TRANSACTIONS AND PROCEEDINGS

AND

REPORT

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA.

VOL. XXI.

For 1896-97.

[With Three Plates]

EDITED BY PROFESSOR RALPH TATE.

Adelaide:

W. C. RIGBY, 74, KING WILLIAM STREET.

DECEMBER, 1897.

Parcels for transmission to the Royal Society of South Australia, from Europe and America, should be addressed "per W. C. Rigby, care Messrs. Thos. Meadows & Co., 35, Milk Street, Cheapside, London."

Royal Society of South Australia.

Patron:

HER MAJESTY THE QUEEN.

OFFICERS.

[Elected October, 1897.]

President:

W. L. CLELAND, M.B.

Vice-President:

PROFESSOR RALPH TATE
(Representative Governor.)
WALTER HOWCHIN, F.G.S.

Hon. Treasurer:

WALTER RUTT, C.E.

Hon. Secretary:

G. G. MAYO, C.E.

Members of Council:

REV. THOS. BLACKBURN, B.A.
SAMUEL DIXON
MAURICE HOLTZE, F.L.S.
J. S. LLOYD
PROFESSOR E. H. RENNIE, D.Sc., F.C.S.
W. H. SELWAY, Jun.
E. C. STIRLING, C.M.G., M.D., M.A., F.R.S.

ERRATUM.

VOL. XX. PLATE II.

The legend "grits, rotten slates," &c., refers to the Archæan; whilst the area indicated as occupied by those beds is Eocene.

CONTENTS.

The Gasteropods of the Older Tertiary of Australia—Les Opisthobranches.

By Maurice Cossmann, Hon. Fellow.

[Read April 6, 1897.]

Plates I., II.

[Preface.—The examples of fossil-species which form the subject of this memoir were presented to the author by me, but a duplicate set is placed in the Museum of the University of Adelaide. The locality-names quoted by M. Cossmann are those which accompanied his specimens, but I have added to the list as fully as records in the University Museum allow of.—R. Tate.]

Actæon scrobiculatus, *Ten.-Woods.* Pl. i., fig. 1-3.

Référence.—Proc. Roy. Soc. Tasmania for 1876, p. 102 (1877).

Taille petite ; forme ovale, plus ou moins ventrue ; spire courte, à galbe conoïdal ; embryon peu saillant ; cinq tours peu convexes, dont la hauteur est inférieure à la moitié de la largeur, séparés par des sutures peu profondes, ornés de quatre sillons spiraux, cloisonnés par de fines lamelles d'accroissement. Dernier tour presque égal aux quatre cinquièmes de la longueur totale, ovoïde, régulièrement orné comme la spire jusque sur la base, qui est étroitement subperforée dans la région ombilicale. Ouverture étroite en arrière, dilatée en avant où elle est arrondie et légèrement versante ; labre assez épais, très arqué, un peu échancré au dessus de la suture ; columelle coudée par un pli oblique et à peine saillant ; bord columellaire large, calleux, un peu détaché de la base.

Dimensions.—Longueur, 8 mill. ; diamètre, 3·75 mill.

Localités.—Eocene : Table Cape, Tasmania ; Spring Creek, near Geelong, Victoria.

Néotypes.—Pl. i., figs. 1-3 ; deux échantillons ventras de Table Cape, un échantillon plus étroit de Spring Creek. Ma collection.

Affinités.—Cette espèce se rapproche par son ornementation de *Act. subinflatus*, d'Orb., du calcaire grossier parisien ; mais elle en diffère par sa spire plus courte, par ses tours plus étroits et moins convexes, par sa perforation ombilicale, par son pli moins saillant. Si on la compare à *Act. electus*, Desh., du Suessonien des environs de Paris, elle a la spire plus courte, les tours moins élevés, le labre plus arqué, la columelle plus coudée. Enfin, quand on la rapproche de *Act. inflatior*, Meyer, de Claiborne, on

remarque qu'elle est moins globuleuse, que sa spire est plus conoide, que son embryon est moins saillant, que son labre est plus sinueux en arrière, et que son pli columellaire est moins anguleux.

Actæon funiculifer, *nov. sp.* Pl. i., fig. 4, 5.

Taille petite ; forme ovale et globuleuse ; spire très courte, à galbe conique ; embryon à nucléus extrêmement petit, à peine dévié ; cinq tours très étroits, presque plans, séparés par des sutures étroitement canaliculées, ornés de trois rainures spirales et cloisonnées par de fines lamelles d'accroissement. Dernier tour égal ou supérieur aux quatre cinquièmes de la longueur totale, plus large en arrière qu'au milieu, ovalement atténué à la base, orné de rainures cloisonnées inégales et inéquidistantes, celles du bas plus larges que les rubans qui les séparent, celles de la base plus serrées et séparées par des cordons arrondis aussi larges qu'elles. Ouverture médiocrement rétrécie en arrière, dilatée et versante en avant ; labre arqué, non échancré en arrière ; columelle courte, presque dans le prolongement de la base de l'avant-dernier tour, munie d'un pli saillant, transverse et placé très bas qui forme un gradin peu élevé ; bord columellaire calleux, recouvrant la fente ombilicale.

Dimensions.—Longueur, 8 mill. ; diamètre, 4·25 mill.

Localité et type.—Muddy Creek (pl. i., fig. 4, 5), ma collection. Miocene, Victoria.

Affinités.—Quoique cette espèce ait beaucoup de ressemblance avec *Act. scrobiculatus*, T. Woods, elle mérite d'un être séparée à cause de sa spire plus courte, de ses tours plus étroits, de ses sutures canaliculées, de ses sillons plus largement rainurés, de son pli columellaire plus saillant et moins élevé, de l'absence de perforation sous le bord columellaire. Elle est presque aussi ventrue que *Act. inflatior*, Meyer, de Claiborne ; mais elle a une spire plus courte, la convexité maximum de son dernier tour est située plus en arrière, son pli columellaire est plus saillant et moins arrondi, enfin ses rainures spirales sont plus larges.

Actæon subscalatus, *nov. sp.* Pl. i., fig. 8, 9.

Taille très petite ; forme globuleuse, subsphérique ; spire courte, étagée en gradins, à galbe conoïdal ; embryon très petit, à nucléus dévié perpendiculairement ; quatre tours très convexes, dont la hauteur atteint le tiers de la largeur, séparés par des sutures peu profondes, étagés en arrière par une rampe arrondie, ornés de cinq sillons spiraux et cloisonnés par de fines lamelles d'accroissement. Dernier tour égal aux trois quarts de la longueur, ventru, subanguleux en arrière, ovalement arrondi à la base, régulièrement orné de sillons étroits et finement cloisonnés, qui sont plus profonds et plus serrés sur la base imperforée. Ouverture courte et

assez large, à peine versante en avant ; labre presque rectiligne et vertical, lacinié sur son contour par l'extrémité des sillons spiraux ; columelle munie d'un pli oblique et peu saillant ; bord columellaire étroit et peu calleux.

Dimensions.—Longueur, 4·5 mill.; diamètre, 3 mill.

Localités et type.—Aldinga (Pl. i., fig. 8, 9), ma collection ; Adelaide-bore.—Eocene, Austr. Sud.

Affinités.—Il n'est pas possible de confondre cette espèce avec les précédentes; outre qu'elle est beaucoup plus globuleuse et plus courte, ses tours sont plus étagés, et son pli columellaire est plus oblique, enfin son labre est presque droit. Elle a un peu la forme de *Semiactæon sphæriculus* du bassin de Paris, mais elle n'appartient pas au même sous genre à cause de son pli épais et de l'absence de fente ombilicale ; de plus, ses sillons sont plus cloisonnés.

Actæon distinguendus, *nov. sp.* Pl. i., figs. 6, 7.

Taille petite ; forme ovale, trapue ; spire courte, à galbe conique ; embryon gros, à nucléus obliquement dévié ; cinq tours à peine convexes, dont la hauteur est inférieure au tiers de la largeur, séparés par des sutures étroitement canaliculées, étagés par une rampe obliquement déclive et plus ou moins visible au dessus de la suture, ornés d'un seul sillon spiral et ponctué sur cette rampe inférieure. Dernier tour un peu cylindrique au milieu, ovale à la base, subanguleux à la limite de la rampe déclive en arrière, orné de sillons spiraux et ponctués très écartés, entre lesquels il y a une strie plus obsolète; sur la base, les sillons sont plus profonds et plus rapprochés. Ouverture égale aux deux tiers de la longueur totale, très étroite en arrière, arrondie et versante à la base ; labre assez mince, arqué, un peu sinueux en arrière ; columelle faisant un angle de 100° avec la base de l'avant-dernier tour, munie d'un pli épais, saillant et arrondi ; bord columellaire large et calleux, recouvrant complètement la fente ombilicale.

Dimensions.—Longueur, 7 mill. ; diamètre, 2·5 mill.

Localités et type.—Eocene : Muddy Creek (Pl. i., figs. 6, 7), ma collection; Cheltenham near Melbourne; River Murray Cliffs.

Affinités.—Cette espèce ressemble à *Act. Deshayesi*, de Rainc., du calcaire grossier parisien, à cause de son ornementation et de sa rampe déclive ; mais elle est beaucoup moins globuleuse, sa spire est plus allongée, ses sutures sont plus canaliculées et son pli columellaire est plus saillant. On peut encore la comparer à *Act. lineatus*, Lea, de Claiborne, qui a aussi des sillons écartés ; mais elle s'en distingue par son unique sillon sur chaque tour de spire, par sa rampe plus déclive, par son ouverture plus étroite et par son pli plus saillant.

Actæon evanescens, *nov. sp.* Pl. i., fig. 10, 11.

Taille assez petite ; forme ovale, trapue ; spire courte, un peu étagée, à galbe conique ; embryon à nucléus globuleux et dévié ; quatre tours un peu convexes, dont la hauteur atteint à peine le tiers de la largeur, séparés par des sutures canaliculées et formant un étroit gradin, lisses et brillants, sont un seul sillon spiral au dessus de la suture. Dernier tour presque supérieur aux trois quarts de la longueur totale, régulièrement ovale, arrondi à la base qui est étroitement perforée, orné d'un profond sillon et d'une légére strie au dessus de la suture puis une large zone lisse, au milieu cinq sillons spiraux et ponctués avec une légère strie intercalaire, enfin sur la base une douzaine de sillons plus rapprochés et plus profonds, sans stries dans l'intervalle. Ouverture grande et large, peu versante en avant ; labre à peu près rectiligne et vertical; columelle faisant un angle de 120° avec la base de l'avant-dernier tour, munie d'un pli oblique, assez large et peu saillant ; bord columellaire mince, détaché en avant de la fente ombilicale.

Dimensions.—Longueur, 5·25 mill.; diamètre, 2·75 mill.

Localités et type.—Adelaide-bore (Pl. i., figs. 10, 11), ma collection ; Aldinga.—Eocene, Austr. Sud.

Affinités.—Cette espèce se rapproche, par son ornementation et sa bande lisse, d'*Act. Loustaui*, Desh., du calcaire grossier parisien ; mais elle n'a pas la rampe déclive et les tours subanguleux de cette coquille. Si on la compare à *Act. procerus*, Desh., du Suessonien, qui a aussi une bande lisse sur le dernier tour, elle en diffère par sa forme beaucoup plus trapue, et d'ailleurs elle n'appartient pas au même groupe, puisque son pli columellaire est simple.

Actæon olivellæformis, *Tate.* Pl. i., figs. 12, 13.

Synonymie.—Actæopyramis olivellæformis, Tate, 1893.

Référence.—Journ. Roy. Soc. N.S.W. vol. XXVII., p. 181, pl. xi., fig. 2.

Taille assez petite ; forme étroite, pyramidelloïde ; spire allongée, à galbe conique ; embryon à nucléus obtus et dévié ; huit tours à peine convexe, dont la hauteur atteint ou dépasse les trois quarts de la largeur, séparés par des sutures étroitement canaliculées, à peu près lisses, avec de très fines stries spirales écartées ou peu visibles et un seul sillon situé près de la suture supérieure. Dernier tour embrassant, égal à la moitié de la longueur totale chez les individus adultes, étroitement ovale, presque lisse comme la spire, sauf à la partie antérieure où il existe 9 sillons écartés, et sur la base imperforée qui porte encore 6 stries plus serrées. Ouverture courte, subrhomboïdale, arrondie du côté antérieur ; labre très mince, peu arqué et peu sinueux en arriére ; columelle coudée, faisant un angle de 100°

avec la base de l'avant-dernier tour munie d'un pli sans saillie qui forme le coude ; bord columellaire mince et bifide sur la région du pli.

Dimensions.—Longueur, 8·25 mill. ; diamètre, 2·5 mill.

Localités. — Muddy Creek, Spring Creek near Geelong.— Eocene.

Nèotype.—Muddy Creek (Pl. i., figs. 12, 13), ma collection.

Observations.—Cette espèce a été décrite par M. Tate dans le genre *Actæopyramis*, institué par Fischer pour corriger le double emploi *Monoptygma* (Gray, *non* Lea) ; je ne crois pas qu'elle appartienne à ce genre qui ne comprend que des coquilles de *Pyramidellidæ*, tandis qu *'Act. olivellæformis* a les tours embrassants et l'embryon des *Actæonidæ ;* d'ailleurs on trouve déjà l'indice de son pli bifide dans les *Actæon* du groupe d *'A. Gmelini ;* elle ne s'en distingue que par sa forme plus allongée et à demi lisse, comme les *Crenilabium ;* toutefois elle n'a pas les crénelures columellaires de ce dernier genre, et son pli coudé est tout à fait différent.

Semiactæon microplocus, *nov. sp.* Pl. i., figs. 14, 15.

Taille assez petite ; forme ovale ; spire courte ; embryon obtus, à nucléus empâté dans la spire ; quatre tours peu convexes, dont la hauteur égale le tiers de la largeur, séparés par des sutures étroitement canaliculées, ornés en avant de trois stries spirales obsolétes, et au dessous d'un intervalle lisse un peu plus large, d'un sillon peu profond, plus rapproché de la suture. Dernier tour égal aux trois quarts de la hauteur totale, ovale, arrondie à la base qui est perforée d'une étroite fente ombilicale, orné sur toute sa surface (sauf un etroit espace lisse au dessus du sillon sutural), de stries spirales et finement ponctués, plus serrées et plus profondes autour de la région ombilicale. Ouverture courte et large, arrondie et peu versante du côté antérieur ; labre un peu oblique et subsinueux, épaissi à l'intérieur ; continuelle droite et inclinée, faisant un angle de 130° avec la base de l'avant-dernier tour, portant au milieu un pli arrondi et peu saillant ; bord columellaire détaché de la base, se raccordant au contour supérieur de l'ouverture.

Dimensions.—Longueur, 6·5 mill.; diamètre, 4·75 mill.

Localités et type.—River Murray Cliffs (Pl. i., figs. 14, 15), ma collection ; Mornington (Port Phillip Bay).—Eocene.

Affinités.—Cette coquille s'écarte des *Actæon* par la petitesse de son pli columellaire ; pour ce motif, je la place dans le sous-genre *Semiactæon* que j'ai proposée, en 1889, pour *S. sphæriculus*, Desh.,

Actæon puteolata, Pritchard, Roy. Soc. Victoria, vol. VIII., p. 124, t. 4, figs. 10-12, 1896, a fossil from Table Cape, is considered by MM. Cossmann and Tate to belong to *Odontostomia*.

du calcaire grossier parisien ; mais l'espèce australienne se distingue de celle ci par sa taille plus grande, par ses sillons beaucoup moins profonds, par son ombilic moins ouvert et par son pli plus saillant. Si on la compare à *S. Bezançoni*, de la Loire inférieure, on remarque que ses sillons sont moins profonds, moins réguliers, et que son ouverture est plus large, plus évasée en avant.

Triploca ligata, *Tate.* Pl. i., figs. 16, 17.

Référence.—Journ. Roy. Soc., N.S.W., vol. XXVII., 1893, p. 186, pl. xi., fig. 7.

Forme ovoïdo-coniqué ; spire un peu étagée et allongée, à galbe conique ; embryon peu développé, à nucléus obtus ; cinq tours peu convexes, séparés par des sutures canaliculées, avec un étroit gradin accompagné d'un profond sillon spiral, ornés de fines stries imperceptiblement ponctuées. Dernier tour égal aux deux tiers de la longueur totale, arrondi à la base qui est étroitement perforée, orné sur toute sa surface de fines stries spirales, outre le sillon voisin de la suture. Ouverture courte, ovale en avant et légèrement échancrée sur le contour supérieur ; labre mince, peu arqué ; columelle munie de trois plis lamelleux et saillants, les deux antérieurs plus rapprochés et presque confondus ou un suel pli bifide ; bord columellaire non calleux.

