Sparrow....229
-faced Glossy Ibis....76
-fronted Goose....70
-headed Woodpecker....167
Pelecan....44
-rumped Shrike....264
-tailed Kite....135
-winged Dove....121
Scoter....66
Widgeon....52
Willow Goldfinch....217
Woodpecker....165
Wilson Phalarope....96
Plover....120
Snipe....99
Wood Duck....58
Ibis....77
Peewee. Western....191
Woodpecker. Cabanis....164
California....170
Lewis....171
Nuttall....166
Willow....165
Wren. Bryant Cactus....294
Dotted Canon....296
Northern Cactus....293
Rock....295
San Diego....297
Tule....299
Western House....298
Wren-Tit. Pallid....307
Wright Flycatcher....195

Yakatut Fox Sparrow....247
Yellow-headed Blackbird....207
-throat. Western....282
Tule....283
Warbler. Alaska....285
California....276

Xantus Murrelet....11

Zone-tailed Hawk....142

JUN 4 1921

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AN ANNOTATED LIST OF THE MAMMALS OF SAN DIEGO COUNTY, CALIFORNIA

By FRANK STEPHENS

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Mammals of San Diego County California

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Order Cetacea

Cetaceans are mammals that are fishlike in form and adapted for life in oceans, seas and large rivers. Like all mammals they breathe by means of lungs and suckle their young, which are born well developed.

Family BALÆNIDÆ. Whalebone Whales.

The food is zoophytes, mollusks, crustaceans and small fish. When a quantity of these are taken into the mouth the accompanying water is strained out through the fringed "balleen" of the upper jaw, the mouth being partially closed. Whales of this family have no teeth.

1. CALIFORNIA GRAY WHALE. **Rhachianectes glaucus.**
Formerly common, now infrequent or nearly extinct. Migrate up and down the coast, at times within sight from the land. Seen here from November until April. Hunted for their oil, which averages about twenty barrels to the whale. The flesh is beginning to be utilized for food.
2. PACIFIC HUMPBACK WHALE. **Megaptera versabilis.**
Nearly exterminated. Migrate irregularly.
3. SULPHUR-BOTTOMED WHALE. **Sibbaldius sulfureus.**
The largest species of whale. Swift and difficult to capture. Not common. Migrate irregularly.
4. PACIFIC FINBACK WHALE. **Balænoptera velifera.**
Occasional along the coast.

Family PHYSETERIDÆ. Sperm Whales.

The food is squid, cuttlefish, octopus, etc. Teeth in lower jaw.

5. SPERM WHALE. **Physeter macrocephalus.**
Found in temperate and tropical seas. Now almost exterminated.

Family DELPHINIDÆ. Dolphins, Porpoises, etc.

The food is fish, squid, cuttlefish, etc. Gregarious and voracious. But little is known about the habits of these small cetaceans. Usually there are teeth in both jaws.

6. NORTHERN RIGHT WHALE PORPOISE. **Lissodelphis borealis.**

Rather common. Sometimes enter bays.

7. BAY PORPOISE. **Phocæna communis.**

The Bay Porpoises seem to prefer brackish waters, where rivers enter the ocean and therefore are not common here.

8. BLACKFISH. **Globicephala scammoni.**

Formerly common off the coast; now this large porpoise is seldom seen.

9. GRAMPUS. **Grampus griseus.**

10. COWFISH. **Tursiops gilli.**

Occasional along the coast. Said to have entered bays formerly.

11. STRIPED PORPOISE. Striped Dolphin. **Lagenorhynchus obliquidens.**

Rather common near the coast and occasional in bays.

12. COMMON DOLPHIN. **Delphinus delphis.**

Rather common near the coast and occasional in bays.

Order UNGULATA.

Family CERVIDÆ. Deer.

But one native species of this family occurs in this county now. It is possible that elk may have once ranged this far south but I know of no records of their occurrence here.

13. CALIFORNIA MULE DEER. **Odocoileus hemionus californicus.**

Still fairly common in the mountains. If the laws regarding close seasons and number limits are honestly obeyed there will always be fair deer hunting in this county, as there is a large area of brush land and forest that will never be put in cultivation and will be good deer range.

Several Dwarf Elk have been turned out in the Laguna Game Preserve, but they may not be able to establish themselves.

Family ANTILOCAPRIDÆ. Prong-horn Antelopes.

14. PENINSULA PRONG-HORN ANTELOPE. **Antilocapra americana peninsularis.**

Now practically extinct in this county. Not long ago they ranged along the edge of the Colorado Desert in the eastern part of this county. Many years ago I saw four at Carrizo Creek. I have heard that when the first settlers came to this county Antelopes were found on the mesas near the seacoast.

Family BOVIDÆ. Cattle, Sheep, etc.

15. NELSON BIGHORN. Mountain Sheep. **Ovis canadensis nelsoni.**

While not as common as they were twenty years ago Bighorns are still to be found on the mountain sides of the desert slope, and now appear to be slowly increasing in numbers.

Order RODENTIA. Gnawing Animals.

Family SCIURIDÆ. Squirrels.

This is a large family of rather small-sized animals. Squirrels are found in nearly all parts of the world except Australia. Some species are used for food. Some species are of economic importance because of their destruction of crops. The habits are varied; some are arboreal, others are terrestrial; many are fossorial. Most species are diurnal, but the Flying Squirrels are principally nocturnal. The principal food is vegetable,—seeds, fruits, leaves, etc., but some flesh and insects are eaten by many species.

16. FISHERS GROUND SQUIRREL. **Citellus beecheyi fisheri.**

Abundant in the mountains and west to the sea. Not found in the desert or in the foothills bordering the desert. Very destructive to crops and pasturage. Has been found to be infested with the germs of bubonic plague in other counties of this state. Has few redeeming characters.

17. ROUND-TAILED GROUND SQUIRREL. **Citellus tereticaudus.**

Rather common along the edge of the Colorado Desert and in the valleys of the eastern slope of the mountains.

18. ANTELOPE GROUND SQUIRREL. **Ammospermophilus leucurus.**

Common on the eastern slope of the mountains. Prefers rocky ground around the edges of the valleys.

19. MERRIAM CHIPMUNK. **Eutamias merriami.**

Found principally in forests of mixed oak and pine. Common in a few places.

20. ANTHONY GRAY SQUIRREL. **Sciurus griseus anthonyi.**

Found in mixed oak and pine forests on the Laguna, Cuyamaca and Palomar Mountains. They are subject to epidemics and irregular fluctuations in abundance.