Dimensions.—Longueur, 8 mill.; diamétre, 4 mill.

Localités et néotype.—Adelaide-bore (Pl. i., figs. 16, 17), ma collection ; Cape Otway.—Eocene.

Observations.—J'ai placé *Triploca* (Essais de Pal. Comp. I., 1895, p. 50, pl. vii., fig. 19) comme sous-genre de *Tornatellœa*, parce que ses plis columellaires ont la même apparence et que le contour basal de l'ouverture est subéchancré ; ce rapprochement est d'autant plus justifié, que les deux plis antérieurs ont une tendance à se confondre l'un avec l'autre, de manière à présenter l'apparence d'un seul pli dédoublé. D'ailleurs *Triploca* s'écarte des *Ringinella*, qui ont aussi trois plis columellaires et un galbe presque identique, par son labre mince ou peu épais, non bordé par un bourrelet externe. On ne connait jusqu'à présent, que cette seule espèce type representant cet intéressant sous-genre.

Tornatina pachyptycha, *nov. sp.* Pl. i., figs. 20, 21.

Taille petite ; forme cylindrique ; spire très courte, étagée en gradins ; embryon assez gros, a nucléus translucide, globuleux et obliquement dévié ; quatre tours plans, extrêmement étroits, munis en arrière d'une rampe déclive, excavée et limitée par un angle un peu saillant, ornés de petits plis d'accroissement obliques sur la rampe. Dernier tour supérieur aux trois quarts de la hauteur totale, à galbe cylindracé, un peu ovalisé en arrière et à la base qui porte, sur la région ombilicale, une dépression im-

perforée et limitée par un angle émoussé ; surface entiérement lisse, sauf les stries d'accroissement. Ouverture longue, étroite, à bords parallèles en arrière, dilatée, versante et obliquement tronquée à la base ; labre mince, oblique, arqué, sinueux prés de la rampe suturale ; columelle courte, excavée, se raccordant avec la base de l'avant-dernier tour par une courbe en *S.*, munie d'un gros pli oblique et peu saillant ; bord columellaire large, mince en arrière, calleux en avant, rejoignant le contour supérieur par une courbe largement ouverte.

Dimensions.—Longueur, 6·25 mill. ; diamètre, 2·75 mill.

Localité et type.—Muddy Creek (Pl. i., figs. 20, 21), ma collection ; MIOCENE : Victoria.

Affinités—On ne peut confondre cette espèce avec *E. crassiplica*, Conr., du Vicksburgien des Etats Unis, qui a une spire encore plus courte et sans gradins, dont le pli est plus anguleux, dont la forme est plus trapue et dont le galbe est plus arrondi en arrière. Si on la rapproche de *E. grignonensis*, Desh., du calcaire grossier parisien, on remarque qu'elle s'en distingue par sa spire étagée et par sa forme cylindracée, par sa dépression ombilicale.

Tornatina longispira, *nov. sp.* Pl. i., figs. 18, 19.

Taille petite ; forme cylindrique ; spire un peu allongée, étagée en gradins ; embryon saillant à nucléus globuleux et translucide ; quatre tours dont la hauteur atteint ou dépasse le tiers de la largeur, plans et lisses, munis en arrière d'une rampe assez large et taillée à angle droit. Dernier tour égal aux trois quarts de la longueur totale, cylindracé, ovale à la base qui porte une petite rainure, imperforée à la place de l'ombilic ; surface entiérement lisse, sur laquelle on ne distingue même pas les stries d'accroissement. Ouverture a bords non parallèles, étroite en arrière, un peu plus dilatée en avant où elle est obliquement tronquée ; labre mince, arqué, peu sinueux en arrière ; columelle oblique, peu incurvée, renflée au milieu par un pli épais, à peine saillant ; bord columellaire large, calleux, recouvrant la région ombilicale.

Dimensions.—Longueur, 7·25 mill. ; diamètre, 2·5 mill.

Localité et type.—Muddy Creek (Pl. i., figs. 18, 19), ma collection.—MIOCENE, Victoria.

Affinités.—Cette coquille n'est peut être qu 'une variété de l'espèce précedente, *T. pachyptycha ;* cependant les trois échantillons que je posséde me paraissent distincts de cette dernière, par leur forme plus étroite, par leur spire plus allongée, par leurs tours plus élevés, par leur rampe moins déclive, par leur pli plus obsolète, par leur columelle moins incurvée. Il est possible que si l'on recueille une série de nombreux échantillons de *Tornatina* du gisement de Muddy Creek, on pouvra trouver des individus in-

termédiaires entre ces deux espèces; mais provisoirement, je crois qu'on peut admettre *T. longispira* comme une espèce distincte.

Tornatina aptycha, *nov. sp.* Pl. i,, figs. 22, 23.

Taille assez petite; forme cylindrique, étroite; spire très courte, un peu étagée en gradins; embryon très saillant, à nucléus dévié en forme de crosse; quatre tours extrêmement étroits, convexes ou subanguleux, avec une rampe déclive au dessus de la suture. Dernier tour égal aux cinq sixièmes de la hauteur totale, cylindracé, ovale à la base qui est imperforée et munie d'une dépression ombilicale très obsolète; surface entièrement lisse. Ouverture très étroite en arrière, à peine dilatée en avant, où elle est découverte et un peu versante; labre peu épais, presque vertical, renversé à gauche de l'axe du côté antérieur, à peine échancré sur la rampe suturale; columelle dans le prolongement de la base de l'avant-dernier tour, absolument dénuée de pli; bord columellaire calleux, recouvrant presque entièrement la dépression ombilicale, et se raccordant avec le contour supérieur de l'ouverture.

Dimensions.—Longueur, 6·5 mill.; diamètre, 2·25 mill.

Localités et type.—Muddy Creek (Pl. i., fig. 22, 23), ma collection; Table Cape.—Eocene, Victoria et Tasmania.

Affinités.—Malgré la resemblance exterieure de cette *Tornatina* cylindrique avec les deux autres espèces déjà décrites, il est impossible de la confondre avec celles, à cause de l'absence compléte de pli columellaire; en outre, elle est plus cylindrique que *T. pachyptycha* et elle n'a pas la rampe de *T. longispira* ni la spire aussi allongée. L'existence simultanie de ces trois formes, qui appartiennent évidemment au même genre *Tornatina*, démontre qu'il ne faut pas attacher l'importance d'un caractere générique à la présence ou à l'absence d'un pli à la columelle, et qu'il n'y a pas lieu de se fonder sur ce pli pour distinguer *Tornatina* de *Retusa*.

Volvulella Tatei, *nov. sp.* Pl. i., figs. 26, 27.

Taille petite; forme fusoïde, acuminée au sommet, ovale à la base; spire involvée et imperforée. Dernier tour embrassant toute la coquille, à galbe ovale et étroit, à surface lisse en apparence mais couverte de fines stries spirales, qui deviennent plus écartées et plus visibles sur la base. Ouverture presque lineaire en arrière, un peu dilatée et découverte en avant; labre très mince, peu arqué, vertical, formant en arrière un bec aigu qui dépasse le sommet d'un demi millimétre; columelle droite,

---

Tenison-Woods in Proc. Linn. Soc. N.S.W., 1878, figures an Opisthobranch, t. 21, f. 4, as *Tornatina involuta*, which is quite inadequate for generic determination, and is unaccompanied with a description. It may represent a *Volvulella*.

faiblement tordue sur elle même. Bord columellaire étroit, détaché de la base et découvant une étroite fente ombilicale.

Dimensions.—Longueur, 5 mill.; diamètre, 1·75 mill.

Localité et type.—Muddy Creek (pl. i., fig. 26, 27), ma collection.—Miocene, Victoria.

Affinités.—Cette espèce est plus étroite que *V. redacta*, Desh., du calcaire grossier des environs de Paris, et elle s'en distingue en outre par ses stries et par sa perforation ombilicale; elle est beaucoup moins étranglée en arrière et moins profondément sillonnée que *V. lanceolata* Sow., de Barton; si on la compare à *V. DeKayi*, Lea, de Claiborne, on trouve qu'elle est bien moins conique, que son pli columellaire est moins saillant, et que son labre dépasse moins le sommet; *V. Meyeri*, Cossm., de Jackson (Mississipi) est beaucoup plus ventrue et a un pli bien plus saillant; elle ressemble plutôt à *V. radius*, Desh., du Suessonien, mais elle est plus étroite et plus allongée, plus visiblement striée. En résumé, quoique le nombre des *Volvulella* éocéniques est déjà grand, je la crois différente de celles qui sont anterieurement décrites.

Volvulella inflatior, *nov. sp.* Pl. i., fig. 24, 25.

Taille microscopique; forme régulierement ovale, étroite; dernier tour embrassant toute la coquille, entièrement lisse, imperforé au sommet et à la base. Ouverture lineaire en arrière, subitement dilatée en avant; labre mince, à peu prés vertical; un fort pli columellaire, se raccordantpar une courbe arrondie et carénée avec le contour supérieur, qui découvre largement l'ouverture.

Dimensions.—Longueur, 2·25 mill.; diamètre, 1·25 mill.

Localités et type.—Spring Creek (Pl. i., fig. 24, 25), ma collection; Table Cape.—Eocene, Victoria et Tasmania.

Affinités.—Quoique je ne posséde qu'un seul échantillon extramement petit, je n'hésite pas à séparer cette espèce de *V. Tatei*, qui est beaucoup plus allongé et plus étroit; en outre *V. inflatior* a un pli plus saillant à la columelle et son labre ne dépasse pas le sommet de la coquille. Si on compare *V. inflatior* à *V. redacta* du bassin de Paris, on trouve que cette dernière espèce est moins ovale et plus acuminée au sommet, que son ouverture est moins rétrécie en arrière et qui sa base est perforée; si on la rapproche de *V. radius*, Desh., du Suessonien, on remarque que l'espèce australienne a l'extremite inférieure plus arrondie, et que son ouverture est plus étroite en arrière, plus dilatée et plus découverte en avant.

Scaphander Tatei, *nov. sp.* Pl. i., figs. 34, 35.

Taille moyenne; test très mince; forme ovoido-conique; spire largement perforée au sommet qui est creusé d'un petit entonnoir

arrondi. Dernier tour embrassant toute la coquille, ventru au milieu, obliquement atténué du côté posterieur, largement dilaté et ovalement arrondi du côté anterieur ; surface régulièrement ornée de profonds sillons finement ponctués par les accroissements, et dont les intervalles portent quelquefois, surtout en arrière, une strie intermédiaire plus fine. Ouverture grande et découverte, rapidement dilatée ; labre régulièrement arqué ; bord columellaire mince, largement étalé.

Dimensions.—Longueur, 15 mill.; diamètre, 8 mill.

Localités et type.—Muddy Creek (Pl. i., fig. 34, 35), ma collection ; Mornington, River Murray Cliffs.—Eocene, Austr. Sud., Victoria.

Affinités.—Cette fragile espèce se distingue de la plupart de celles qui ont été antérieurement decrites, par ses stries plus visiblement ponctuées ; en outre, si on la compare à *S. conicus*, Desh., du calcaire grossier parisien, on remarque qu'elle a une forme plus conique et moins ovale et que son sommet est plus largement perforé. Quant on la rapproche de *S. altavillensis* du Cotentin et de la Loire inférieure, on trouve qu'elle est plus dilatée en avant, que son ouverture est plus grande et que sa perforation apicale est moins étroite. Enfin *S. fortis*, Brongn., des environs de Roncâ, dans le Vicentin, est plus contracté aux abords du sommet, plus allongé et plus étroit par son galbe général.

Bullinella exigua, *Ten.-Woods.* Pl. i., figs. 31-33.

Référence.—Proc. Linn. Soc. N.S. Wales, vol. IV, p. 19, pl. i., fig. 6 (1880).

Synonymie.—*Cylichna exigua*, T. Woods *(non Atys exigua*, A. Adams).

Taille grande pour ce genre ; forme cylindracée ; spire tronquée au sommet ; perforée par un entonnoir graduellement rétréci, qui laisse apercevoir l'enroulement étagé de trois ou quatre tours. Dernier tour embrassant toute la coquille, à galbe presque cylindrique, un peu plus étroit en arrière qu'en avant, arrondi à la périphérie de l'entonnoir apical, et à la base qu'est munie d'une fente ombilicale, orné de quelques filets spiraux dans l'entonnoir, de deux ou trois stries très obsolétes au dessus de sa périphérie, de sept stries très écartées sur la base, et de sillons beaucoup plus rapprochés sur la région ombilicale qui porte en outre une rainure spirale isolant une sorte de bourrelet à peine saillant. Ouverture plus longue que le corps du dernier tour, à bords parallèles sur presque toute sa hauteur, arrondie et versante à la base ; labre assez épais, rectiligne ex vertical, dépassant la troncature apicale, avec laquelle il se raccorde par une courbe échancrée et limitée par un rebord calleux ; columelle très courte, excavée, munie d'un pli épais tout à fait en avant, et d'un renflement très obsoléte en arrière.

Dimensions.—Longueur, 16 mill.; diamètre, 6·5 mill.

Localités et néotype.—Muddy Creek (Pl. i., figs. 31-33), ma collection; Cheltenham, Gellibrand River, Spring Creek, River Murray Cliffs, Table Cape.—Eocene.

Affinités.—Par sa taille et par son aspect général, cette espèce ressemble beaucoup à *B. Saint-Hilairei*, Lea, de Claiborne: mais son entonnoir apical est plus anguleux et plus ouvert, muni de filets qui manquent chez l'espèce americaine, ses stries basales sont plus écartées, et son ouverture est moins obliquement tronquée en avant. Elle se distingue de *B. Verneuili*, Desh., du calcaire grossier parisien, par sa forme plus cylindracée, et par sa surface lisse au milieu; elle est moins étroite et plus atténuée en arrière que *B. Bruguierei*, Desh., du bassin de Paris, qui a en outre la columelle plus oblique que l'espèce australienne.

Bullinella angustata, *Tate* and *Cossmann, nov. sp.* Pl. i., fig. 1, 2.

Taille moyenne; forme cylindro-conique, assez étroite; spire tronquée au sommet, à enroulement peu visible au fond d'une étroite perforation. Dernier tour embrassant toute la coquille, à profil à peine arqué, un peu plus atténué en arrière, arrondi à la périphérie de l'angle apical, ovale à la base que est perforée d'une étroite fente ombilicale; surface ornée de stries spirales alternées, les principales un peu plus profondes aux extrémités qu'au milieu; un dernier sillon basal limite un étroit bourrelet contre la fente ombilicale. Ouverture à bords paralléles et très étroite, sur la plus grande partie de sa hauteur, dilatée tout à fait en avant, arrondie et découverte sur son contour supérieur; labre mince, rectiligne, presque vertical, dépassant un peu la troncature apicale et se raccordant avec le bord opposé par une sinuosité profondément échancrée; columelle très courte, excavée, munie en avant d'un léger pli tordu; bord columellaire très étroit, peu calleux, se raccordant avec le contour supérieur.

Dimensions.—Longueur, 10½ mill.; diamètre, 4 mill.

Localité et type.—Adelaide (Pl. ii., fig. 1, 2), ma collection.—Eocene, Austr. Sud.

Affinités.—Cette espèce ne peut être confondue avec *B. exigua*, à cause de sa surface entièrement striée, et de son unique pli columellaire moins saillant; en outre elle est plus étroite et le bec du labre est moins prolongé. Si on la compare à *B. Verneuili*, Desh., du calcaire grossier parisien, qui est striée comme elle sur toute sa surface, on remarque que l'espèce australienne est beaucoup plus étroite, que son ouverture est moins découverte à la base, que sa columelle est plus excavée, non oblique, munie d'un pli plus visible. Elle est enfin moins cylindrique que *B. Bruguierei* et *Saint-Hilairei*, qui s'en distinguent en outre par l'absence de stries au milieu du dernier tour.

Bullinella paucilineata, *Tate* and *Cossmann*, nov. sp. Pl. i., fig. 28-30.