I am told that Flying Squirrels have been seen on Palomar Mountain, but I have seen none in the county.

Family MURIDÆ. Rats and Mice.

A very large family of world wide distribution. The introduced species are destructive and harmful, as are a few of the native species in a less degree. The greater number of native species occur mostly at a distance from dwellings and cultivated land and therefore are not of economic importance. Some species are almost exclusively vegetarian, others, particularly the introduced species, are omnivorous.

21. BROWN RAT. **Epimys norvegicus.**

Introduced and thoroughly established. Abundant in towns and becoming common in the country. Very destructive. Sometimes carry disease germs into dwellings.

22. BLACK RAT. **Epimys rattus.**
Earliest in introduction, but kept reduced in numbers by the stronger Brown Rat.

23. ROOF RAT. **Epimys rattus alexandrinus.**
Introduced. Has not become numerous.

24. HOUSE MOUSE. **Mus musculus.**
Introduced. Abundant.

25. GRASSHOPPER MOUSE. **Onychomys torridus.**
Found in valleys on the eastern slope of the mountains, but nowhere common.

26. RAMONA GRASSHOPPER MOUSE. **Onychomys torridus ramona.**
Found on the mesas and in valleys of the coast region. Not common. Food is insects with some flesh and seeds.

27 GAMBEL WHITE-FOOTED MOUSE. **Peromyscus maniculatus gambeli.**
Common throughout the county. Most abundant in the pine forests. Not often troublesome in dwellings.

28. SONORA WHITE-FOOTED MOUSE. **Peromyscus maniculatus sonoriensis.**
The paler desert form. Common in the eastern part of the county.

29. ROWLEY MOUSE. **Peromyscus boylii rowleyi.**
A mountain species. Common locally.

30. SAN PEDRO MARTIR MOUSE. **Peromyscus truei martirensis.**
Found in the foothills and mountains. Seldom common.

31. CHEMISAL MOUSE. **Peromyscus californicus insignis.**
Found in thick brush from the lower edge of the pine forests to the sea. Common.

32. DESERT MOUSE. Hermit Mouse. **Peromyscus eremicus.**
Abundant in parts of the Colorado Desert and on the eastern slope of the mountains, principally in valleys.

32a. DULZURA MOUSE. **Peromyscus eremicus fraterculus.**
Rather common in brushy localities from the western slope of the mountains to the sea.

33. STEPHENS CAÑON MOUSE. **Peromyscus crinitus stephensi.**
Rare this far south. Found in cañons and valleys on the east slope.

34. LARGE-EARED HARVEST MOUSE. **Reithrodontomys megalotis.**
Occurs in grassy places and weed patches in valleys on the eastern slope of the mountains and along the edge of the desert.

35. LONG-TAILED HARVEST MOUSE. **Reithrodontomys longicaudus.**
Abundant in grass and weeds in the mountains and west to the seacoast.

36. LONG-EARED BRUSH RAT. **Neotoma fuscipes macrotis.**
Common in brush from the summit of the mountains to the seacoast.
Scarcely or not injurious.
37. INTERMEDIATE BRUSH RAT. **Neotoma intermedia.**
Cholla cactus thickets in foothills and west to the sea.
38. YELLOW BRUSH RAT. **Neotoma intermedia gilva.**
Cactus thickets of the foothills bordering the desert.
39. MESQUITE BRUSH RAT. **Neotoma albigula venusta.**
Colorado Desert and bordering foothills. Frequents mesquite brush.
40. SOUTHERN CALIFORNIA MEADOW MOUSE.
Microtus californicus neglectus.
Abundant in grassy localities in the mountains and west to the seacoast.

Family GEOMYIDÆ. Pocket Gophers.

The food is vegetable, principally roots and tubers. Stems of plants are also cut off and drawn into the runs. Worms and insects found in the runs are also eaten. Pocket Gophers are quite injurious in cultivated land, especially in fruit orchards. They are easily trapped. Poison and bi-sulphide of carbon are often used in the runs and are moderately effective.
41. TAWNY POCKET GOPHER. **Thomomys nigricans.**
Abundant in the mountains.
42. SOUTHERN POCKET GOPHER. **Thomomys bottæ pallescens.**
Abundant in the foothills and west to the seacoast.
43. IMPERIAL VALLEY POCKET GOPHER. **Thomomys perpallidus albatus.**
Colorado Desert and bordering foothills. Not common in many places.

Family HETEROMYIDÆ. Pocket Rats and Pocket Mice.

Differ from common rats and mice in having pockets in the sides of the neck similar to those of pocket gophers. Sometimes destructive, but not often abundant in cultivated land. Nocturnal. The food is principally seeds. Often called Kangaroo Rats.
45. DULZURA POCKET RATS. **Dipodomys streatori simulans.**
Western slope of the mountains. Not common.
46. BIG DESERT POCKET RAT. **Dipodomys deserti.**
Common in parts of the Colorado Desert and in the bordering foothills. Usually found in small colonies.
47. MIMIC POCKET RAT. **Dipodomys merriami simiolus.**
Abundant in the valleys of the eastern slope of the mountains and in the Colorado Desert.

48. BANGS' POCKET MOUSE. **Perognathus panamintus bangsi.**

Valleys of the eastern slope of the mountains. Not common.

49. SAND POCKET MOUSE. **Perognathus panamintus arenicola.**

Western border of the Colorado Desert. Rare.

50. PACIFIC POCKET MOUSE. **Perognathus pacificus.**

A very small species. The four known specimens were taken within a mile of the sea in this county.

51. BAILEY POCKET MOUSE. **Perognathus baileyi.**

Eastern slope of the mountains near the border. Rare.

52. LONG-TAILED POCKET MOUSE. **Perognathus formosus.**

Valleys of the eastern slope of the mountains. Not common.

53. TUFT-TAILED POCKET MOUSE. **Perognathus penicillatus.**

Abundant in places in the Colorado Desert and in the valleys of the eastern slope of the mountains.

54. SHORT-EARED POCKET MOUSE. **Perognathus fallax.**

Rather common in the western foothills and thence to the sea.

55. PALLID SHORT-EARED POCKET MOUSE. **Perognathus fallax pallidus.**

Eastern slope of the mountains. Rather common in rocky ground.

56. DARK POCKET MOUSE. **Perognathus californicus femoralis.**

Foothills and western slope of the mountains. Not common.

57. SPINY POCKET MOUSE. **Perognathus spinatus.**

Foothills and low mountains bordering the Colorado Desert. Usually found in rocky places. Seldom common.

Family LEPORIDÆ. Hares and Rabbits.

A rather large family of some economic importance, partly because of the value of their flesh for food, and partly because of the damage occasionally done to crops and fruit trees. Their food is vegetable, mostly the leaves, stems, branches and bark of plants and shrubs, which are bitten off and eaten on the spot. The young of Rabbits are born blind and hairless in underground nests, while those of Hares are well haired at birth and can see and very soon can take care of themselves.

58. SAN DIEGO JACK RABBIT. **Lepus californicus bennetti.**

Common from the sea to the pine forests.

59. COLORADO DESERT JACK RABBIT. **Lepus californicus deserticola.**

More or less common from the eastern slope of the mountains to the Colorado River. This light-colored subspecies is subject

to severe epidemics, sometimes almost to the extent of extermination.

60. SAN DIEGO COTTONTAIL. **Sylvaticus auduboni sanctidiegi.**

Common from the coast to the pine forests.

61. ARIZONA COTTONTAIL. **Sylvaticus auduboni arizonæ.**

Rather common in places in the foothills bordering the Colorado Desert and east through Arizona.

62. ASHY BRUSH RABBIT. **Sylvaticus bachmani cinerascens.**

Common in thick brush from the coast to the higher mountains. Seldom seen in the open.

Order PINNIPEDIA. Seals.

Family PHOCIDÆ. Earless Seals.

Seals are abundant along Arctic seashores; common along those of temperate regions; less common or wanting along tropical coasts. The food is fish and some crustaceans and mollusks. The fish are caught by pursuit in the water. Seals must come to the surface every few minutes to breathe, and they come ashore occasionally to rest and to bask in the sun.

63. SAN GERONIMO HARBOR SEAL. **Phoca richardi geronimensis.**

Occasional in San Diego Bay and at sea; a small herd stays in Mission Bay. They destroy many fish and in that way are injurious to human interests with but little good to offset the loss.

Family OTARIIDÆ. Eared Seals.

64. CALIFORNIA SEA LION. **Zalophus californianus.**

Occasional along the coast. Prefer the neighborhood of rocky islands, which are lacking near the coast in this county.

Elephant Seals, **Macrorhinus angustirostris,** formerly were abundant on some of the Santa Barbara Islands. I know of no records of any Elephant Seals having been seen on shore within San Diego County but this probably occurred at times when they were still common. The species is very nearly exterminated, a small herd of about a dozen individuals that occasionally comes ashore on Guadaloupe Island being the only known survivors.

Order CARNIVORA. Flesh-eating Mammals.

Family FELIDÆ. Cats.

65. PACIFIC COAST PUMA. "Mountain Lion". **Felis oregonensis.**

Still occasionally found in San Diego County. I have never seen one alive out of a cage. The food is flesh exclusively. Being large and powerful they are able to catch large game, such

as deer, bighorns, colts, calves and hogs. They kill only for food. Instances of their attacking people are rare and nowadays they avoid men as much as possible.

66. CALIFORNIA BOBCAT. Wildcat. **Lynx eremicus californicus.**

Common in brush and forests throughout the county. They vary greatly with age and season, in color, spotting, and size of ear tuft. Bobcats prey on all the smaller mammals and birds and frequently on poultry. Most of their hunting is done in the night but they prowl around more or less in the daytime.

The Canada Lynx does not occur here.

Family CANIDÆ. Wolves, Dogs and Foxes.

This is a rather large family, distributed over all the world. All are carnivorous, but many species eat other food, such as fruits.

67. VALLEY COYOTE. **Canis ochropus.**

Rather common from the summit of the mountains to the seacoast. Sometimes harmful to poultry and occasionally to sheep and young stock. In the long run this harm is nearly offset by their destruction of gophers, squirrels and mice and by keeping rabbits in check around grain fields, vineyards and orchards. Rather fond of grapes and occasionally troublesome in vineyards. We are apt to remember the harm they do and give them scant credit on the beneficial side.

68. DESERT COYOTE. **Canis ochropus estor.**

Common on the eastern slope of the mountains and on the Desert.

A smaller, brighter colored race (**Canis ochropus mearnsi**) probably occurs in the mountains, but not enough examples are available to decide the point.

69. LONG-EARED KIT FOX. **Vulpes macrotis.**

It is reasonably certain that this Fox formerly occurred in the region between the sea and the mountains, and probably a few still live here.

70. MOHAVE DESERT KIT FOX. **Vulpes macrotis arsipus.**

Occasional in the Mohave Desert and Colorado Desert. I have trapped this pale colored race at Borego Springs in the northeastern part of this county.

71. CALIFORNIA GRAY FOX. **Urocyon cinereoargenteus californicus.**

Common in brush and forest in many parts of the county.

Family PROCYONIDÆ. Raccoons, etc.

A rather small family distributed through temperate and tropical America. The food is small mammals, birds, eggs, fish, insects, fruit and seeds. Nocturnal. Terrestrial and arboreal.

72. CALIFORNIA RING-TAILED CAT. **Bassariscus astutus raptor.**

Occasionally found in the northern part of the county. Apparently a recent immigrant from further north, as the Indians did not know the animal. The earliest capture that I know of was in 1907, at the southern foot of Palomar Mountain.

73. SOUTHWESTERN RACCOON. **Procyon psora californicus.**

Common from the mountains to the seacoast.

Family URSIDÆ. Bears.

74. CHIEF GRIZZLY. **Ursus magister.**

The type of this species was killed at the head of San Onofre Canon, in the northwestern part of this county, in 1900. He was estimated to weigh 1400 pounds. This is about the largest species of bear known. The species is nearly or quite extinct. Fifty years ago they were rather common in the mountains of this county.

I know of no authentic record of black bears ever having been found in this county.

Family MUSTELIDÆ. Weasels, etc.

This is a rather large and important family of nearly world-wide distribution. The fur of many species is of high quality. Many species are provided with large scent glands, the scent usually being very disagreeable.

75. CALIFORNIA WEASEL. **Mustela xanthogenys.**

Western slope of the mountains and west to the sea. Not common. Beneficial by destroying gophers, mice and squirrels. This species of Weasel seldom kills poultry and should never be killed except individuals known to have acquired the habit of killing poultry.

76. CALIFORNIA SPOTTED SKUNK. **Spilogale phenax.**

Common in the mountains, occasional on the mesas west to the sea. The food is mice, birds, eggs, poultry, insects and grubs. They are bold, having great confidence in their peculiar means of defense. They are good climbers and their small size permits them to enter squirrel holes. They destroy some poultry, some of this destruction being laid to weasels. It is a well established fact that bites of some species of skunks of this genus cause a form of hydrophobia, but cases of hydrophobia from skunk bites in California are not well authenticated.