Taille assez grande; forme cylindracée, un peu trapue; perforation apicale étroite, ne laissant pas apercevoir l'enroulement de la spire, située au fond d'un entonnoir arrondi et évasé. Dernier tour embrassant toute la coquille, à galbe légérement ovale, arrondi à la périphérie de l'entonnoir apical, ovale à la base qui est imperforée, orné de sillons spiraux très visibles, plus écartés au milieu qu'aux extrémités, se prolongeant à l'interieur de l'entonnoir apical et sur la région ombilicale où ils sont presque imbriqués. Ouverture à bords non paralléles, rétrécie en arrière, graduellement dilatée et arrondie en avant, où elle est obliquement versante; labie mince, renversé à gauche de l'axe du côté anterieur, vertical au milieu, arrondi en arrière; columelle régulièrement excavée, portant au milieu un renplement à peine visible; bord columellaire assez large, mince en arrière, calleux et détaché à la base, se terminant en pointe à l'extrémité du contour supérieur.

Dimensions.—Longueur, 11 mill.; diamètre, 5 mill.

Localité et type.—Spring Creek, (Pl. i., fig. 28-30), ma collection.—Eocene, Victoria.

Affinités.—Cette espéce se distingue facilement de *B. exigua* et de *B. Saint-Hilairei* par sa forme moins cylindrique et moins étroite, par l'ornementation qui couvre toute sa surface, par son sommet moins tronqué et plus arrondi, par sa perforation apicale plus étroite, par sa columelle non plissée. Elle appartient encore au groupe de *Bullinella* typiques et se distingue des *Cylichnina* par son entonnoir apical beaucoup plus ouvert que celui des *B. galba*, Conrad, espéce de Claiborne, qui est à peu près à la limite de séparation des deux groupes et que beaucoup d'auteurs ont même confondee spécifiquement avec *B. Saint-Hilairei.*

Bullinella aratula, *nov. sp.* Pl. ii., fig. 3, 4.

Taille moyenne; forme cylindracée, subconoïdale; spire tronquée au sommet, largement perforée au fond d'un entonnoir à peu près conique. Dernier tour embrassant toute la coquille, à galbe un peu ovale, plus atténué en arrière qu'à la base, subanguleux à la périphérie de l'entonnoir apical, orné de stries finement ponctués et écartées au milieu, qui se transforment du côté postérieur en larges rainures séparées par des cordons plus etroits et se prolongeant à l'interieur de l'entonnoir; sur la base, les sillons spiraux sont à peine plus serrés qu'au milieu du dernier tour, mais ils sont plus pronds et subimbriqués. Ouverture plus allongée que le corps de la coquille, à bords non paralléles rétrécie en arrière, dilatée et arrondie en avant où elle est peu versante; labre légérement arqué, se prolongeant en arrière par un bec

échancré à sa jonction avec le bord opposé dans l'entonnoir ; columelle courte et très excavée, sans pli ni renflement ; bord columellaire calleux et aplati, un peu détaché de la base, se raccordant par son contour caréné avec le bord supérieur.

Dimensions.—Longueur, 10 mill. ; diamètre, 4·5 mill.

ètroit qui dépasse de plus d'un millimètre la troncature apicale,

Localités et type.—Mornington (Pl. ii., fig. 3, 4), ma collection ; Muddy Creek, Gellibrand River, Fyansford, Corio Bay.—

—Eocene, Victoria.

Affinités.—Quoique cette coquille soit très voisine de *B. paucilineata*, il me parait nécessaire de l'en séparer à cause de son ornementation bien differente du côté posterieure, et aussi parce qu'elle porte un bec à l'extrémité inferieure du labre ; en outre, son bord columellaire est plus aplati, son labre est moins rectiligne. Tous ces caractéres l'eloignent encore davantage des autres *Bullinella* connues dans l'Eocéne d'Europe et des Etats Unis.

Bullinella cuneopsis, *nov. sp.* Pl. ii., fig. 5, 6.

Taille médiocre ; forme conique ; somnet tronquée en entonnoir, muni d'une perforation laissant apercevoir l'enroulement des tours de spire. Dernier tour embrassant toute la coquille, à profil presque rectiligne, coniquement atténué en arrière, ovalement arrondi à la base, qui est à peu prés entiérement imperforée ; surface entiérement lisse. Ouverture un peu plus longue que le corps de la coquille, à bords paralléles, retrécie et contractée en arrière, dilatée subitement et arrondie du côte anterieur, où elle n'est presque pas versante ; labre mince, peu renversé à gauche de l'axe du coté anterieur, rectiligne et vertical sur presque toute sa hauteur, légérement sinneux en arrière, où il forme un bec qui dépasse la troncature apicale ; columelle très courte, droite, faisant un angle de 130° anec la base de l'avant-dernier tour, un peu gonflée au milieu, mais sans pli apparent ; bord columellaire étroit, un peu détaché de la base, se raccordant avec le contour supérieur par une courbe presque régulière.

Dimensions.—Longueur, 5 mill. ; diamètre à la base, 2·25 mill.

Localité et type.—Muddy Creek (Pl. ii., fig. 5, 6), ma collection.

—Eocene : Victoria.

Affinités.—Cette espèce se reconnait aisément par sa forme tout-à-fait conique et rétrécie en arrière, par sa surface lisse et son ouverture contractée ; son galbe est plus rectiligne que celui de *B. conulus*, Desh., du calcaire grossier parisien, et d'ailleurs elle s'en distingue par sa surface non striée, par l'absence de pli à la columelle, par son sommet moins étroitement perforé. Quant à *B. conoïdea*, Desh., de l'Oligocéne d'Europe, c'est une espèce dont la perforation apicale est plus etroite, presque recouverte par la callosité de l'attache du labre, et dont le galbe est plus ovale.

Bullinella infundibulata, *nov. sp.* Pl. ii., fig. 15, 16.

Taille médiocre ; forme ovoïdo-conique, un peu trapue ; sommet tronqué en entonnoir assez profond, laissant apercevoir l'enroulement de trois tours étagés, pleins et déclives, ainsi que le nucléus embryonnaire globuleux et lisse. Dernier tour embrassant toute la coquille, ovale au milieu et en avant, attenué en arrière et caréné à la périphérie de l'entonnoir apical, très finement orné, sur toute la surface de stries spiralés extrêmement serrées, qui s'écartent et deviennent plus profondes sur la base ; il n'y a pas de fente ombilicale, mais une étroite rainure imperforée, limitée par un sillon obsolète. Ouverture très étroite en arrière, subitement dilatée et arrondie en avant ; labre, à peu prés rectiligne et vertical sur la plus grande partie de sa hauteur ne dépassant pas la truncature apicale ; columelle courte et droite, coudée en avant par une torsion pliciforme, bord columellaire aplati, un peu calleux, limité à l'extérieur par une caréne qui se raccorde en courbe avec le contour supérieur.

Dimensions.—Longueur, 6 mill. ; diamètre, 3 mill.

Localités et type.—Gellibrand River (Pl. ii., fig. 15, 16), ma collection ; Spring Creek, Fyansford, Corio Bay, Birregurra, Muddy Creek.—Eocene : Victoria.

Affinités—Moins conique et plus trapue que *B. cuneopsis*, cette espèce s'en distingue en outre par sa surface entiérement striée, par sa truncature apicale et par l'absence de bec au labre, &c. ; si on la compare à *B. goniophora*, Desh., du bassin de Paris, qui a aussi une troncature carénée on remarque qu'elle est moins cylindrique, que sa columelle est moins oblique et plus tordue, que la base est imperforée et que son ouverture est plus dilatée en avant. Quant à *B. acrotoma*, Cossm., de Claiborne, c'est une espèce dont la spire est masquée par une callosité tout à fait caracteristique.

Bullinella altiplica, *nov. sp.* Pl. ii., fig. 9-11.

Taille petite ; forme ovoïdo-cylindrique, courte et trapue ; sommet tronqué en entonnoir large et peu profond laissant apercevoir l'enroulement des quatre tours de spire jusqu'au nucléus embryonnaire, avec de petits plis d'accroissement curvilignes. Dernier tour embrassant toute la coquille, à profil ovalisé, régulièrement atténué à ses deux extrémités, caréné à la périphérie de l'entonnoir apical, lisse en arriére, orné de quelques stries spirales très peu visibles sur la base qui est imperforée. Ouverture rétrécie en arriére où les bords ne sont paralléles que sur une faible hauteur, dilatée, arrondie et découverte en avant ; labre un peu arqué dépassant à peine la troncature du sommet ; columelle excavée, munie tout à fait à la base d'un pli tordu qui se raccorde avec le contour interne du rebord supérieur ; bord

columellaire etroit, calleux, aplati, limité par une caréne qui se raccorde avec le contour externe du bord supérieur.

Dimensions.—Longueur, 3·5 mill.; diamètre, 1·75 mill.

Localité et type.—Mornington (Pl. ii., fig. 9-11), ma collection. —Eocene, Victoria.

Affinités.—Cette coquille ne peut se confondre avec aucune des *Bullinella* que je connais dans l'Eocéne, à cause de sa spire bien visible dans l'entonnoir caréné que ferme la troncature apicale ; en outre la position tout à fait anterieure de son pli columellaire est un caractére qui est particulier à cette espèce. Elle est d'ailleurs beaucoup plus trapue que la plupart de ses congénéres et ressemble, par son galbe, à une *Roxania ;* mais elle n'a pas la columelle tronqué á la base.

Bullinella phanerospira, *nov. sp.* Pl. ii., figs. 12-14.

Taille petite ; forme ovoïde et trapue ; sommet tronqué en entonnoir un profond, laissant apercevoir l'enroulement de quatre tours convexes, séparés par de profondes sutures, avec une petite perforation apicale au centre. Dernier tour embrassant toute la coquille, ventru, ovale, également atténué à ses deux extrémités, arrondi à la périphérie de la troncature de la spire, entiérement lisse, sauf quelques striés très fines et très serrées sur la base qui est imperforée. Ouverture très étroite et contractée en arrière, dilatée et arrondie en avant ; labre arqué, un peu épaissi et réfléchi en arrière, muni d'un bec court à la jonction avec la troncature apicale ; columelle courte et droite, munie d'une torsion pliciforme du côté antérieur ; bord columellaire calleux et aplati, appliqué sur la base, se raccordant avec le contour supérieur.

Dimensions.—Longueur, 3·25 mill.; diamètre, 2 mill.

Localité et type.—Muddy Creek (Pl. ii., figs. 12-14), ma collection.—Eocene, Austr. Sud.

Affinités.—Cette espéce est extrêmement voisine de *B. altiplica*, et j'ai beaucoup hésité à ne la considérer que comme une simple varieté, d'autant plus qu'il y a quelques individus intermédiaïres et douteux ; cependant on distingue assez facilement les deux échantillons types, par la forme beaucoup plus ventrue de *B. phanerospira*, qui n'a pas de caréne périphérique à la troncature apicale, dont la spire a des tours arrondis, dépourvus de plis d'accroissement ; le dernier tour a le galbe plus gonflé au milieu, plus obliquement déclive en arrière, et sa base est ornée de stries plus serrées ; l'ouverture est plus contractée en arrière, la labre est plus arqué, plus réfléchi ; le pli columellaire est beaucoup moins saillant. On peut donc admettre la séparation de cette espéce.

Roxania Woodsi, *Tate.* Pl. ii., fig. 7-6.

Référence.—Cylichna Woodsi, Proc. Roy. Soc., Tasmania, for 1883, p. 211 (1884); *id,* p. 228 (1885).

Synonymie.—Cylichna arachis, Ten.-Woods, *op. cit.,* p. 102 (1877); non Quoy.

Taille grande; forme réguliérement ovale, un peu ventrue; sommet étroitement perforé, ne laissant pas apercevoir la spire. Dernier tour embrassant toute la coquille, un peu plus atténué en arrière qu'en avant, entiérement couvert de fines stries spirales ponctuées, inéquidistantes, plus profondes, plus espacés et subimbriquées sur la base qui est étroitement perforée d'une fente ombilicale. Ouverture assez large, dilatée et arrondie en avant; labre à peu pres vertical, sans bec ni échancrure à sa jonction avec la perforation apicale; columelle excavée en arc de cercle, tronquée à la base par un pli tordu et peu saillant, qui se raccorde par une courte hélice avec le contour supérieur; bord columellaire calleux, détaché de la fente ombilicale, se terminant contre la courbe héliçoidale du pli columellaire.

Dimensions.—Longueur, 15·5 mill.; diamètre, 7·5 mill.

Localité et type.—Table Cape (Pl. ii., fig. 7, 8), ma collection. Eocene, Tasmania.

Affinités.—Cette espèce est moins ventrue et plus allongée que *R. utriculoides,* Bosquet, de l'Oligocéne de Belgique; elle a la columelle beaucoup plus tronquée que *R. ovulata,* Lamk., du calcaire grossier parisien. Si on la compare á *R. biumblicata,* Desh., du calcaire grossier de Parnes, on trouve qu'elle est moins globuleuse, moins étroitement perforée au sommet, que ses stries spirales sont plus fines, que sur bord columellaire est plus large et plus aplati. Quant à *R. cincta,* Desh., du Paléocéne des environs de Paris c'est une espèce á sommet imperforé, dont les sillons spiraux sont bien plus écartés que les stries de l'espèce australienne. *R. oviformis,* Meyer, de Jackson (Mississipi) est plus trapue et plus cylindracée et a la columelle plus droite, plus mince, l'ouverture plus arquée, le sommet plus étroitement perforé.

Roxania scrobiculuta, *Tate* and *Cossmann, nov. sp.* Pl. ii., fig. 17, 18.

Taille médiocre; forme globuleuse; sommet trés étroitement perforé; deruier tour embrassant toute la coquille, réguliérement ellipsoïdal, un peu atténué à la base qui est dépourvue de fente ombilicale, orné sur toute la surface de sillons ponctués, inéquidistants, plus écartés au milieu qu'aux extrémités. Ouverture arquée, rétrécie en arrière, dilatée et arrondie en avant; labre mince un peu arqué, formant un bec peu saillant et faiblement échancré à sa jonction avec la perforation apicale; columelle courte, droite, à peine inflechié par une légére torsion antérieure, se terminant en pointe sans faire de crochet contre le bord

supérieur ; bord columellaire un peu calleux, appliqué sur la base.

Dimensions.—Longueur, 6·5 mill.; diamètre, 4·5 mill.

Localités et type.—Muddy Creek (Pl. ii., fig. 17, 18), ma collection ; River Murray Cliffs.—EOCENE.

Affinités.—Cette coquille ne peut se confondre avec *R. Woodsi*, parce qu'elle est beaucoup plus globuleuse et que ses sillons sont plus écartés ; elle ressemble beaucoup à *R. biumbilicata*, Desh., du calcaire grossier parisien, mais elle s'en distingue par sa forme plus ellipsoïdale et plus renflée, par ses sillons moins profonds et moins réguliers, surtout par l'absence de fente ombilicale. Si on la compare à *R. utriculoides*, Bosquet, de l'Oligocéne de Belgique, on trouve qu'elle s'en écarte par l'absence de fente ombilicale, par ses sillons inéquidistants, par sa columelle moins excavée ; enfin *R. oviformis*, Meyer, de Jackson (Mississipi), a une forme moins elliptique, un pli columellaire plus saillant et est munie d'une fente ombilicale.

Roxania (?) **bullæformis**, *nov. sp.* Pl. ii., figs. 21, 22.

Taille petite ; forme ovoïde, ventrue ; sommet étroitement perforé ; dernier tour embrassant toute la coquille, un peu contracté en arrière, arrondi à la base qui est perforée d'un entonnoir ombilical assez largement ouvert ; surface ornée de stries spirales très fines et très serrées au milieu, plus profondes et plus écartées aux extrémités, sauf sur la région ombilicale où elles se rapprochent davantage que sur la base. Ouverture plus longue que le corps de la coquille, arquée, peu rétrecie en arrière, peu dilatée et versante à la base ; labre un peu épaissi, à peu prés rectiligne et légérement oblique, formant un angle sur son contour postérieur, se prolongeant par un bec saillant, large et versant, beaucoup au delà du sommet ; columelle coudée, se raccordant avec le contour supérieur ; bord columellaire calleux, caréné à l'exterieur et détaché de la base.

Dimensions.—Longueur, 4·25 mill. ; diamètre, 2·5 mill.

Localité et type.—Muddy Creek (Pl. ii., fig. 21, 22), ma collection.—EOCENE : Victoria.

Affinités.—Cette espèce se distingue de la plupart de ses congénéres par sa columelle presque pas tronquée : cependant je ne puis me résoudre à la placer dans le genre *Bullinella* dont elle s'écarte par sa forme générale, par son ornementation, par sa columelle coudée. C'est une forme dont le classement est très embarrassant et probablement pas définitif ; en tous cas, elle est facilement reconnaissable par sur entonnoir ombilical et par la contraction bien visible du galbe posterieur de son dernier tour.