77. SOUTHERN CALIFORNIA SKUNK. **Mephitis occidentalis holzneri.**

Common throughout the county.

78. WESTERN BADGER. **Taxidea taxus neglecta.**

Generally distributed. Not very common.

79. SOUTHERN SEA OTTER. **Latax lutris nereis.**

Very rare. Sometimes seen in kelp beds.

Order INSECTIVORA.

Family SORECIDÆ. Shrews.

A large family of quite small animals, most abundant in the colder parts of the northern hemisphere. The food is insects and mice.

80. ADORNED SHREW. **Sorex ornatus.**
In the mountains. Rare.

81. GRAY SHEW. **Notiosorex crawfordi.**
Mountain and mesa. Rare.

Family TALPIDÆ. Moles.

A moderate sized family generally distributed over the north temperate zone. The food is insects, larvæ, etc., obtained in burrowing through the soil.

82. SOUTHERN CALIFORNIA MOLE. **Scapanus latimanus occultus.**
Rather rare near the coast; more common in the mountains. These Moles do not eat the roots of plants or other vegetation.

Order CHIROPTERA. Bats.

Bats are found in all parts of the world except the polar regions. The food of California species is insects caught in the air.

Family VESPERTILIONIDÆ. Bats.

A rather small family, most common in temperate regions.

83. PALE BAT. **Antrozous pallidus.**
This large Bat is found in the Colorado Desert and in the bordering foothills. It is not common.

84. PACIFIC PALE BAT. **Antrozous pallidus pacificus.**
Occasional in the mountains; probably found also in the coast region. but I have no record from there.

85. PALE LUMP-NOSED BAT. **Corynorhinus macrotis pallescens.**
Rather common in the Colorado Desert and occasional in the coast region.

86. LONG-SHANKED BAT. **Myotis lucifugus longicrus.**
Generally distributed but not common in the coast region.

87. OAK FOLIAGE BAT. **Myotis californicus quercinus.**
Common in the mountains and in the coast region.

88. LA GRULLA BROWN BAT. **Myotis orinomus.**
Found in the mountains. Not common.

90. LONG-EARED BAT. **Myotis evotis.**
Found throughout the county. Not common.

91. WESTERN BAT. **Pipistrellus hesperus.**
Abundant in spring and rather common in summer and autumn in the Colorado Desert and bordering foothills.

92. MERRIAM BAT. **Pipistrellus hesperus merriami.**
Occasional in the coast region.
93. SAN BERNARDINO BAT. **Eptesicus fuscus bernardinus.**
Common in the mountains.
94. WESTERN RED BAT. **Nycteris borealis teliotus.**
Winter residents in valleys. Not common.
95. HOARY BAT. **Nycteris cinerea.**
Winter residents in valleys. Rare. Sometimes found hanging in fruit trees.

Family MOLLOSSIDÆ. Free-tailed Bats.

A small family of tropical and sub-tropical distribution.
96. MOHAVE BAT. **Nyctinomus mexicanus mohavensis.**
Common in the Colorado Desert and bordering foothills; less common or occasional in the coast region.
97. CALIFORNIA MASTIFF BAT. **Eumops californicus.**
Rare winter residents in the coast region and in the Colorado Desert. I know of no summer records anywhere.

Family PHYLLASTOMATIDÆ. Leaf-nosed Bats.

A tropical American family. Some species eat fruit as well as insects.
98. CALIFORNIA LEAF-NOSED BAT. **Macrotus californicus.**
Found in foothills and valleys, often in caves.

Index

Adorned Shrew 80
Antelope Ground Squirrel 18
  Peninsula Prong-horn 14
Anthony Gray Squirrel 20
Arizona Cottontail 61
Ashy Brush Rabbit 62
Badger, Western 78
Bailey Pocket Mouse 51
Bang's Pocket Mouse 48
Bat, California Leaf-nosed 98
  Mastiff 97
  La Grulla Brown 88
  Long-eared 90
    —Shanked 86
  Merriam 92
  Mohave 96
  Oak-foliage 87
  Pacific Pale 84
  Pale 83
    Lump-nosed 85
  San Bernardino 93
  Western 91
    Red 94
Bay Porpoise 7
Bear, Chief Grizzly.....74
Big Desert Pocket Rat.....47
Bighorn, Nelson 15
Blackfish 8
Black Rat 22
Bobcat, California 66
Brown Bat, La Grulla 88
  Rat 21
Brush Rabbit 62
  Rat, Intermediate 37
    Mesquit 39
    Yellow 38
California Bobcat 66
  Gray Fox 71
    Whale 1
  Leaf-nosed Bat 98
  Mastiff Bat 97
Mule Deer 13
Ring-tailed Cat 72
Sea Lion 64
Spotted Skunk 77
Weasel 75
Canon Mouse, Stephens 33
Cat, California Ring-tailed 72
Chemisal Mouse 31
Chief Grizzly 79
Chipmunk, Merriam 19
Colorado Desert Jack Rabbit...59
Common Dolphin 12
Cottontail, Arizona 61
  San Diego 60
Cowfish 10
Coyote, Desert 68
  Valley 67
Dark Pocket Mouse 56
Deer, California Mule 13
Desert Coyote 68
  Jack Rabbit 59
  Kit Fox, Mohave 70
  Mouse 32
  Pocket Rat. Big 46
Dolphin, Common 12
  Striped 11
Dulzura Pocket Mouse 45
Finback Whale, Pacific 4
Fisher's Ground Squirrel 16
Fox, California Gray 71
  Long-eared Kit 69
  Mohave Desert Kit 70
Gambel Pocket Rat 44
  White-footed Mouse 27
Gopher, Imperial Valley Pocket 43
  Southern Pocket 42
  Tawny Pocket 41
Grampus 9
Grasshopper Mouse 25
  Ramona 26
Gray Fox, California 71
  Shrew 81
  Squirrel, Anthony 20
  Whale, California 1
Grizzly, Chief 74
Ground Squirrel, Antelope 18
  Fisher's 16
  Round-tailed 17
Harbor Seal, San Geronimo 63
Harvest Mouse, Large-eared...34
  Long-tailed 35