Cylichnella callosa, *Tate* and *Cossman, nov. sp.* Pl. ii., fig. 19, 20.

Taille moyenne ; forme cylindracée, médiocrement trapue ; sommet étroisement perforé, spire invisible ; dernier tour embras-

sant toute la coquille, à galbe ovale, également atténué à ses deux extrémités, qui sont ornées de sillons spiraux peu visibles et assez écartés; base munie d'une fente ombilicale tres étroite. Ouverture un peu plus longue que le corps de la coquille, rétrécie à bords paralléles en arrière, à peine dilatée en avant et découverte à la basé ; labre mince, renversé à gauche de l'axe du côté anterieur, vertical et peu arqué au milieu, formant un bec court à la jonction avec la perforation apicale ; columelle calleuse très courte, peu excavée, munie de deux plis, l'inférieur lamelleux et saillant forme la limite externe du bord columellaire, l'antérieur plus petit et plus épais se raccorde avec le précédent au contour supérieur.

Dimensions.—Longueur, 10 mill.; diamètre, 4 mill.

Localités et type.—Aldinga (Pl. ii., fig. 19, 20), ma collection ; Cape Otway.—Eocene, Austr. Sud. et Victoria.

Affinités.—Cette espèce ne ressemble à *C. Bourdoti*, Cossm., de l'Eocéne des environs de Nantes, que par sa plication columellaire et par sa perforation apicale ; mais elle s'en distingue par sa forme plus etroite et plus cylindrique, par l'absence de plis axiaux au sommet, et par son ouverture plus découverte à la base, de sorte qu'elle a plutôt l'aspect d'une *Bullinella ;* seulement elle s'écarte des espèces de ce genre par son double pli columellaire.

Ringicula lactea, *Johnston.* Pl. ii., figs. 23-24.

Référence.—Proc. Roy. Soc. Tasmania for 1879, p. 34, 1880.

Taille petite ; forme buccinoïde, un peu allongée ; spire pointue, à galbe conique ; embryon petit, à nucléus subglobuleux et dévié ; cinq tours un peu convexes, dont la hauteur est un peu inférieure à la moitié de la largeur, séparés par de profondes sutures ; subétagés par une rampe obsolète, ornés de quatre stries spirales écartés. Dernier tour peu supérieur aux deux tiers de la hauteur totale, peu ventru, subanguleux au dessus de la suture, arrondi à la base qui est imperforée, régulièrement orné, sur toute la surface, d'une douzaine de stries spirales écartées et de plis d'accroissement irréguliers et obsolètes. Ouverture égale à la moitié de la longueur totale, large en travers, canaliculée en arrière, largement échancrée à la base ; labre vertical épaissi et bordé par un large bourrelet qui envahit la moitié de l'avant-dernier tour, lisse à l'interieur avec un renflement un peu plus saillant au dessus du canal posterieur de l'ouverture ; trois plis columellaires épais, les deux anterieurs lamelleux et très saillants, le pariétal plus écarté, écrasé à sa naissance ; bord columellaire très calleux et très étalé.

Dimensions.—Longueur, 5 mill. ; diamètre, 3 mill.

Localités et néotype.—Table Cape (Pl. ii., fig. 23-24), Muddy Creek, ma collection.—Eocene ; Tasmania ; Victoria.

Affinités—Cette espèce se distingue aisément de la plupart des *Ringicula* typiques de l'Eocéne d'Europe et des Etats Unis, par l'absence de crénelures à l'interieur du labre ; elle s'écarte des formes néogénes par sa forme allongée et peu gonflée.

Ringicula Tatei, *nov. sp.* Pl. ii., fig. 32, 33.

Taille très petite ; forme buccinoïde, un peu trapue ; spire peu allongée, à galbe conique ; embryon à nucléus obtus et peu dévié ; quatre à cinq tours à peine convexes, dont la hauteur égale la moitié de la largeur, séparés par des sutures linéaires, ornés de six stries spirales assez fines. Dernier tour égal aux deux tiers de la hauteur totale, globuleux, arrondi à la base qui est imperforée, régulièrement orné de stries spirales équidistantes, sauf celles qui bordent la suture et qui sont un peu plus serrées. Ouverture large et courte, profondément canaliculée en arrière, entaillée à la base par une échancrure assez étroite ; labre très epais, un peu oblique, bordé à l'exterieur par un énorme bourrelet dont l'extrémité amincie se prolonge sur la moitié de la hauteur de l'avant dernier tour, lisse à l'interieur avec un renflement médian qui accentue la gouttière posterieure de l'ouverture ; trois plis columellaires très inégaux, l'anterieur assez epais et un peu oblique, l'inférieur mince, transverse et moins saillant, le pariétal extrêmement épais et aplati à sa naissance ; bord columellaire large, étalé, très callaux, s'élevant presque aussi haut que la saillie du bord opposé.

Dimensions.—Longueur, 3·5 mill. ; diamètre, 2 mill.

Localité et type.—Muddy Creek (Pl. ii., fig. 32, 33), ma collection.—Eocene et Miocene, Victoria.

Affinités.—Beaucoup plus courte et plus ventrue que *R. lactea*, cette espèce s'en distingue en outre par ses stries moins écartées, par l'absence de rampe déclive au dessus de la suture, par les plis plus inégaux.

Ringicula teniulirata, *nov. sp.* Pl. ii., fig. 27, 28.

Taille très petite ; forme buccinoïde ; spire un peu allongée, à galbe subconoïdal ; embryon obtus, à peine dévié ; quatre tours un peu convexes, dont la hauteur dépasse la moitié de la largeur, séparés par des sutures linéaires, ornés de très fines stries spirales. Dernier tour égal aux trois cinquiemes de la hauteur totale, ovale, arrondi à la base qui est imperforée, entièrement couvert de stries spirales, régulières et serrées, finement ponctuées par les accroissements. Ouverture large et ovale échancrée à les deux extrémités ; labre épais, obliquement incliné en avant, bordé d'un large bourrelet aplati, lisse à l'intérieur, subitement aminci et presque creusé du côté postérieur ; trois plis columellaires divergents, minces, lamelleux, l'anterieur contournant la profonde échancrure basale de l'ouverture ; bord columellaire à peu près nul.

Dimensions.—Longueur, 2·5 mill.; diamètre, 1·5 mill

Localités et type.—Spring Creek (Pl. ii., fig. 27-28), ma collection; Gellibrand River, Mornington.—Eocene, Victoria.

Affinités.—Cette espèce ressemble à *R. Tatei*, mais ses stries sont plus fines et moins visibles, ses plis columellaires sont plus lamelleux, plus égaux, son bord columellaire n'existe, pour ainsi dire, pas; sa forme générale est moins trapue, et sa spire est plutôt conoïdale que conique. L'absence de crénelures au labre ne permet pas de la classer dans le groupe des *Ringicula* typiques, comme l'espèce suivante, dont elle se distingue d'ailleurs par sa spire moins allongée.

Ringicula prælonga, *nov. sp.* Pl. ii., fig. 25-26.

Taille petite; étroite, ovoïdo-conique; spire longue, subulée, à galbe régulièrement conique; embryon obtus, à peine dévié; six tours légèrement convexes, dont la hauteur atteint presque les deux tiers de la largeur, séparés par des sutures profondes et subcanaliculées, ornés de huit sillons spiraux, un peu plus serrés en avant qu'en arrière. Dernier tour égal aux trois cinquiémes de la hauteur totale, à galbe arrondi, surtout à la base qui est à peine perforée d'une fente ombilicale très étroite; surface entièrement couverte de sillons spiraux, profonds et réguliers, un peu plus serrés sur la base. Ouverture très courte, large, canaliculée en arrière, profondément échancrée à la base; labre assez epais, bordé à l'exterieur par un bourrelet large et aplati qui dépasse à peine la suture, portant à l'interieur quelques crénelures divisées en deux groupes séparés par un intervalle lisse; columelle courte et excavée, munie de deux plis minces, lamelleux, très saillants et paralléles, pli parietal très écarté, peu proéminent et peu épais; bord columellaire peu calleux, bien moins élevé à la base que la saillie du bord opposé.

Dimensions.—Longueur, 4·5 mill.; diamètre, 2·25 mill.

Localité et type.—Muddy Creek (Pl. ii., figs. 24-26), ma collection.—Eocene, Victoria.

Affinités.—Cette espèce ne peut être confondue avec *R. lactea*, non seulement à cause de son ornementation et de sa forme plus étroite, de sa spire plus allongée et de ses tours plus élevés, de ses plis plus minces, mais surtout à cause des crénelures obsolètes de son labre, qui la placent dans le groupe typique du genre *Ringicula*. Elle s'écarte cependant de *R. ringens*, Lamk., de l'Eocene des environs de Paris, par ses sillons plus profonds par son ouverture moins calleuse, par ses crénelures labiales moins fines et disposées en deux séries avec un intervalle lisse.

Umbrella australiensis, *nov. sp.* Pl. ii., fig. 29-31.

Taille assez grande; test mince; forme elliptique, subcirculaire, un peu élevée et irrégulière; sommet presque central, à nucleus

embryonnaire globuleux, dévié et un peu enroulé ; surface extérieure lisse, gauchie marquée par des dépressions rayonnantes très obsolètes, ornée de plis d'accroissement irréguliers et peu saillants. Surface interne brillante, avec quelques rayons indistincts ; impression musculaire assez étroite, irrégulièrement frangée.

Dimensions.—Longueur, 27 mill.; largeur, 22 mill.; hauteur, 5 mill.

Localité et type.—Mornington (Pl. ii., fig. 29-31), ma collection ; Muddy Creek, River Murray Cliffs.—Eocene, Victoria et Austr. Sud.

Affinités.—Cette espèce est beaucoup plus grande, plus mince et moins aplatie qu' *U. laudunensis* de l'Eocéne inférieur du bassin de Paris.

EXPLICATION des PLANCHES.

Pl. I.

Fig.
1- 3. Actæon scrobiculatus, *T. Woods.* (5/2) Spring Creek, Table Cape.
4- 5. Actæon funiculifer, *Cossm.* (5/2) Muddy Creek.
6- 7. Actæon distinguendus, *Cossm.* (5/2) Muddy Creek.
8- 9. Actæon subscalatus, *Cossm.* (4/1) Aldinga.
10-11. Actæon evanescens, *Cossm.* (4/1) Adélaïde.
12-13. Actæon olivellæformis, *Tate.* (8/2) Muddy Creek.
14-15. Semiactæon microplocus, *Cossm.* (3/1) Murray Cliffs.
16-17. Triploca ligata, *Tate.* (4/1) Adélaïde.
18-19. Tornatina longispira, *Cossm.* (4/1) Muddy Creek.
20-21. Tornatina pachyptycha, *Cossm.* (5/1) Muddy Creek.
22-23. Tornatina aptycha, *Cossm.* (3/1) Muddy Creek.
24-25. Volvulella inflatior, *Cossm.* (6/1) Spring Creek.
26-27. Volvullela Tatei, *Cossm.* (4/1) Muddy Creek.
28-30. Bullinella paucilineata, *Tate* and *Cossm.* (2/1) Sprink Creek.
31-33. Bullinella exigua, *T. Woods.* (5/4) Muddy Creek.
34-35. Scaphander Tatei, *Cossm.* (2/1) Muddy Creek.

Pl. II.

1- 2. Bullinella angustata, *Tate* and *Cossm.* (2/1) Adélaïde.
3- 4. Bullinella aratula, *Cossm.* (2/1) Mornington.
5- 6. Bullinella cuneopsis, *Cossm.* (4/1) Muddy Creek.
7- 8. Roxania Woodsi, *Tate.* (6/5) Table Cape.
9-11. Bullinella altiplica, *Cossm.* (5/1) Mornington.
12-14. Bullinella phanerospira, *Cossm.* (5/1) Muddy Creek.
15-16. Bullinella infundibulata, *Cossm.* (3/1). Gellibrand River.
17-18. Roxania scrobiculata, *Tate* and *Cossm.* (3/1) Muddy Creek.
19-20. Cylichnella callosa, *Tate* and *Cossm.* (4/1) Muddy Creek.
21-22. Roxania (?) bullæformis, *Cossm.* (4/1) Muddy Creek.
23-24. Ringicula lactea, *Johnston.* (4/1) Table Cape.
25-26. Ringicula prælonga, *Cossm.* (4/1) Muddy Creek.
27-28. Ringicula tenuilirata, *Cossm.* (6/1) Spring Creek.
29-31. Umbrella australensis, *Cossm.* (g.n.) Mornington.
32-33. Ringicula Tatei, *Cossm.* (5/1). Muddy Creek.

ERRATA.

Page 11, ligne 15, au lieu de Pl. i. lisez Pl. ii.
Page 16, ligne 1, au lieu de fig. 7-6 lisez fig. 7-8.

List of Birds Collected or Observed in the Neighbourhood of Laura, S.A.,

By M. Morgan, M.D.

[Read November 3, 1896].

The nomenclature adopted is that of Gould's Handbook to the Birds of Australia. The skins obtained are now in the South Australian Museum.

1. Aquila audax
2. Haliastur sphenurus
3. Falco hypoleucus
4. Falco melanogenys
5. Falco lunulatus
6. Hieracidea berigora
7. Tinnunculus cenchroides
8. Accipiter torquatus
10. Circus assimilis (Gld. Hdbk. sp. 26)
11. Circus jardinii (Gld. Hdbk. sp. 27)
12. Strix delicatula
13. Spiloglaux boobook (female)
14. Spiloglaux marmoratus (male)
15. Ægotheles novæ-hollandiæ
16. Podargus strigoides
17. Cypselus pacificus
18. Hirundo frontalis
19. Petrochelidon nigricans
20. Lagenoplastes ariel
21. Cheramœca leucosternum
22. Merops ornatus
23. Dacelo gigas
24. Todirhamphus pyrrhopygius
25. Artamus sordidus
26. Artamus personatus
27. Artamus superciliosus
28. Pardalotus striatus
29. Pardalotus xanthopygius
30. Strepera arguta (?) melanoptera
31. Gymnorhina tibicen
32. Gymnorhina leuconota
33. Grallina picata
34. Graucalus melanops

35. Campephaga humeralis
36. Pachycephala rufiventris
37. Collyriocincla harmonica
38. Falcunculus frontatus
39. Oreoïca cristata
40. Rhipidura albiscapa
41. Sauloprocta motacilloides
42. Seisura inquieta
43. Micræca fascinans
44. Smicrornis brevirostris
45. Petrœca leggii
46. Petrœca goodenovii
47. Melanodryas cucullata
48. Malurus melanotus
49. Malurus lamberti
50. Malurus leucopterus
51. Acanthiza nana
52. Acanthiza pyrrhopygia
53. Geobasileus chrysorrhæa
54. Ephthianura albifrons
55. Ephthianura aurifrons
56. Ephthianura tricolor
57. Xerophila leucopsis
58. Anthus australis
59. Calamoherpe australis
60. Cincloramphus cruralis
61. Ptenoëdus rusfescens
62. Mirafra horsfieldi
63. Staganopleura guttata
64. Taeniopygia castanotis
65. Corvus australis
66. Pomatostomus superciliosus
67. Meliornis novæ-hollandiæ
68. Glyciphila fulvifrons
69. Glyciphila albifrons
70. Ptilotis penicillata
71. Acanthogenys rufigularis
72. Acanthochaera carunculata
73. Myzomela nigra
74. Melithreptus gularis
75. Melithreptus brevirostris
76. Myzantha flavigula
77. Dicæum hirundinaceum
78. Zosterops coerulescens
79. Climacteris scandens
80. Cacomantis pallidus

81. Cacomantis flabelliformis
82. Mesocalius oscularis
83. Lamprococcyx plagosus
84. Lamprococcyx basalis
85. Cacatua galerita
86. Platycercus flaveolus
87. Platycercus barnardi
88. Psephotus hæmatonotus
89. Euphema chrysostoma
90. Melopsittacus undulatus
91. Calopsitta novæ-hollandiæ
92. Trichoglossus multicolor
93. Glossopsitta australis
94. Glossopsitta porphryocephala
95. Glossopsitta pusilla
96. Phaps chalcoptera
97. Geopelia tranquilla
98. Stictopelia cuneata
99. Turnix velox
100. Coturnix pectoralis
101. Choriotis australis
102. Œdicnemus grallarius
103. Lobivanellus lobatus
104. Sarciophorus pectoralis
105. Ægialites nigrifrons
106. Himantopus leucocephalus
107. Carphibis spinicollis
108. Ardea pacifica
109. Ardea novæ-hollandiæ
110. Nycticorax caledonicus
111. Tribonyx ventralis
112. Hypotaenidia philippensis
113. Anas superciliosus
114. Anas punctata
115. Chlamydochen jubata
116. Phalacrocorax nova-hollandiæ
117. Phalacrocorax varius

Notes on Australian Typhlopidæ.