Hoary Bat 95
House Mouse 24
Humpback Whale, Pacific..... 2
Imperial Valley Pocket Gopher 43
Intermediate Brush Rat.....37
Jack Rabbit, Colorado Desert..59
San Diego 58
Kit Fox, Long-eared 69
Mohave Desert 70
La Grulla Brown Bat 88
Large-eared Harvest Mouse 34
Leaf-nosed Bat, California.....98
Lion, California Sea 64
Mountain 65
Long-eared Bat 90
Brush Rat 36
Kit Fox 69
Long-shanked Bat 86
-tailed Harvest Mouse....35
Pocket Mouse 52
Mastiff Bat, California 97
Meadow Mouse, Sou. Calif.....40
Merriam Bat 92
Chipmunk 19
Mimic Pocket Rat 47
Mole, Southern California 82
Mohave Bat 96
Desert Kit Fox 70
Mountain Lion 65
Sheep 15
Mouse, Bailey Pocket 51
Bang's Pocket 48
Chemisal 31
Dark Pocket 56
Desert 32
Gambel White-footed 27
Grasshopper 25
Ramona 26
House 24
Large-eared Harvest 34
Long-tailed 35
Pocket 52
Pacific Pocket 49
Rowley 24
San Pedro Martir.....30
Sand Pocket 49
Short-eared Pocket 54
Sonora White-footed 28
Southern California Meadow..40
Spiny Pocket 57
Stephens Canon 33
Mouse, Tuft-tailed Pocket.....53
Mule Deer, California 13
Nelson Bighorn 15
Northern Right Whale Porpoise 6
Oak Foliage Bat 87
Otter, Southern Sea 79
Pacific Coast Puma 65
Finback Whale 4
Humpback Whale 2
Pale Bat 83
Pocket Mouse 50
Pale Bat 83
Peninsula Pronghorn Antelope..14
Pocket Gopher, Imperial Valley 43
Southern 42
Tawny 41
Pocket Mouse, Bailey.....51
Bangs 48
Dark 56
Long-tailed 52
Pacific 50
Sand 49
Short-eared 54
Spiny 57
Tuft-tailed 53
Rat, Big Desert 46
Dulzura 45
Gambel 44
Mimic 47
Porpoise, Bay 7
Northern Right Whale..... 6
Striped 11
Pronghorn Antelope, Peninsula 14
Puma, Pacific Coast.....65
Rabbit, Ashy Brush 62
Colorado Desert Jack 59
San Diego Jack 58
Raccoon, Southwestern 73
Rat, Big Desert Pocket 46
Black 22
Brown 21
Dulzura Pocket 45
Gambel Pocket 44
Mimic Pocket 47
Roof 23
Red Bat, Western 94
Right Whale Porpoise..... 6
Ring-tailed Cat, California.....72
Roof Rat 23

Rowley Mouse 29
San Bernardino Bat.....83
San Diego Cottontail 60
Jack Rabbit 58
Sand Pocket Mouse 49
San Geronimo Harbor Seal.....63
Sea Lion, California 64
Otter, Southern 79
Short-eared Pocket Mouse.....54
Shrew, Adorned 80
Gray 81
Skunk, California Spotted.....76
Southern California 77
Sonora White-footed Mouse....28
Southern Calif. Meadow Mouse 40
Mole 82
Pocket Gopher 42
Skunk 77
Sea Otter 79
Southwestern Raccoon 73
Sperm Whale 5
Spiny Pocket Mouse 57
Spotted Skunk, California.....76
Squirrel, Antelope Ground.....18
Anthony Gray 20
Fisher Ground 16
Stephens Canon Mouse 33
Striped Dolphin Porpoise 11
Sulphur-bottomed Whale 3
Tawny Pocket Gopher 41
Weasel, California 75
Western Badger 78
Bat 91
Red Bat 94
Whale, California Gray 1
Pacific Finback 4
Humpback 2
Sperm 5
Sulphur-bottomed 3
Yellow Brush Rat 38
Valley Coyote 67

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Class Amphibia

Order CAUDATA. Salamanders.

Young salamanders begin life as aquatic animals, breathing by means of gills. Later in life a transformation occurs; the gills disappear and the animal then breathes by means of lungs and are adapted for life on land. The skin is not covered with scales. The limbs are small and comparatively weak. They retain their tails through life.

Family PLETHODONTIDÆ.

1. ARBOREAL SALAMANDER. **Aneides lugubris.**

The only San Diego County occurrences known to me are—Falls of the San Diego River, Sorrento Mountain near La Jolla, and in the Sequoia Mine. Probably more common than these records indicate.

2. SLENDER SALAMANDER. **Batrachoseps attenuatus.**

In wet weather these little lizard-like animals may be found under boards lying on the ground and under stones in the coast region; and in the mountains under rotten logs. In the dry season they burrow in the soil.

Order SALIENTA. Toads and Frogs.

Toads and frogs begin life as aquatic animals (tadpoles), in a manner similar to salamanders, and like them transform from water breathing to air breathing animals; but in the transformation they lose their tails. The limbs, acquired in the transformation, are comparatively long and strong. The food is insects caught on the tip of the protruded tongue. They are principally nocturnal.

Family PELOBATIDÆ.

3. WESTERN SPADEFOOT TOAD. **Scaphiopus hammondi.**

Two San Diego specimens are in the collection of the Natural History Museum; one was taken in May, the other in August.

Family BUFONIDÆ.

4. CALIFORNIA TOAD. **Bufo borealis halophilus.**

Generally distributed throughout the County except in the Desert.

5. SPOTTED TOAD. **Bufo punctatus.**

Found around springs and in damp places along the edge of the Colorado Desert and on the eastern slope of the mountains.

Family HYLIDAE.

6. PACIFIC TREE FROG. **Hyla regilla.**

Common from the sea to the eastern slope of the mountains. Usually found on the ground. Variable and changeable in colors.

7. ARIZONA TREE FROG. **Hyla arenicolor.**

Common about springs and damp places on the summits and eastern slope of the mountains. Unlike the eastern tree frogs the Californian species do not inhabit trees to any great extent.

Family RANIDÆ.

8. CALIFORNIA RED-LEGGED FROG. **Rana aurora draytoni.**

Common on the western slope of the mountains and west to the sea.

The Yellow-legged Frog, Rana boylii, is found in the San Jacinto Mountains, but has not been reported from this County.

Class Reptilia

Order SQUAMATA.

Suborder SAURIA. Lizards.

Lizards are cold-blooded quadripedal vertebrates that breathe air by means of lungs from birth. Limbs are absent in a few degenerate species. Lizards may be terrestrial, subterranean or arboreal; diurnal, crepuscular or nocturnal in habit. Some species are insectivorous or carnivorous; other are vegetarian; the greater number include both animal and vegetable food in their diet. Many species are oviparous; a few are viviparous. Lizards are most abundant in warm climates.