By Edgar R. Waite, F.L.S., Zoologist, Australian Museum, Sydney.

[Read April 6, 1897.]

Plate III.

The present contribution is the outcome of an examination of specimens sent to me from the South Australian Museum by the Director, Dr. E. C. Stirling. Further particulars will be included in a future article. When all available material has been examined, I propose to write on the distribution of the family in Australia, but for the present content myself with the description and illustration of a new and interesting species and some remarks on the identity of other forms.

9*. Typhlops pinguis, *sp. nov.*

Habit very stout, of tolerable even thickness. Head short; snout fairly prominent with rather sharp edge. Rostral, above half the width of the head, extending nearly to the level of the eyes, slightly narrowed in front, the portion visible from beneath a little broader than long; nasal incompletely divided, the fissure extending from the anterior half of the second labial; nostrils inferior; preocular narrower than the ocular, in contact with the second and third labials. Eye distinct. Four upper labials. Diameter of the middle of the body about two and twenty times in the total length. Tail as long as broad, ending in an obtuse spine. Twenty scales round the body.

Colors.—In spirits, brownish-yellow above, somewhat lighter beneath.

Dimensions.—Total length, 348 mm. Length of head, 8 mm.; width of head, 10 mm. Width of body, 15·5 mm. Length of tail, 12·5 mm.; width of tail, 12·5 mm.

Hab.—South Australia, one example.

Type.—In the South Australian Museum.

---

* Previous species-numbers were published as follows:—1-3. Records Austr. Mus. II. (1893), pp. 57-62, pl. XV. 4-8. Proc. Linn. Soc., N.S.W., IX. (1894), pp. 9-14, pl. T.

The circumstance of the nasal fissure being in contact with the second labial, and the scales round the body being in 20 rows, limits the Australian species from which *T. pinguis* requires to be distinguished to three, namely, *T. bituberculatus*, Peters,* *T. leucoproctus*, Boul.,† and *T. wiedii*, Peters.‡ All these are elongate forms, the diameter of the body being contained at most 44, 40, and 42 times respectively in the total length; whereas in *T. pinguis* the diameter is 22 in the length, or nearly twice that of any of the others; it is in fact the stoutest Australian species known.

Should further distinction be required, it may be mentioned that the trilobed snout of the first-named is a character which renders that species unmistakeable. The narrow rostral and lateral position of the nostrils sufficiently sunders *T. leucoproctus*, while *T. Wiedii* may be at once recognised by the fact that the nasal fissure extends on to the upper surface of the snout, almost dividing the plate.

10. Typhlops australis, *Gray*, and T. bicolor, *Peters*.

The collection includes a number of examples which I confess I cannot decide whether to name *T. australis*§ or *T. bicolor*;‖ they are certainly one or the other.

A glance at Boulenger's work shows that this writer widely separates the species in his synopsis,¶ the former being included in the main division, characterised by having the "snout rounded," and the latter in that distinguished by the snout having an "obtusely angular horizontal edge."

Referring to the respective epitomised descriptions,** we find that this is the only important difference between the two. The number of scales (22) round the body, the character of the nasal fissure, and the diameter of the body (33–37 and 30–34 respectively) are the same. The enlarged head scales do not appear to be distinguishing features, and the proportional width of the rostral to the head is only slightly different (three-fifths in *T. australis*, and one-half in *T. bicolor*).

---

* Peters, Monatsb. d. k. Akad. d. W. Berlin, 1863, p. 233; and 1867, p. 708, fig. 4.

† Boulenger, Ann. and Mag. Nat. Hist. (6) IV., 1889, p. 361; and Cat. Snakes in Brit. Mus., T., 1893, p. 20, pl. I., fig. 6.

‡ Peters, *loc. cit.*, 1867, p. 24, and Waite, Proc. Linn. Soc., N.S.W., IX., 1894, p. 13, pl. T., figs. 7, 8, and 9.

§ Gray. Cat. of Lizards, Brit. Mus. (1845), p. 135.

‖ Peters. *Loc. cit.* 1860, p. 81.

¶ Boulenger. Cat. Snakes in Brit. Mus. 1893, I., pp. 11, 13.

** Boulenger. *Ibid*, pp. 35, 48.

Although examples showing the extreme degree of acuteness or roundness of the snout may be recognised, the collection exhibits so many intermediate grades that at present I feel inclined to regard the condition as of varietal rather than specific import. Should this view be ultimately maintained, the species will be known as *Typhlops australis*, Gray.

EXPLANATION OF PLATE III.

Fig.

1. Typhlops pinguis, *sp nov.* Nat. size.
2. Typhlops pinguis, head from above. Twice nat. size.
3. Typhlops pinguis, head from below. Twice nat. size.
4. Typhlops pinguis, head in profile. Twice nat. size.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species.

By the Rev. T. Blackburn, B.A.

[Read April 16th, 1897.]

Part XXI.

PECTINICORNES.

CERATOGNATHUS.

C. Frenchi, sp. nov. Mas. Minus elongatus, sat latus, sat parallelus; inæqualis; inæqualiter sat fortiter punctulatus; niger, squamis crassis albidis sparsim instructus, antennis picescentibus; capite medio tuberculo magno bifido et utrinque supra oculos cornu brevi sat acuto armato, oculis transversis minus convexis; mandibulis quam caput paullo longioribus, curvatis, ad apicem sursum compresso-dilatatis, margine apicali processu dentiformi sat elongato armatis; mento ut lamina erecta transversa posito, hoc sparsim grosse punctulato setoso (in medio haud canaliculato); prothorace transversim quadrato, antice haud angustato; elytris 3 vel 4 plus minusve distincte costatis; antennarum flabellis quam articuli ceteri conjuncti haud brevioribus. Long. (mands. excl.), 6 l.; lat., $2\frac{4}{5}$ l.

The form of the mentum (resembling the erect part of that organ in *Cryptodus caviceps*, Westw.) and the shape of the eyes are suggestive of close affinity between this insect and *C. mentifer*, Westw. I have not seen the latter but judging from the description of it the present species differs *inter alia* by the absence of a median tooth on the inner margin of the mandibles, by the strong erect process on the clypeus above each eye and by the form of the mentum which is neither sulcate down the middle nor emarginate at the apex.

Victorian Mountains; taken by Mr. Giles.

LAMELLICORNES *(Dynastides)*.

ISODON.

I. novitius, sp. nov. Mas. Brevis, subovatus; nitidus; brunneo-rufus, hic illic incerte infuscatus; clypeo antice modice (ut *I. pecuarii*) producto bidentato, ad latera nec acute nec extrorsum ultra oculos producto, crebrius rugulose (ut

reliquum capitis, basi summa excepta) punctulato, carina clypeali minus elevata recta haud tuberculata, lateribus sat fortiter sinuatis ; prothorace quam longiori paullo plus quam sesquilatiori, sparsim obsolete punctulato, antice vix impresso, basi marginata quam apex (hoc in medio tuberculato) fere duplo latiori, angulis anticis parum prominulis posticis rotundatis ; scutello lævi vel fere lævi ; elytris (stria subsuturali excepta) fere lævibus, striis punctulatis postice abbreviatis 2 vel 3 vix manifestis impressis ; propygidio stridulationis organis instructo (his rugis numerosis minus elevatis compositis) ; pygidio sat crebre punctulato, partibus mediana et postica fere lævibus ; tibiis anticis extus sat fortiter tridentatis ; tarsorum unguiculis simplicibus.

Fem. latet. Long., 5–6 l. ; lat., 3–3½ l.

A very distinct species that should stand in my tabulation (Tr. R.S. S.A., 1896, p. 237) beside *pecuarius* from which however it differs by many characters—*inter alia* the very fine and very sparse puncturation of its prothorax the elytra almost devoid of sculpture outside the subsutural stria, and the clypeus (as in *Australasiæ*, *terræ-reginæ*, and the species I take to be *curtus*, Burm., and *laticollis*, Burm.) not produced laterally in an angular projection protruding beyond the contour of the eyes.

W.A. ; Geraldton ; sent by Mr. Lea.

ASEMANTUS.

A. Leai, sp. nov. Minus latus, vix subovatus ; nitidus ; piceus (nonnullis exemplis plus minusve rufescentibus), subtus et in pedibus fulvo-hirtus ; sat convexus ; capite transversim sat crebre rugato, vix tuberculato, clypeo antice parum reflexo, carina inter frontem et clypeum modice distincta ; prothorace quam longiori paullo minus quam sesquilatiori, postice quam antice ut 1⅔ (vix) ad 1 latiori, antice excavatione parva leviter impressa (hac intus sat fortiter punctulata) et postice canaliculata (canali ut excavatio antica punctulato), subtilissime (antice crebrius postice sparsim) punctulato, lateribus minus rotundatis, angulis anticis acutis minus productis posticis obtusis ; scutello fere lævi ; elytris minus subtiliter sed sat leviter punctulatis, puncturis ut series 8 geminatim dispositis, interstitiis vix vel leviter convexis inter serierum paria ut series (sed confuse sparsim) punctulatis, parte apicali confuse crebre punctulata ; tarsis sat gracilibus minus brevibus ; pygidio plus minusve crebre (parte mediano-apicali quam ceteræ minus crebre punctulata vel lævi) punctulato.

Maris pygidio quam feminæ multo magis gibbo, tarsis posterioribus magis elongatis, unguiculis anticis inæqualibus.

Feminæ pygidio minus gibbo, tarsis posterioribus minus elongatis, unguiculis simplicibus. Long., 8–8½ l.; lat., 4½ l.

This species seems too close to *A. subæqualis* to be justifiably made into a new genus; nevertheless it differs in several not unimportant structural characters, notably in its longer and more slender tarsi (there being also a greater difference in length between the hind tarsi of the sexes, the basal joint of the hind tarsi being moreover but little dilated externally and not much more in the female than in the male). This is a perplexing character which makes *Asemantus* very difficult to place among the *Dynastid* genera, since in M. Lacordaire's arrangement the male of *A. subæqualis* would be a *Pentodontid* and the female a *Pimelopid* and both sexes of the present species have *Pentodontid* structure of the hind tarsi. Other characters in which this species differs slightly from the generic characters I attributed to *Asemantus* are as follows:—The carina separating the clypeus from the hinder part of the head is a little better defined than the expression "clypeus a fronte vix distinctus" implies, and the anterior excavation on the prothorax cannot be called "large."

Among the examples before me are two much smaller than the rest (long. 6 l.) which however do not seem to differ otherwise from the larger specimens.

W. Australia; Perth, Mount Barker, &c.; sent by Mr. Lea.

BUPRESTIDÆ.

STIGMODERA.

S. insularis, sp. nov. Sat lata; minus convexa; æneo-nigra, capite prothoraceque cyaneo- et viridi-nonnihil micantibus, scutello cyaneo, elytris testaceo-rufis (margines versus paullo magis læte rufis) sutura fasciis 2 (paullo ante et paullo pone medium positis) maculaque subquadrata apicali cyaneis, antennis pedibusque violaceis aureo-viridi-plus minusve micantibus; corpore subtus pilis erectis argenteo-cinereis vestito; capite longitudinaliter sat late excavato, antice sat fortiter minus crebre postice sat crebre minus fortiter punctulato; prothorace quam longiori (et postice quam antice) fere ut 1¾ ad 1 latiori, sat fortiter minus crebre (antice magis crebre magis subtiliter, ad latera crebre magis grosse) punctulato, in medio longitudinaliter late leviter impresso, latera versus depresso, lateribus sat arcuatis, latitudine majori pone medium posita, basi leviter sinuata; scutello sat lævi; elytris ad apicem leviter acuminatis (haud spinosis), punctulato-striatis, interstitiis convexis sparsim punctulatis; corpore subtus minus crebre minus fortiter (metasterno crebre fortius) punctulato. Long., 10 l.; lat., 4⅕ l.

The markings on the elytra consist of a very narrow basal border, a fascia in front of the middle resembling that of *S. simulata*, L. and G. (as figured Tr. Ent. Soc., Lond., 1868, t. 2, fig. 15), a fascia behind the middle resembling that of *S. præcellens*, Kerremans (widest on the suture and sinuously narrowed to the margin), a spot at the apex resembling that of *S. undulata*, L. and G. (as figured Tr. Ent. Soc., Lond., 1868, t. 2, fig. 20), and narrow dark coloring along the suture. In general form this species is very much like *S. cruenta*, L. and G., but is a little more depressed and wider with the sides of the prothorax very decidedly flattened out.

Tasmania; in the collection of C. French, Esq.

S. campestris, sp. nov. Minus lata; modice convexa; antennis capite prothoraceque æneis viridescentibus, scutello viridi, elytris brunneo-testaceis (basi summa, sutura, fascia postmediana, et apice nigro-violaceis), corpore subtus pedibusque cyaneis; capite antice sat producto, longitudinaliter sat profunde canaliculato, fortiter sat crebre punctulato, clypeo antice triangulariter exciso; prothorace quam longiori (et postice quam antice) ut $1\frac{3}{5}$ ad 1 latiori, fere ut caput punctulato, lateribus modice arcuatis, latitudine majori fere ad basin posita, basi sat fortiter bisinuata; scutello sparsim punctulato; elytris ad apicem late arcuatim emarginatis bispinosis, punctulato-striatis, interstitiis antice parum evidenter (postice gradatim fortius, apicem versus valde fortiter) convexis sat crebre minus fortiter punctulatis; corpore subtus subfortiter sat crebre (sternorum parte intercoxali sparsim sat subtiliter) punctulato. Long., $4\frac{4}{5}$ l.; lat., $1\frac{4}{5}$ l.

A species bearing much general resemblance to *S. distincta*, Saund. (as figured in Journ. Linn. Soc., 1868, t. 10, fig. 30), but differing in the suture being widely of blackish violet color. Differs from the description also in the prothorax being much less than twice as wide as long and its base much less than twice as wide as its apical margin, and in the sutural apex of the elytra being distinctly spiniform.

Queensland; sent by Mr. French.

S. Caroli, Blackb. Having seen reeently some more examples of *S. capucina*, Blackb., and discovered it to be a very variable species I have come to the conclusion that *S. Caroli* is probably an extreme variety of it. Unfortunately the description of *capucina* was founded on a then unique example in Mr. French's collection so that I had not a specimen before me when I described *Caroli*.

S. pulchripes, sp. nov. Modice lata; minus convexa; capite prothoraceque nigro-viridibus, elytris brunneo-testaceis,

horum basi summa sutura (late) fascia lata mox pone medium posita et parte apicali (late) nigro-viridibus vel subcyaneis, corpore subtus antennisque nigro-viridibus parce breviter argenteo-pubescentibus, pedibus læte violaceis ; capite longitudinaliter profunde excavato, vix crebre minus fortiter punctulato ; prothorace quam longiori ut $1\frac{2}{5}$ ad 1 latiori, sparsim (ad basin lateraque sat fortiter, in aliis partibus subtiliter) punctulato, ad latera in parte postica depresso, lateribus minus arcuatis, latitudine majori fere ad basin posita, basi minus fortiter sinuata ; scutello lævi ; elytris ad apicem tri-spinosis, punctulato-striatis, interstitiis (præsertim postice) sat fortiter carinatis fere lævibus ; corpore subtus minus fortiter vix crebre punctulato. Long., 5–6 l. ; lat., $1\frac{9}{10}$-$2\frac{1}{2}$ l.

Not unlike *S. campestris* in colors and markings, but with the post-median fascia of the elytra considerably wider ; very different from it however in other respects. Its nearest ally is I think *S. bicincta*, Boisd., from which it differs *inter alia (a)* in markings, the suture being widely of dark color along its whole length and the basal dark coloring on the elytra consisting of a mere narrow edging ; *(b)* in the prothorax (which is otherwise very like that of *S. bicincta*) being only very sparsely punctulate ; *(c)* in the front of the elytra being very much less strongly arched forward. The structure of the apex of the elytra is as in *S. bicincta*—each apex trispinose, the two spines near the suture placed close together, the sutural spine the shortest of the three.