Family EUBLEPHARIDÆ.

9. BANDED GECKO. **Coleonyx variegatus.**

Found occasionally on the eastern slope of the mountains. Spend the day in crevices of rocks or underground. Nocturnal and insectivorous. Harmless. The scales on the upper surface of the body are smaller than in other families of lizards.

In November, 1920, I captured a specimen of the Warty Gecko, Phyllodactylus tuberculosus, on Coyote Mountain, west-

ern Imperial county. This species probably occurs also in the foothills of eastern San Diego county.

Family IGUANIDÆ.

This family of lizards is principally tropical in distribution. Many species are very large, some becoming six feet in length; our representatives are comparatively insignificant animals. The species living in the Desert are able to do without water.

10. DESERT IGUANA. **Dipsosaurus dorsalis.**

Common in parts of the Colorado Desert. Herbivorous.

11. GRIDIRON-TAILED LIZARD. **Callosaurus ventralis.**

Common in the Colorado Desert and in the valleys of the eastern slope of the mountains; the food is ants, beetles, grasshoppers, etc.

12. LEOPARD LIZARD. **Crotaphytus wislizeni.**

Occasional in the Colorado Desert and on the eastern slope of the mountains. The food is leaves, blossoms and insects and other lizards.

13. BAILEY COLLARED LIZARD. **Crotaphytus collaris baileyi.**

Occasional on the eastern slope of the mountains. The food is like that of the preceding species.

14. CHUCKWALLA. **Sauromelas ater.**

Found in rocky localities. Not common in this county, but we have specimens from 2,000 feet altitude on the eastern slope of the Cuyamaca Mountains. Herbivorous. Harmless. Sometimes mistaken for the "Gila Monster", which is not found in California.

15. MEARNS LIZARD. **Uta mearnsi.**

Lives among boulders and on the face of cliffs on the eastern slope of the mountains. Not common.

16. DESERT BROWN-SHOULDERED LIZARD. **Uta stansburiana elegans.**

Generally distributed on the eastern slope of the mountains and in the Desert.

17. SOUTHERN BROWN-SHOULDERED LIZARD. **Uta stansburiana hesperis.**

This subspecies is common in Southern California from the sea to the summit of the mountains. The food is flies, beetles, ants, spiders, etc.

18. LONG-TAILED LIZARD. **Uta graciosa.**

Lives in bushes and trees on the eastern slope of the mountains and in the Desert. Food, insects and leaves.

19. VAN DENBURGH LIZARD. **Sceloporus graciosus vandenburghianus.**

Rather common in forests and among rocks in the Laguna. Cuyamaca and Palomar Mountains.

20. FENCE LIZARD. **Sceloporus occidentalis biseriatus.**
Common throughout the county except the Colorado Desert and in the lower bordering foothills. Food, insects.

21. ROUGH-SCALED LIZARD. **Sceloporus magister.**
Occasional on the eastern slope of the mountains below 3,000 feet altitude. Frequent yuccas, rocks and brush thickets. Food, insects.

22. ORCUTT LIZARD. **Sceloporus orcutti.**
Common from the sea coast eastward part way down the mountains. Found in brush and among rocks.

23. BLAINVILLE HORNED LIZARD. "Horned Toad." **Phyrnosoma blainvillei.**
Common in the coast region, occasional in the mountains. Food, ants, beetles and other insects.

24. DESERT HORNED LIZARD. **Phyrnosoma platyshinus.**
Common in the Colorado Desert and in valleys on the eastern slope of the mountains.

25. FLAT-TAILED LIZARD. **Anota mccalli.**
Colorado Desert and lower part of the valleys in the bordering foothills. Not common.

Family ANGUIDÆ.

26. SAN DIEGO ALLIGATOR LIZARD. **Gerrhonotus scincicaudus webbi.**
Common in the coast region and occasional on the western slope of the mountains. This comparatively slow moving snake-like lizard is harmless, like all lizards living in this county. The food is insects, with occasionally a small lizard of some other species.

Family ANNIELLIDÆ.

Lizards of this family lack legs but rudiments of the pelvic girdle may be found by dissection. The tail is very blunt and the animal looks more like an angleworm than a lizard.

27. SILVERY FOOTLESS LIZARD. **Anniella pulchra.**
Found in a sandy or soft soil throughout the central and western part of the county. Usually burrow in the soil in the daytime. I have found them under boards and stones.

Family XANTUSIDÆ.

A family of quite small lizards having small scales on the upper surface and large ones in conspicuous transverse series on the belly. They are nocturnal.

28. DESERT NIGHT LIZARD. **Xantusia vigilis.**
Rather common in semi-desert localities on the eastern slope of the mountains, mostly under the dead leaves of yuccas and agaves.

29. HENSHAW NIGHT LIZARD. **Xantusia henshawi.**

Appears to be rare. So far only found in three or four localities on the western slope of the mountains. Not reported from any place outside of this county. Found in crevices of rocks. Crepuscular and nocturnal.

Family TEIIDÆ.

30. DESERT WHIP-TAILED LIZARD. **Cnemidophorus tigris.**

Common in the Colorado Desert. Insectivorous.

31. STEJNEGER WHIP-TAILED LIZARD. **Cnemidophorus tigris stejnegeri.**

Locally common in the mountains and west to the sea.

32. BELDING ORANGE-THROATED LIZARD. **Cnemidophorus hyperythrus beldingi.**

Coast region not common.

Family SCINCIDÆ.

33. WESTERN SKINK. **Plestiodon skiltonianum.**

Usually found lying under boards or stones or among dead leaves. Young individuals have bright blue tails. Principally nocturnal. Insectivorous.

Suborder SERPENTES. Snakes.

Snakes are born with lungs. Limbs are absent. The body is covered with scales. Snakes follow many modes of life; terrestial, arboreal, subterranean, aquatic; diurnal, nocturnal or crepuscular. Progression may be straightforward, by movement of the broad scales of the under surface; by pushing with the back side of the curves of the body and tail; or by a combination of both methods. In cold climates snakes hibernate in winter; in hot climates æstivation may take place in the hotter or drier seasons. They are carnivorous. Snakes are usually oviparous, but a few species are viviparous.

Family LEPTOTYPHLOPIDÆ.

34. WORM SNAKE. **Leptotyphlops humilis.**

Very rare. Two have been found on the eastern slope of the mountains.