Victoria ; sent by Mr. French.

S. undulata, Don. Mr. French's collection contains a remarkable variety of this insect in which the dark markings of the elytra are extended to cover the whole surface,—so that the elytra are of a uniform greenish-black color.

ELATERIDÆ.

MEGAPENTHES.

M. futilis, Cand. I have received under this name from Mr. Lea (who tells me that he obtained the name from Dr. Candèze) examples of the insect that I named *Elater wentworthensis*. It was to similar specimens, no doubt, that Dr. Candèze referred in the note appended to his original description of *M. futilis* (from N. Australia) when he said "I have had for some time several individuals from N.S. Wales lying unpublished (restès inédits) under the name of *futilis* and closely allied to it (ayant de grands rapports avec celui-ci)" and then mentioned its coloring, and said that it was also closely allied to *M. lituratus*. I am still of opinion that it is a good species. There are several specimens from tropical Australia in my collection which I regard

as *futilis* without doubt, and comparing *E. wentworthensis* with these I find that besides the strongly marked color distinctions the latter presents several slight differences; notably a somewhat finer and closer prothoracic puncturation and an evidently more marked sinuation of the hinder part of the lateral margins of that segment causing the hind angles to appear manifestly divaricate. It is also a consideration of some weight with one who has had experience in the collection of specimens in Australia that the probabilities are distinctly against the occurrence near Sydney (where I have taken *wentworthensis)* of species that are found in tropical Queensland. As regards the generic position of *wentworthensis* I accept Dr. Candèze's verdict. *Megapenthes* and *Elater* are (as indeed that learned author remarks in his "Mon. des *Elaterides*") very close, differing however in the prosternal sutures which are impressed in the latter genus and not in the former. In *wentworthensis* the sutures certainly appear less absolutely simple than in an average *Megapenthes*, but I think on re-examination they are not sufficiently concave to justify a place in *Elater;* in any case Dr. Candèze's authority may well determine the matter.

DASCYLLIDÆ.

MACROHELODES.

M. tasmanicus, sp. nov. Fem. Late ovalis; nitidus; supra glaber; subtus sat dense breviter sericeo-pubescens; supra flavo-brunneus (elytrorum partibus impressis quam ceteræ minus flavis), capite prothoraceque indeterminate piceo-notatis, elytris piceo-trimaculatis (maculis versus marginem lateralem prope basin prope mediam partem et pone medium positis), antennis palpisque versus apicem infuscatis; subtus (coxis exceptis) paullo infuscatus; capite (hoc inter oculos biimpresso) confertim sat subtiliter, prothorace sparsim leviter nec subtiliter, elytris crebre grosse, punctulatis; elytrorum sutura tota late leviter convexa sublævi; antennarum gracilium articulis 2° 3° que conjunctis quam 4^{us} sat brevioribus. Long., 4$\frac{1}{5}$ l.; lat., 3 l.

This species is much like *M. crassus*, Blackb., but can be at once distinguished from it by its more slender and differently formed antennæ. In *M. crassus* the joints beyond the third of the antennæ are evidently compressed and each evidently increases in width from its base to its apex (the width of the fifth joint at its apex being a trifle more than half its length). In the present species the joints of the antennæ are scarcely compressed at all, but very nearly cylindrical (the width of the fifth joint at its apex being not more than a third of its length). I may say that this character is specific not sexual inasmuch as I possess

both sexes of *M. crassus* and find that they present no notable difference except in the last ventral segment, which is feebly emarginate in the male and pointed (very obtusely) in the female. The present species also differs from *crassus* (apart from color) by its larger size and the evidently stronger puncturation of its prothorax.

Tasmania.

MALACODERMI.

LUCIOLA.

L. Cowleyi, sp. nov. Oblonga; supra nigra vel nigro-picea, prothorace (late) et elytris (magis anguste) ad latera testaceo-limbatis, scutello testaceo; corpore subtus (capite excepto) pedibus antennis (his paullo infuscatis) palpisque testaceis; segmento ventrali penultimo albo; capite concavo crebre punctulato; prothorace transversim quadrato, crebre punctulato, in medio longitudinaliter sulcato, antice in medio prominulo, lateribus sat late deplanatis, angulis anticis obtusis posticis rectis; elytris crebre aspere punctulatis, sutura et costis nonnullis elevatis. Long., $2\frac{1}{5}$—$2\frac{2}{5}$ l.; lat., 1 l.

Differs from *L. flavicollis*, Macl., by its smaller size, prothorax less narrowed behind and having the explanate sides wider, &c., from *L. coarcticollis*, Oliv., by smaller size, prothorax with sides much more explanate, lateral margins nearly straight, &c., from *australis*, Fab., by the blackish color of its prothorax (except the margins) and from *L. Gestroi*, Oliv., by the nearly straight sides of its prothorax, &c.

N. Queensland; sent by Mr. E. Cowley.

TENEBRIONIDÆ.

AXYNAON (gen. nov. *Meracanthidarum*).

Caput planum verticale, in coxas anticas reclive; clypeus utrinque supra antennarum basin sat gibbus; palporum articulus ultimus securiformis; labrum modicum; antennæ corporis dimidio longitudine sat æquales; prothorax sat parvus, fortiter convexus, sat gibbus, ad latera haud marginatus; scutellum transversum; elytra foveolato-striata; pedes sat graciles sat elongati, femoribus inermibus, tibiis ad apicem mucronibus binis armatis; metasternum brevissimum.

*No Australian species of *Meracanthides* has been described

*I have submitted an example of this insect to Mr. G. C. Champion, the eminent specialist on the *Heteromera*, and he, with his accustomed courtesy, has favored me with his opinion. He says "the insect is either an aberrant *Meracanthid* or should form the type of a new group. Your supposition regarding its affinities is quite correct. It differs from the *Meracanthides* in precisely the same way that the *Megacanthides* differ from the *Amarygmides*, viz., in the unarmed anterior femora. In some respects, as regards the scutellum, &c., it is more like *Psorodes* than *Meracantha*."

hitherto. The present insect is certainly I think referable to the tribe, though it cannot be placed in any known genus. I have not an example in my collection of either of the two genera (the African *Psorodes* and the N. American *Meracantha*) on which M. Lacordaire founded the tribe, and so cannot very confidently remark on the affinities of the genus I am characterising, but I judge it to be not very near either of the two, as it evidently differs from them by its femora without teeth and its prothorax without lateral carinæ. In general appearance it resembles a *Chalcopterus* but is at once distinguishable from that genus by its very short metasternum.

A. Championi, sp. nov. Æneus (exemplis nonnullis viridi- vel cupreo-micantibus); capite inter oculos crebre aspere punctulato; prothorace subtiliter minus perspicue punctulato, transverso, antice supra caput (a latere viso) fortiter declivi, lateribus haud marginatis; scutello lævi brevi; elytris grosse seriatim foveolatis, interstitiis angustis convexis. Long., 8 l.; lat., 4 l.

N. Queensland; sent by Mr. French.

CURCULIONIDÆ.

CAR (gen. nov.; ? *Erirhininarum*).

Corpus pubescens; rostrum prothorace sat longius, minus robustum, subcylindricum, leviter arcuatum; scrobes breves subbasales inferæ; antennæ fere rectæ (vix geniculatæ), ad basin fere contiguæ, scapo brevi, clava a funiculo vix distincta (hujus quam funiculi articulis inter se haud magis arcte conjunctis); oculi valde leviter sed minus subtiliter granulati; prothorax, subcylindricus sed antice angustatus, quam elytra sat angustior, lobis ocularibus nullis; scutellum modicum; elytra sat lata; prosternum ante coxas minus elongatum; coxæ anticæ contiguæ, intermediæ modice approximatæ; femora mutica; tibiæ validæ, apice apertæ inermes; tarsi modici, articulo 3° alte bilobo; unguiculi divaricati intus sinuati; pygidium elytris tectum; segmentum ventrale 2^{um} quam 1^{um} multo brevius, quam 3^{um} parum longius; segmenta intermedia ad latera vix angulata; metasternum modicum.

The small *Curculionid* for which I propose this new generic name is a most perplexing species and difficult to place in any of M. Lacordaire's "Tribes." There is no doubt of its appertaining to the aggregate which M. Lacordaire calls "Section B of Phalanx I. of the Curculionides Phanerognathes Synmerides." On first consideration it seems to appertain to that portion of the said "Section" in which the antennæ are straight and have no

distinct club and to be referable to the *Belides;* but as it has no other resemblance to those genera, being in general appearance as unlike a *Belid* as it can well be, it does not seem at all satisfactory to give it such a place. The idea of its being a *Belid* once laid aside, the general resemblance to *Erirhininæ* must certainly strike the attention, and subsequent consideration cannot fail I think to indicate those latter as really being the tribe of which the present insect is an aberrant member. Regarding it as such I do not find any aberration except in the antennæ which undoubtedly are very unlike those of a typical *Erirhinid;* nevertheless even these when carefully observed are found to differ in degree rather than fundamentally,—for the basal joint (though not longer than the following two joints together) is evidently a "scape," and the joints following it do not uninterruptedly (as they do in *Belus)* continue the direction of the basal joint but are feebly geniculate with it. Perhaps however the greatest divergence from the *Erirhinid* type is in the antennæ not having a defined club but terminating quite like those of a *Belus;* yet even this character is distantly approximated in *Eniopea.* The *position* of the antennæ (inserted on the underside of the base of the rostrum and separated only by a narrow canthus) does not appear to be more inconsistent with the *Erirhininæ* than with any other Tribe that I can suggest for this species to be placed in;—so that on the whole I feel fairly confident that I am placing it rightly. Its claws scarcely differ from those of an *Emplesis.* The prothorax and elytra in outline much resemble those of *Rhynchites betuleti,* F., except in the prothorax being more conico-cylindric. The basal two segments of the abdomen separated by a well-defined suture and the presence of a good-sized scutellum and the absence of an antennal club separate the present species from *Apion* and its allies as characterised by Lacordaire.

C. condensatus, sp. nov. Fem. (?). Tota rufo-brunnea, pilis brevibus dilutioribus inæqualiter vestitus, his in elytro utroque ut lunula magna indeterminata condensatis (cujus apices in margine laterali positi sunt); rostro gracili, cylindrico, leviter arcuato, quam prothorax sat longiori, subtiliter sparsim punctulato; antennarum scapo articulis sequentibus 2 conjunctis longitudine sat æquali, funiculi articulis 1° quam 2^{us} et 2° quam 3^{us} paullo brevioribus, 3°—5° inter se sat æqualibus, 6° 7° que paullo brevioribus; prothorace vix transverso, crebre fortiter sat rugulose punctulato; elytris punctulato-striatis, interstitiis leviter convexis crebre subrugulose punctulatis. Long. (rostr. excl.), $2\frac{1}{2}$ l.; lat, $1\frac{2}{5}$ l.

Australia; exact habitat uncertain, but I believe it to be in Eyre's Peninsula.

ELLESCHODES (gen. nov. *Tychiidarum*).

Corpus pubescens; rostrum prothorace vix longius, sat robustum, subdepressum; scrobes antemedianæ subrostrum directæ, oculos attingentes; funiculus 7-articulatus; oculi subfortiter granulati; prothorax transversus, quam elytra haud multo angustior, lobis ocularibus fere nullis; scutellum sat parvum; elytra brevia, lata; prosternum ante coxas minus breve; coxæ intermediæ minus approximatæ; femora dente parvo armata; tibiæ sat validæ, anterioribus breviter mucronatis; tarsi sat breves, articulo 3° alte bilobo; unguiculi divaricati, appendiculati; pygidium elytris tectum; segmentum ventrale 2^{um} quam 1^{um} paullo brevius, quam 3^{um} 4^{um} que conjuncta sublongius; segmenta intermedia ad latera fortiter angulata, 2° 3^{um} haud amplectenti.

In M. Lacordaire's classification this genus falls into the Group *Elleschides* and is very near *Elleschus* from which *inter alia* its strongly divaricate claws distinguish it. Its dentate femora *inter alia* distinguish it from *Orichora* and *Ochrophœbe*.

E. Hamiltoni, sp. nov. Ferrugineus vel piceo-ferrugineus, rostro pedibus sternisque nigricantibus; rostro supra longitudinaliter striolato; antennis minus elongatis, scapo oculum attingenti, funiculi articulo 1° modice elongato ceteris brevibus, clava manifeste articulata; capite prothoraceque crebre vix fortiter punctulatis; hoc sat transverso, antice subito angustato, in medio longitudinaliter plus minusve perspicue subcarinato; elytris vix striatis, seriatim subgrosse (interstitiis planis crebre subtiliter) punctulatis; corpore breviter pubescenti. Long. (rostr. exc.), $1\frac{1}{2}$ l.; lat., $\frac{4}{5}$ l.

Perhaps congeneric with *Elleschus orbitalis*, Schönnh., which its author places in *Elleschus* with some hesitation, but differing from the description of that species *inter alia* by the absence of white pilosity on the orbits of the eyes and on the sterna.

N.S. Wales; taken near Mount Kembla by A. G. Hamilton, Esq., who is publishing (in Linn. Soc. N.S.W.) a paper on the economic value of this species.

LONGICORNES.

NENENIA.

The following two species may I think be confidently referred to *Nenenia* with which they seem to agree in all generic characters.

N. thoracica, sp. nov. Sat elongata; sat parallela; nigra, capite subtus genis et prothorace rufo-testaceis, elytris chalybeis notula subapicali transversa testacea (hac in margine laterali

quam in sutura multo latiori) ornatis, antennis apicem versus subferrugineis; pedibus piceis. Long., $5\frac{1}{2}$ l.; lat., $1\frac{1}{2}$ l.

The structure of the head mouth organs and antennæ does not differ from the same in *N. aurulenta*, Pasc.; the elytra are more parallel more distinctly punctured and scarcely distinctly pubescent; the tarsi are distinctly (though not very much) more slender. I do not observe any other notable structural difference from *N. aurulenta*, Pasc., but the difference in coloring prevents any possibility of confusing the two species. The subapical fascia of the elytra commences on the lateral margin about half-way between the middle and the apex and continues there more than half-way to the apex; its front margin runs obliquely hindward to a point a little behind the middle of its lateral margin; its hind margin is on the suture about level with its lateral hind margin but its hind margin is deeply roundly emarginate so that the chalybeate apex has the appearance of a round spot.

Victoria; sent by Mr. Sloane; also by Mr. French.

N. virgata, sp. nov. Elongata; parallela; pallida (subtus obscura flavo-pubescens); capite, prothoraceque maculatim, elytris longitudinaliter adque apicem antennis, et femorum tibiarum tarsorumque parte apicali, nigro-vel piceo-notatis. Long., 5 l.; lat., $1\frac{1}{5}$ l.

Evidently a variable species in the distinctness of its markings, as the two specimens I have seen differ considerably in this respect. Regarding pale yellow as the ground color of the upper surface the dark markings are as follows:—a large space between the eyes, a spot on the vertex, the middle of the front of the prothorax and two large discal spots on the same, the scutellum (which however is clothed with pale pubescence), and on the elytra the suture (widely but not quite to the apex) a narrow interrupted marginal vitta and an apical spot. In one of the examples before me the sutural vitta is subobsolete and the marginal vitta quite faint, while the space between the apical spot and the elytral vittæ is more brightly yellow than the rest of the surface so that it seems to bear a rather conspicuous fascia. This species is evidently more narrow and parallel than the preceding; the fine cariniform lines on the elytra are less marked than in it or *N. aurulenta*.

N. Queensland; sent by Mr. French.

RHYTIPHORA.

R. Spenceri, sp. nov. Piceo-nigra, pilis niveis variegata; his frontem totam genasque dense æqualiter vestientibus, in vertice (hoc longitudinaliter impresso) tri-radiatim co nden satis, in prothorace lineas transversas plus minusve inter

ruptas 4 vel 5 formantibus, in elytris ut lineæ varie contortæ maculæque condensatis, corpus subtus pedesque dense sat æqualiter (nihilo minus hic illic, præsertim in metasterno et abdominis lateribus interrupte) et antennarum articulos 2^{um}—8^{um} ad basin vestientibus; oculis permagnis; capite prothoraceque irregulariter sat sparsim vix profunde punctulato; hoc transversim subquadrato, transversim plicato; elytris fere ut prothorax punctulatis, granulis nonnullis basin versus instructis, ad apicem rotundatim vix truncatis. Long. 14–16 l.; lat., 5–5½ l.