Family BOIDÆ.

35. CALIFORNIA BOA. Rubber Snake. **Lichanura roseofusca.**

Not common. Foothills.

36. CALIFORNIA GARTER SNAKE.. **Thamnophis ordinoides hammondi.**

Common in most parts of the county, near or in water. Food insects, tadpoles, small fish.

37. DESERT BURROWING SNAKE. **Sonora occipitalis.**
Colorado Desert and valleys on the eastern slope of the mountains. Burrows in sandy or soft soil.

38. LITTLE RING-NECKED SNAKE. **Diadophis amabilis.**
Western slope of the mountains and west to the sea. Rather common. Food earthworms, salamanders and probably insects

39. CORAL KING SNAKE. **Lampropeltis pyromelana multicincta.**
Occasional in the mountains.

40. BOYLE KING SNAKE. **Lampropeltis getulus boylii.**
Rather common throughout the county.

41. CALIFORNIA KING SNAKE. **Lampropeltis californiæ.**
Occasional in the mountains.

42. LONG-NOSED SNAKE. **Rhinocheilus lecontei.**
Rather common throughout the county.

43. SPOTTED NIGHT SNAKE. **Hypsiglena ochrorhyncha.**
Apparently rare. Several have been taken in various parts of the county. Nocturnal.

44. PATCH-NOSED SNAKE. **Salvadora hexalepis.**
Not common. Mountains and mesa.

45. WESTERN YELLOW-BELLIED RACER. **Coluber constrictor vetustus.**
Has been found in various places in the county, but does not seem to be common.

46. RED RACER. **Coluber flagellum frenatus.**
Valleys and foothills. Not very common.

47. CALIFORNIA STRIPED RACER. **Coluber lateralis.**
Rather common, but not often seen. Inhabits chapparal.

48. FADED SNAKE. **Arizona elegans.**
Apparently rare. Has been found in the mountains and along the coast.

49. WESTERN GOPHER SNAKE. Bull Snake. **Pituophis catenifer.**
One of the largest snakes found here. Found almost everywhere in the county. A very beneficial snake; anyone killing a Gopher Snake should be fined. They are not poisonous or harmful to mankind. They feed on gophers, mice, rats and squirrels.

50. DESERT GOPHER SNAKE. **Pituophis catenifer deserticola.**
This subspecies of the Gopher Snake inhabits the eastern slope of the mountains and the region eastward.

None of the snakes listed above are poisonous, or to be feared in any way. Most of them are beneficial and none should be killed. Snakes of all kinds are much less numerous than when this region was first settled. The following species are poisonous, but they are not aggressive and ordinarily will not attack if they are not disturbed.

subfamily BOIGINÆ.

51. CALIFORNIA TANTILLA. **Tantilla eiseni.**

These little snakes are rare. I found one at Witch Creek. They have grooved fangs and a small poison gland. The poison is used for subduing their prey.

Family CROTALIDÆ. Rattlesnakes.

52. PACIFIC RATTLESNAKE. **Crotalus oreganus.**

Found throughout the county except in the Desert. Most common on the mesas.

53. RED RATTLESNAKE. **Crotalus exsul.**

Found throughout the mountains and occasionally on the mesas.

54. PALLID RATTLESNAKE **Crotalus mitchelli.**

Found on the eastern slope of the mountains and in the Colorado Desert.

55. SIDEWINDER. HORNED RATTLESNAKE. **Crotalus cerastes.**

Common locally in the Colorado Desert and in the valleys on the eastern slope of the mountains. Has a peculiar sidewise method of locomotion.

Rattlesnakes molt the old skin two or three times each year. A new rattle is added at each molt; the terminal rattles wear loose and drop off; if the snake lives on rocky ground the rattles wear off faster than when the snake lives on softer ground. The number of rattles remaining are no guide to the age of the snake.

Order TESTUDINATA.

Family DERMOCHELIDÆ. Sea Turtles.

Outer surface covered with a thick leather-like skin, limbs flat, paddle-like, adapted for swimming. Inhabits tropical seas, but occasionally straggles to temperate waters.

56. PACIFIC LEATHERBACK TURTLE. **Dermochelys schlegeli.**

One caught off Point Loma about 1888 was exhibited in the Coronado Museum. Said to have weighed 800 pounds.

Family CHELONIDÆ. Sea Turtles.

Outer surface covered with horny plates. Limbs paddle-like. Inhabit tropical seas, straggling to temperate waters.

57. PACIFIC GREEN TURTLE. **Chelonia japonica.**

Straggle to the California coast occasionally. Several have been seen in San Diego Bay and in Mission Bay. One was caught at National City several years ago. The food is said to be sea weeds.

Family TESTUDINIDÆ. Mud Turtles and Tortoises.

Outer surface covered with horny plates. Feet adapted for walking on land. Size comparatively small.

58. PACIFIC MUD TURTLE. **Clemmys marmorata.**

Occasional locally, in the coast region. There are few suitable streams or ponds in this county where Mud Turtles could live.

The Desert Tortoises have been found in Imperial County and it is possible that they may occur in the northeastern corner of San Diego County.

Index

Alligator Lizard, San Diego....26
Amabilis, Diadophis 38
Aneides lugubris 1
Anniella pulchra 27
Anota mccalli 25
Ater, Sauromalus 14
Arboreal Salamander 1
Arenicolor, Hyla 7
Arizona elegans 48
Tree Frog 7
Attenuatus, Batrachoseps 2
Aurora draytoni, Rana..... 8
Bailey Collared Lizard.....13
Banded Gecko 9
Batrachoseps attenuatus 2
Belding Orange-throated Lizard 32
Beldingi, Cnemidophorus
hyperythrus 32
Blainville Horned Lizard.....23
Blainvillei, Phyrnosoma 23
Boa, California 35
Borealis halophilus, Bufo..... 4
Boyle King Snake.....40
Boylii, Lampropeltis 40
Brown-shouldered Lizard,
Desert 16
Southern 17
Bufo borealis halophilus..... 4
Punctatus 5
Bull Snake 49
Burrowing Snake, Desert.....37
California Boa 35
Californiæ, Lampropeltis 41
California Garter Snake.....36
King Snake 41
Red-legged Frog 8
Striped Racer 47
Tantilla 51
Toad 4
Callisaurus ventralis 11
Catenifer, Pituophis 49
Deserticola, Pituophis 50
Cerastes, Crotalus 55
Chelonia japonica 57
Chuckwalla 14
Clemmys marmorata 58
Cnemidophorus hyperythrus
beldingi 32
Tigris 30
Stejnegeri 31
Coleonyx variegatus 9
Collared Lizard 13
Collaris baileyi, Crotaphytus....13
Coluber constrictor vetustus....45
Flagellum frenatus 46
Lateralis 47
Constrictor vetustus, Coluber...45
Coral King Snake.....39
Crotalus cerastes 55
Exsul 53
Mitchelli 54
Oreganus 52
Crotaphytus collaris baileyi.....13
Wislizeni 12
Dermochelys schlegeli 56
Desert Burrowing Snake 37
Brown-shouldered Lizard 16
Gopher Snake 50
Iguana 10
Night Lizard 28
Whip-tailed Lizard 30
Diadophis amabilis 38
Dorsalis, Dipsosaurus 10
Draytoni, Rana aurora 8
Eiseni, Tantilla 51
Elegans, Arizona 48
Faded Snake 48
Fence Lizard 20
Flagellum frenatus, Coluber....46
Footless Lizard 27
Frog, Arizona Tree 7
California Red-legged 8
Pacific Tree 6
Garter Snake, California.....36
Gecko, Banded 9
Gerrhonotus scincicauda webbi 26
Gila Monster, Under.....14
Gopher Snake, Western 49
Graciosus vandenburghianus,
Sceloporus 19
Green Turtle, Pacific 57
Gridiron-tailed Lizard 11