Closely allied to *R. (Penthea) Saundersi*, Pasc., but differing from it by its very much larger eyes, the space between which is densely clothed with even white pubescence, the spots and patches of pubescence on its elytra considerably larger though of similar form and arrangement, and its narrower and more elongate form. The antennæ of the male are a trifle longer (of the female a trifle shorter) than the body. I take the essential distinction of *Rhytiphora* from *Penthea* to lie in the less fine granulation of the eyes; tested by that character this species and *Saundersi*, Pasc., appertain to *Rhytiphora*.

Central Australia; taken by Professor Spencer; sent to me by Mr. French.

Critical Remarks on Some Australian Mollusca.

By Professor Ralph Tate.

[Read May 4, 1897.]

I availed myself of the opportunity during my recent visit to Europe to compare actual South Australian specimens taken with me with the types of certain Australian species preserved in National Museums of Paris and London.

The Musée de l'Histoire Naturelle at Paris contains some of the Lamarckian types collected by the Baudin-expedition on the southern coasts of Australia, and some of those described and figured by Quoy and Gaimard in the "Zoologie de l'Astrolabe," collected at King George Sound, Western Port, and Hobart. The British Museum, London, contains the celebrated Cumingian collections, many of the Australian species of which are figured in Reeve's Icon. Conchol.; and types or co-types of species collected by Angas, and described by himself, or in conjunction with A. Adams, and by Crosse.

I need not rehearse the many disappointments which I experienced. But what authentic informations I have been able to glean are set forth in the following pages. Doubtless many of the synonymns herein indicated have already been established, but the independent opinion of an Australian conchologist on Australian shells may be worthy of record, even if it be only in conformation of prior determinations. Exchanges of opinions between Australian collectors and Mr. E. A. Smith, of the British Museum, and other conchologists having access thereto, cover a period at least of 20 years, and we have profited thereby, chiefly as regards the larger forms; but the National collection inadequately illustrates the molluscan fauna of Australia.

PART I.—GASTEROPODA.

Triton exaratus, T. Quoyi, T. verrucosus, and T. eburneus, all of Reeve !, are correctly identified.

Fusus ustulatus, Reeve !, is correctly identified.

Cominella filicea, Crosse !. I have of this species specimens now identified with the type from Newcastle, N.S.W., and N.E. coast of Queensland. So far as I know, the species has not been taken here by local collectors, and I suspect that Angas's record of a single find is an importation, the locality of the type being

Port Jackson, to which on the label has been added "S. Australia."

Cominella Adelaidensis, Crosse !, is not separable specifically from C. ALVEOLATA. It may, however, be regarded as a local race.

COLUMBELLA SEMICONVEXA, Lamarck !, is correctly identified. *C. Yorkensis*, Crosse !, is a unicolorous variety, and *C. infumata*, Crosse !, is a mere micromorph.

ANCILLARIA MARGINATA, Lamarck !, is rightly named.

Cancellaria lævigata, Sowerby !, v. *C. purpuræformis*, Valenc. The type-specimens of the former are somewhat rolled, but one large one is without costation. The British Musuem examples of the latter are smaller, spirally lineated, and the spire-whorls not costate. The absence or presence of costation on the posterior whorls is thus not constant, and the absence of spiral striation in *C. lævigata* may be due to obliteration by erosion. I regard the two as conspecific, and would employ the name C. PURPURÆFORMIS as the anterior of the two.

NATICA UMBILICATA, Quoy and Gaimard !, and *Nactina picta*, Reeve !, are conspecific, as already suspected. The shell may be located in the subgenus *Stigmaulax*, Mörch, 1852, of *Natica*; whilst *Naticina nitida*, Reeve, another South Australian shell, becomes a *Eunaticina*, Fischer, 1885—*Naticina*, Gray, 1842 (non Guilding, 1834).

THYLACODES SULCATUS, Lamarck.

The South Australian vermitiform shell, thus named, agrees with the type of *Serpula sulcata*, Lamk., and *S. sipho* of that author is the same; *Vermetus arenarius*, Q. and G. ! (non. Lk.) is another synonym.

Tryon (Man. Conch., VIII., p. 179, t. 53, f. 64, 1886) rejects the Lamarckian name in favour of *V. novæ Hollandiæ*, Rousseau, because "one of the three types of that species [*S. sulcata*] is a fossil and different, the other two appear to be *V. sipho*." From a personal inspection, I assert with confidence that the above statement is not true; *S. sulcata* and *S. sipho* are separately labelled, though I regard them as one species; it is true Lamarck adds a note under *S. sulcata*, "se trouve fossile dans la Touraine," but the fossil is not among the recent types. I regret not being able to consult Vaillant's paper.

The animal of our common tubiculate gasteropod exhibits the same characters as described by Quoy and Gaimard for their *V. arenarius*. But I may add that the oval egg-cases to the number of 50 or 60 are attached by glutinous threads to inner shell-wall; about 20 matured embryos are contained in each capsule.

TURRITELLA OXYACRIS, Tate, *nom. mut.*

T. acuta, Tenison-Woods, 1876 (non Mayer, 1868).

Eulima agur, Angas ! is correctly named.

Diastoma melanoides [Reeve], Tate, Jour. Roy. Soc. N.S.W., vol. XXVII., p. 176, 1893.

Mesalia melanoides, Reeve, Icon. Conch., 1849.

Ataxocerithium serotinum (A. Ads.), Tate, J. Roy. Soc., N.S.W., vol. XXVII., p. 179, 1893. This species I have made the type of a new genus.

Batillaria Cerithium, Q. and G.

Turritella Cerithium, Quoy and Gaimard !, Voy. Astrolabe, p. 131, t. 55, f. 27-28.

Cerithium turritella, Menke, Moll. Nov. Holl., p. 19 (non Q. and G.).

Bittium turritella, Angas, P.Z.S., 1865, p. 171 ; *id.* Ten.-Woods, P. Roy. Soc. Tasm., 1878, p. 35.

Cerithidea turritella, Tryon, Man. Conch.

Quoy and Gaimard's types which I have studied were obtained at Port Western, Victoria ; the species is very common in Tasmania and South Australia ; it inhabits the mud-flats in the region of about half-tide. Its operculum is circular and many whorled.

This shell has been misquoted by Menke and subsequent authors, which is traceable to a confusion of Quoy and Gaimard's own creation ; thus they describe and figure a shell from Port Dorey in Papua as *Cerithium turritella* (t. 55, f. 8), whilst the Victorian shell is called *Turritella cerithium*. The Southern shell is the latter, and it extends to West Australia, if my quotation of Menke is right, who, however, mentions only the name, but adds a reference to Kiener, Icon. p. 64, t. 22, f. 1, which I cannot consult.

The generic name *Batillaria*, Benson, 1842, replaces *Lampania*, proposed four years after by Gray.

Triforis Angasi, Crosse !, is rightly identified.

Diala monile, A. Adams !, is rightly identified, though the types are immature ; *T. tessellata*, Ten.-Woods !, better exemplifies the species than the commoner form in South Australian waters.

Diala lauta, Adams !, is rightly identified.

Littorina Mauritiana, Lamarck. The smaller and rotund variety, which lives at the high-water-mark is *L. Diemensis*, Quoy and Gaimard !.

Paludinella Gilesii, Angas !, P.Z.S., 1877, t. 26, f. 2, 171, was redescribed by me, Trans. Roy. Soc. S. Aust., vol. XVI., p. 196, under the name of *Blandfordia Stirlingi*, an excusable oversight on account of the faulty figure, which better represents *Bithynia australis*. The present species may be quoted as Blandfordia Gilesii.

Melania Balonnensis, Conrad. In the Zoology of the Horn

Expedition I have degraded the two following Melaniæ, *M. Tatei*, Brazier, and *M. subsmilis*, E. A. Smith !, to varietal rank.

Cyclostrema cingulifera, A. Adams !, This Philippine shell is very much larger than *C. Tatei*, Angas, but otherwise they seem identical, in which case *C. lævis*, Phil., will fall in as another synonym.

Cyclostrema micans, A. Adams !, and *Liotia Angasi*, Crosse !, are the same by comparison of types. Adams located his species in the right genus, and his name takes priority.

Phasianella variegata, Lamark !, and *P. Angasi*, Crosse !, are conspecific ; Crosse's type is a somewhat overgrown individual, but otherwise not different from the Lamarckian type.

Clanculus Yatesi, Crosse !, October, 1863 = *C. Menkei*, Ads. and Angas, in British Museum.

Monodonta lineata, Lamk. ! = Trochus badius, Wood.

This admission is on the back of the tablet carrying Lamarck's types, to which is added *M. rosea*, Lamk. ! *M. Peroni*, Lamarck, only differs by having white flames.

These and other congeneric species usually referred to *Elenchus* should be quoted under *Phasianotrochus*, Fischer.

Cantharidus decoratus, Adams and Angas !, P.Z.S., 1864, and *Trochus Tiberianus*, Crosse !, Jour. de Conch., Oct., 1863, are the same as already suspected, and referred as synonymic under *Gibbula smaltata*, Fischer, 1879. Crosse's name is the older, and the shell should be quoted as Gibbula Tiberiana. *G. aurea*, Ten.-Woods (1876) is another synonym.

Gena nigra, Q. and G., was not seen in the Paris Museum, but a shell identically that which is locally referred to that species is present, though unnamed.

Fissurella nigrita, Sowerby !; is rightly identified ; the types are larger than *F. Pritchardi*, Hedley, which I regard as synonymic.

Parmophorus convexus, Q. and G.!=*P. australis*, Lk.!=Scutus anatinus, Donovan.

Acmaea flammea, Q. and G.! (*Patelloidea*). This species has hitherto been known to local conchologists as *A. conoidea*, Q. and G., Angas in 1865 being the first in error. The types are worn smooth externally, and show a cruciform coloration in brown ; each flame is frequently broken-up into three or more streaks.

Acmaea conoidea, Q. and G.!, which is much smaller than *A. flammea*, has a circular aperture and fine radial threads. *A. calamus*, Crosse and Fischer, authentic specimens of which I have not seen, is probably the same.

Acmaea septiformis, Q. and G.!, is rightly identified.

Bullinella arachis, Q. and G.!, is rightly identified.

Haminea cymbalum, Q. and G. The type of this species I have

not seen, but specimens so named in the Museum of the École des Mines at Paris are different from those quoted under that name by Angas in 1865. Our shell is H. TENERA, A. Ads.

PART II.—LAMELLIBRANCHIATA.

The communication under this head will constitute a Fourth Supplementary List of the Lamellibranch Mollusca of South Australia. The first revision was published in Trans. Roy. Soc., S. Aust., vol. ix., pp. 76-111, 1887, and Supplemental Lists in vol. X., 1888, vol. XIV., 1891, and vol. XV., 1892.

TEREDO ADAX, Hedley, P. Lin. Soc., N.S.W., 1895. This species, though unnamed, was recorded by me Revision ix., p. 19, 1887.

Barnea similis [Gray], Tate, op. cit. ix, p. 80, non Gray=B. OBTURAMENTUM, Hedley, Records Austr. Mus., II., p. 55, t. 14, 1893.

SAXICAVA ARCTICA, Linnæus. *Saxicava veneriformis*, Lamk.!, and *Corbula australis*, Lamarck!, are the same, both types equally large.

GENUS CUSPIDARIA.

CUSPIDARIA TASMANICA, Tenison-Woods (Neaera), Proc. Roy. Soc., Tasmania, for 1875, p. 27 (1876).

Mr. E. A. Smith, in the Lamellibranchs of the Challenger Expedition, characterises 13 sections of the genus Neaera, denominated A to M. The dentition of the species here noticed was unknown to him, which desiderrated information I now furnish. It indicates a disposition of the hinge-teeth different from that of each one of Smith's sections, and a new section is required to receive it. The diagnosis is as follows:—

Section N.

Right valve with a lateral tooth on each side; left valve with a single tubercular denticle in front of the apex, no laterals. This arrangement approximates to that in Section F., but without the denticle in front of the apex of the right valve.

C. Tasmanica inhabits the south-east coats of Tasmania and St. Vincent-Gulf, South Australia.

CUSPIDARIA SIMULANS, Tate, 1897.

Oblong-oval, somewhat ventricose, white, thin, translucent, concentrically and distantly lirate; liræ usually rounded and elevated, becoming somewhat lamellose anteriorly, sometimes as close-set and slightly elevated lamellæ. Some examples show distant radial pellucid lines. The rostrum is elongated, about one-fifth of the total antero-posterior diameter, attenuated and truncate.

Right valve with a long lamelliform tooth on each side; left valve edentulous; cartilage-pit posteriorly inclined.

Antero-posterior diameter, 6·5; umbo-ventral diameter, 4; transverse diameter, 2·25.

Habitat.—St. Vincent Gulf, numerous examples dredged by Dr. Verco.

Affinities.—The dentition is that proper to *Rhinomya*, Adams, =Section G., Smith. Hitherto this section has been unrepresented in the Australian fauna, as the *R. rugata* recorded by Angas is not the species of Adams; it belongs to Section F, and has been described by Smith as *C. Brazieri*.

In form and sculpture it resembles *C. Brazieri*, except that the rostrum is shorter (perhaps not a constant character). This general resemblance renders it doubtful if the South Australian shell is distinct from *Rhinomya rugata*, Adams, inhabiting Japan, except that "oblonga," "concentrice confertim lirata," and "liris corrugates" do not well apply.

CUSPIDARIA TRIGONALIS, Tate, 1897.

Subtrigonous, produced posteriorly into a short triangular rostrum; ventricose, white, ornamented with concentric lamellæ; the lamellæ of the left valve are distant, thin, elevated, wider than the interstitial sulci; those of the right valve depressed and separated by linear sulci.

Right valve with a lamellar tooth on each side, left valve with a stout denticle in front of the hinge-notch; cartilage-pit deep and subtriangular in outline.

Antero-post. diameter 5·5, excl. rostrum 4·25; umbo-ventral diameter 4, transverse diameter 4.

Habitat.—Investigator Straits, dredged in 15 fathoms by Dr. J. Verco.

Remarks.—Of the four known examples, three are left valves and one is a right valve; they have the same shape, but as the ornamentation of the opposite valves is different it is possible that two species are represented; yet there is nothing incompatible to the opinion that the difference of ornamentation is one of degree, though it may be, we have here a species with the opposite valves dissimilarly ornamented.

The dentition of *C. trigonalis* is that of Section N., established for *C. Tasmanica*, from which species it differs by its conspicuous cardinal denticle, shape and ventricosity, and thus also from *C. simulans*. Indeed, it is remarkable among congeners by its subtrigonal outline and umbonal inflation.

CORBULA COMPRESSA, Verco, Tr. Roy. Soc., S. Aust., XX. p. 230, t. 8, f. 2, 1896.

Myodora corrugata, *Verco*, op. cit. p. 229, t. 8, f. 1, 1896 (non

Tate, 1887)=Myodora albida, Ten.-Woods. St. Vincent and Spencer Gulfs; also Tasmania.

Mactra rufescens, Lamarck. Correctly identified according to the British Museum record.

Hemimactra corrugata, Tate, is only a varietal form of *H. versicolor*, Tate.

Hemimactra ovalina, Lamarck. Correctly identified apud British Museum, where *Mactra depressa*, Reeve, non Spengler, is admitted a synonym.

Lutraria oblonga [Gmelin], Tate, op. cit., XIV., p. 266. If the South Australian shell should be considered separable from the European, bearing the above name, then *L. rhynchæna*, Reeve !, which is identically our shell, should be substituted. *L. dissimilis*, Deshayes, was not seen.

Mesodesma glabrella, Lamarck. The types of *Amphidesma glabrella*, Lk. !, *Mesodesma præcisa*, Deshayes !, and *M. obtusa*, Crosse !, have been compared, and found to be conspecific; the two latter had already been considered by me, op. cit. IX., p. 85, as the same.

Mesodesma elongata, Desh. This shell occurs in the Paris Museum as a Mactra with an undecipherable specific name. The types of *M. elongata* and *M. angusta*, Desh., which are in the British Museum, belong to one species.

Anapella cuneata, Lamarck sp. *Anapa cuneata* et *A. triquetra*. These two species of South Australian Anapas were admitted by me, op. cit., IX., p. 86, but after the study of the types of Lamarck and Hanley, I have come to the conclusion that only one species is represented, which finds support in the fact that the two variants are correlative with their habitats, the typical form on the sea-coast, and the Hanleyan form in estuaries. *Crassatella cycladea*, Lk., is another synonymn from my examination of the type. This species should be quoted under *Anapella*, Dall, 1895, in substitution for *Anapa*, Gray, 1853, non Gray, 1847.