Halophilus, Bufo borealis..... 4
Hammondi, Scaphiopus 3
Thamnophis ordinoides 36
Henshawi, Xanthusia 29
Henshaw Night Lizard.....29
Hesperis, Uta stansburiana....17
Hexalepis, Salvadora 44
Horned Lizard, Blainville.....23
Desert 24
Flat-tailed 25
Humilis, Leptotyphlops 34
Hyla arenicolor 7
Regilla 6
Hyperythrus beldingi,
Cnemidophorus 32
Hypsiglena ochrorhyncha 43
Iguana, Desert 10
Japonica, Chelonia 57
King Snake, Boyle 40
California 41
Coral 39
Lampropeltis boylii 40
Californiæ 41
Pyromelana multicincta 39
Lateralis, Coluber 47
Leather-back Turtle, Pacific....56
Leptotyphlops humilis 34
Lichanura roseofusca 35
Little Ring-necked Snake 38
Lizard, Bailey Collared.....13
Belding Orange-throated 32
Blainville Horned 23
Brown-shouldered, Desert 16
Desert Horned 24
Night 28
Whip-tailed 30
Flat-tailed Horned 25
Fence 20
Gridiron-tailed 11
Henshaw Night 29
Leopard 12
Long-tailed 18
Mearns 15
Orcutt 22
Orange-throated, Belding 32
Rough-scaled 21
San Diego Alligator 26
Silvery Footless 27
Stejneger Whip-tailed 31
Long-tailed Lizard 18
Lugubris, Aneides 1
Magister, Sceloporus 21
Mccalli, Anota 25
Mearnsi, Uta 15
Mearns Lizard 15
Mud Turtle, Pacific 58
Night Lizard, Desert 28
Henshaw 29
Snake, Spotted 43
Occidentalis biseriatus,
Sceloporus 20
Occipitalis, Sonora 37
Ochrorhyncha, Hypsiglena 43
Orange-throated Lizard, Beld-
ing 32
Orcutti, Sceloporus 22
Oreganus, Crotalus 52
Pacific Leather-back Turtle....56
Green Turtle 57
Mud Turtle 58
Rattlesnake 52
Tree Frog 6
Pallid Rattlesnake 54
Patch-nosed Snake 44
Phyrnosoma blainvillei 23
Platyrhinus 24
Pituophis catenifer 49
Deserticola 50
Plestiodon skiltonianus 33
Pulchra, Anniella 27
Punctatus, Bufo 5
Racer, California Striped.....47
Red 46
Western Yellow-bellied 45
Rana aurora draytoni 8
Boylii muscosa, Under 8
Rattlesnake, Horned 55
Pacific 52
Pallid 54
Red 53
Red-legged Frog 8
Racer 46
Rattlesnake 53
Regilla, Hyla 6
Rhinochilus lecontei 42
Ring-necked Snake, Little 38
Roseofusca, Lichanura 35
Rough-scaled Lizard 21
Rubber Snake 35

Salamander, Arboreal 1
Slender 2
Salvadora hexalepis 44
San Diego Alligator Lizard.....26
Sauromalus ater 14
Scaphiopus hammondi 3
Sceloporus graciosus vanden-
burghianus 19
Magister 21
Occidentalis biseriatus 20
Orcutti 22
Schlegeli, Dermochelys 56
Scincicaudus webbi, Gerrhon-
otus 26
Sidewinder 55
Silvery Footless Lizard 27
Skink, Western 33
Skiltonianum, Plestiodon 33
Slender Salamander 2
Snake, Boyle King 40
Bull 49
California Garter 36
King 40
Coral King 39
Desert Burrowing 37
Gopher 50
Faded 48
Gopher, Western 49
Little Ring-necked 38
Long-nosed 42
Patch-nosed 44
Rubber 35
Spotted Night 43
Western Gopher 49
Worm 34
Sonora occipitalis 37
Spade-foot Toad, Western 3
Spotted Night Snake 43
Toad 5
Southern Brown-shouldered
Lizard 17
Stansburiana hesperis, Uta 17
Elegans, Uta 16
Stejnegeri, Cnemidophorus
tigris 31
Stejneger Whip-tailed Lizard...31
Striped Racer. California 47
Tantilla, California 51
Eiseni 51
Thamnophis ordinoides ham-
mondi 36
Tigris, Cnemidophorus 30
Stejnegeri, Cnemidophorus ...31
Toad, California 4
Spotted 5
Western Spadefoot 3
Tree Frog, Arizona 7
Pacific 6
Turtle, Pacific Green 57
Leatherback 56
Mud 58
Uta graciosa 18
Mearnsi 15
Stansburiana elegans 16
Hesperis 17
Vandenburghianus, Sceloporus
graciosus 19
Van Denburgh Lizard.....19
Vareigatus, Coleonyx 9
Ventralis, Callisaurus 11
Vigilis, Xantusia 28
Western Gopher Snake 49
Skink 33
Spade-foot Toad 3
Yellow-bellied Racer 45
Wislizeni, Crotaphytus 12
Worm Snake 34
Xantusia henshawi 29
Vigilis 28
Yellow-bellied Racer, Western..45

11

3 2044 093 361 194