Mulinia pinguis, C. and F., after a careful study of the description and figures of those authors, I cannot escape from the conviction that their shell is a monstrosity of *Anapella cuneata* forma *triquetra*. The generic location is made clear by the figure which displays the interior of the right valve.

Donax sordida, Angas ! (non Hanley)=D. Brazieri, Smith !, 1872.

Psammobia zonalis, Lamarck !, id. Tate, op cit., IX., p. 87, is rightly identified.

Chloristodon lapicidum, Chem. Of the two synonymic names *Naranio lapicida* and *N. divaricata*, both of Chemnitz, I follow the British Museum authorities in using the former.

CHORISTODON RUBIGINOSUM, Adams and Angas.

Clementia Tasmanica, Petterd !, is a synonym.

VENURUPIS CARDITOIDES and V. CRENATA, Lamarck, are rightly identified according to the British Museum naming.

TAPES FABAGELLA, Deshayes, of my collection agrees with the type in the British Museum.

CHIONE GALLINULA, Lamarck, as so named from South Australian waters, agrees with the type. VENUS AUSTRALIS, Sow., is perhaps not the same species, the type specimens have finer and closer concentric ribs than the type of *V. gallinula*, whilst in outline it is more triangular, the post-ventral margin rising more quickly.

The locality of Lamarck's type is King Island, that of Sowerby's King George Sound.

C. australis has not been found in South Australian waters.

CHIONE PERONI, Lamarck !, with which *C. aphrodinoides !* should be united. *C. conularis !* may be the young state. This species in my Revision, IX., p. 92, is quoted as *C. scalarina*. Reeve, in Mon. Venus, gives an excellent figure of it (t. 17, f. 73) under the name of *C. aphrodinoides*.

CHIONE STRIGOSA, Lamarck !. *C. aphrodina*, Lk., is obviously from descriptions and figures a synonym. In my Revision the species is quoted as *C. aphrodina*.

Chione sp. unnamed. The shell incorrectly referred in my Revision, IX., p. 92, No. 67, to *C. strigosa*, I failed to identify in either the Paris or British Museum. It may possibly be *C. scalarina*, Lamk., which I have not seen, or any examples attributed to it. It agrees very fairly well in outline with Reeve's figure of it, which represents a shell of medium size, particularly in the somewhat arched post-hinge line, but no description of *C. scalarina* alludes to the very distinctive ornamentation of our shell.

DOSINIA DIANA, Adams and Angas, id Tate, op. cit., IX., p. 93.

The type of this species and the shell I figured as *D. grata* are certainly the same, but they are different from *D. grata*. *D. diana* appears as if it were a worn *D. crocea* without the coloration on the escutcheon. *D. crocea* is slightly coarser ribbed, and more depressed than *D. diana*.

Dosinia crocea, Deshayes. This is a wrong identification, but it agrees with *D. histrio*, var. from Swan River, in the British Museum. It has the concentric ribs coarser and wider apart than in *D. grata*.

MERETRIX ALATUS, Reeve. This is in substitution for *Cytherea rutila*, Sow., and in harmony with the British Museum record. *M. rutilus* is a different species.

Meretrix multistriatus, as quoted from Tasmania, can only be

M. DIEMENENSIS; the true *M. multistriatus* is a very different shell; and Hutton's record of *M. disruptus* for the Wanganui-Pliocene relates to *M. multistriatus*. *M. disruptus* is sufficiently distinct from *M. Diemenensis* to take specific rank. The generic name *Cytherea*, Lamarck, is replaced by *Meretrix*.

CYPRICARDIA ROSTRATA, Lk. !, which is attributed to Kangaroo Island, is labelled in the Paris Museum with the locality of New Holland.

LUCINA LACTEOLA, Tate, *nom. mut.*

L. lactea, A. Adams, non Lamarck.

L. concentrica, Adams and Angas, 1863, non Lamarck.

The British Museum records show that *L. lactea* has precedence over *L. concentrica*, and that the two names refer to the one species, but as the employment of either names has previously been in use and continues so, it becomes necessary to affix a new specific denomination.

AXINUS FLEXUOSUS, Montague. A British species now known in New South Wales (Brazier), Tasmania (Petterd ! and May !), and South Australia, St. Vincent Gulf (Dr. Verco !).

LUCINA MINIMA, Ten.-Woods !, Proc. Roy. Soc. Tasmania for 1875, p. 162 (1876), antedates *L. Tatei*, Angas, by two years.

LUCINA CUMINGI, Adams and Angas. This Divaricella may not be *L. quadrisulcata*, D'Orbigny, and if the distinction is valid, then *L. Cumingi* comes to be employed for the Australasian shell.

CRASSATELLA MICRA, Verco, Trans. Roy. Soc. S. Aust., vol. XIX., pl. i., f. 3.

CRASSATELLA PRODUCTA, Verco, op. cit., pl. i, f. 2.

MYTILICARDIA CRASSICOSTATA, Lamarck ! (Cardita), is rightly identified by comparison with the type.

BARBATIA CARPENTERI.

The following are additional synonyms :—*Arca trapezia* and *A. fasciata*, Ten.-Woods in Hobart Museum.

Barbatia laminata, Angas !, is a mere synonym to B. SQUAMOSA, Lamarck !, as also *A. McCoyi*, Ten.-Woods.

AXINÆA RADIANS, Lamarck *(Pectunculus) !*. *Pectunculus obliquus*, Reeve !, is a synonym, and moreover the specific name is preoccupied by Defrance, 1826, and Lea, 1833.

AXINÆA STRIATULARIS, Lamarck *(Pectunculus) !* This is the same as *P. radians* of my "Revision," IX., p. 103. The type is from King George Sound ; the examples in the British Museum are labelled from Swan River.

LIMOPSIS FORSKALI, Adams !. The *Limopsis Belcheri* of my Revision, IX., p. 104, wherein I had adopted McCoy's identification, is certainly not that species !. It approaches best to *L. Forskali*, but whether *L. Macgillivrayi* be the more appropriate designation I cannot say, not having seen that species.

MYTILUS HIRSUTUS, Lamarck. The actual type not seen, but is correctly identified from specimens so named in Paris Museum.

MYTILUS MENKEANUS, Philippi. This species was known to Lamarck, and is his *Magellanicus*, var.!, as it is also *M. polydontes*, Q. and G.!

MYTILUS PLANULATUS, Lamarck! This is *M. chorus* of my Revision, IX., p. 105. Lamarck's type! is from King George Sound. The subordination of the name of this species to that of *M. chorus*, Molinia, I have no opinion upon, having accepted Hutton's views thereon.

MODIOLA AUSTRALIS, Gray. This is also *M. albicosta*, var. *spatula*, Lamarck!

MODIOLA ALBICOSTA, Lamarck! The type is artificially polished, but our shell so named is correctly identified.

MODIOLA INCONSTANS, Dunker, so named in the British Museum, is the same which I figured in my Revision, IX., under the name of *M. semivestita*, Dunker.

MODIOLA FLAVIDA, Dunker, so named in the British Museum, is No. 181 of my Hand List, published by Adcock (1893).

MODIOLARIA CUMINGIANA, Reeve. A synonym of this species is *M. discors*, Q. and G.!, on the opinion that the Australasian is distinct from the European.

MALLEUS VULSELLATUS, Lamarck!, is correctly named in our local list. The following Lamarckian species seem to me to be mere variants:—*M. decurtatus!* is a stunted form, and *M. normalis!* is only a little more winged than *M. vulsellatus*.

VULSELLA OVATA, Lamarck! The types are large examples, with an individuality of a more defined concentric sculpture than is usual with South Australian examples attributed to that species.

AVICULA PAPILIONACEA (Chemnitz), Lamarck! As suspected in my Revision, IX., p. 107, *A. Georgiana*, Q. and G. proves to be the same; and examination of Reeve's types in the British Museum results in attaching the two following as synonyms:—*A. punctulata* and *A. scalpta*.

Descriptions of New Australian Lepidoptera.

By Oswald Lower, F.E.S., &c.

[Read April 6, 1897.]

BOMBYCINA.

Cosmotriche (?) brachycera, n. sp.

Male, 40 mm. Head, palpi, legs, thorax, and abdomen dark fuscous; thorax with a transverse darker fuscous transverse stripe, edged posteriorly with ochreous. Abdomen with ochreous whitish hairs on anterior and middle segments. Antennæ white, biciliated with tufts of pale yellow hairs; at greatest length one and a half, apex of antennæ simple. Forewings elongate triangular; costa straight, hindmargin obliquely rounded, dark fuscous, dusted throughout with whitish, so as to appear ashy-grey-whitish; two well-marked black lines from one-fourth of costa to one-fourth inner-margin, strongly curved outwards on upper half; two well-marked black lines from four-fifth of costa to just before anal angle, hardly denticulate, but with a slight projection outwards in middle and just beneath costa. A triangular semi-hyaline discal spot in middle of wing, partly edged with black; cilia whitish, chequered with black at extremities of veins. Hindwings white, hairs of inner-margin blackish, costal edge blackish; cilia white, partly chequered with black. One specimen at Broken Hill in November. Not unlike *Bombyx mioleuca*, Meyr., but the curious antennæ are quite different, besides shape of wing.

GEOMETRINA.

Hydriomenidæ.

Microdes typhopa, n. sp.

Female, 22 mm. Head, antennæ, palpi, and thorax dark fuscous. Abdomen fuscous, with blackish segmental rings. Legs fuscous, sprinkled with whitish; tibiæ and tarsi blackish, ringed with white. Forewings moderate, dilated posteriorly; costa gently arched, hindmargin somewhat bowed, oblique; smoky fuscous, becoming whitish on median band; a slightly curved moderate transverse whitish fascia near base, containing a finer line of ground colour in middle throughout; anterior margin of median band edged by a similar fascia from one-

fourth of costa to one-fourth inner-margin, edged internally by a fine line of black; posterior margin of band edged by a similar, internally black-edged fascia from beyond three-fourths of costa to just before anal angle, with sharp projection outwards beneath costa, and another less pointed in middle, the fascia edged throughout externally by a line of ochreous-brown; subterminal slenderly white, indented beneath costa; a black hindmarginal line cut by veins into spots; cilia fuscous, somewhat chequered with blackish towards base. Hindwings with hindmargin hardly waved, fuscous, lighter towards base; several darker fuscous, somewhat indistinct waved transverse lines; three below middle more pronounced; cilia greyish. Markings of hindwings reproduced more clearly beneath. One specimen; Semaphore, S. Australia, in December.

SELIDOOSEMIDÆ.

Paralœa maritima, n. sp.

Male, 33 mm. Head, palpi, and thorax dark ashy-grey fuscous. Thorax with a large, dense, bifid, posterior crest. Palpi long. Antennæ ochreous-fuscous; pectinations three to apex. Abdomen grey. Legs fuscous; posterior pair whitish. Forewings elongate-triangular; costa strongly arched at base, thence nearly straight; hindmargin hardly oblique, somewhat crenulate, slightly angulated in middle, ashy-grey-whitish, densely and finely transversely strigulated throughout with darker; a thin, obscure, cuneiform mark of pale whitish-fuscous from costa at about two-thirds, reaching half across wing; a fine, blackish, interrupted hindmarginal line; cilia ashy grey-whitish. Hindwings white, with slight projections on veins four and seven, waved on upper half, lower half nearly straight, three and four from a point, grey-whitish; a more or less suffused-fuscous hindmarginal band, becoming obsolete towards anal angle; hindmarginal line as in forewings; cilia white. Underside of hindwings silvery-white, with a large, black, apical spot. One specimen at Exeter, S. Australia, in June (at light). In Mr. Meyrick's generic description the apex of the antennæ is said to be simple; in the present species the ciliations reach the apex, although extremely short at that point.

NOCTUINA.

Noctuidæ.

Agrotis callimera, n. sp.

Male and female, 38-40 mm. Head and face pale-ochreous. Palpi ochreous; second joint thickly infuscated on sides

externally. Thorax and antennæ ferruginous-brown; ciliations about one-half. Legs greyish; tibiæ spinose; tarsi fuscous, ringed with ochreous-white. Abdomen greyish-ochreous, clothed with whitish hairs on anterior segments. Forewings elongate, moderate; costa nearly straight; hindmargin oblique, ferruginous-brown, in some specimens becoming olive-greenish; all veins more or less outlined with whitish; a dull, leaden, reniform spot at end of cell, upper lobe more or less internally whitish; a transverse row of blackish points on veins from about three-fourths of costa to three-fourths of inner margin; a moderately broad, silvery-whitish hindmarginal band; a hindmarginal row of black points; cilia chestnut-brown. Hindwings and cilia pale creamy-ochreous. Five specimens at Exeter, S. Australia, in March. Although somewhat variable, it is an easily recognised species. Mr. Meyrick, to whom I submitted the species, returned it as unknown to him.

AGROTIS GYPSINA, n. sp.

Male, 34 mm. Head, thorax, palpi, abdomen, and legs white; tibiæ spinose, fuscous, tarsi ringed with white. Antennæ fuscous, shortly ciliated, about one-half. Forewings elongate, moderate; costa nearly straight, hindmargin oblique; white; three short oblique blackish dashes on costa—one near base, one at one-fourth, and one beyond middle—first one more or less continued half across wing as a zigzag line; a transverse row of fine black points from about three-quarters of costa to three-quarters inner-margin; a yellow reniform spot at end of cell, cut by a fine black line, and suffused beneath with fuscous; a hindmarginal row of blackish dots. Hindwings and cilia white, a hindmarginal row of small black lunules. Two specimens taken by Mr. Harold Lower at Exeter, South Australia, in March.

HYPENIDÆ.

HYPENA MESOCHRA, n. sp.

Female, 30 mm. Head, antennæ, thorax, and palpi ochreous fuscous, slightly reddish tinged; palpi nearly five times as long as width of eye; grey-whitish beneath on lower half. Abdomen and legs grey, slightly ochreous tinged beneath. Forewings elongate triangular, costa slightly sinuate beneath apex, bowed outwards in middle, thence oblique; ochreous fuscous; a faintly indicated fuscous median band broadest on upper half, margins waved; anterior edge from one-third costa to one-third inner-margin; posterior edge from beyond two-thirds of costa to just beyond middle of inner-margin, faintly edged with lighter ochreous; two fine blackish dots transversely placed at end of cell, a curved row of ill-defined fuscous dots from five-sixths costa

to just before anal angle, posteriorly edged with whitish dots; a hindmarginal row of fuscous dots between veins; cilia ochreous, slightly reddish-fuscous tinged. Hindwings with hindmargin waved; pale greyish ochreous, fuscous tinged; a denticulate fuscous line from beyond middle of costa to just beyond middle of inner-margin; a similar parallel, less distinct, yet thicker, line beyond; interspace clearer greyish ochreous; hindmarginal area suffused with ochreous fuscous; hindmarginal dots and cilia as in forewings. One specimen; Gisborne, Victoria, in January. Quite distinct from any other species of the genus that I have met with.

TINEINA.

ÆCOPHORIDÆ.

PHLŒOPOLA PYROCENTRA, n. sp.

Male, 20 mm. Head, thorax, and antennæ fuscous. Antennal ciliations one and a-half. Palpi whitish. Legs greyish, banded with fuscous; posterior pair wholly grey. Abdomen grey. Forewings moderate, elongate, costa gently arched, hindmargin obliquely rounded; dark fuscous, with a broad, fleshy-red, suffused, longitudinal streak through middle of wing, becoming blotch-like towards hindmargin; two or three very suffused blackish spots on upper edge, a short, fuscous streak at one-third from base, placed on band; cilia fuscous. Hindwings and cilia fuscous. One specimen, Broken Hill, N.S.W., in April. A curious-looking and distinct insect. The palpi are rather short for this genus.

PHILOBOTA MONADELTA, n. sp.

Female, 25 mm. Head, palpi, and thorax orange-yellow. Second joint of palpi externally fuscous on apical half. Thorax with a narrow, dark-purplish-fuscous anterior band. Antennæ fuscous. Abdomen greyish. Legs greyish; posterior pair yellowish. Forewings elongate, moderate; costa gently arched, apex round-pointed, hindmargin oblique; bright yellow; a small, irregular, dark-fuscous patch on anal angle; cilia yellow, tips fuscous-tinged, becoming fuscous on anal spot. Hindwings dark-fuscous, becoming lighter towards base, hairs at base yellow; cilia fuscous, mixed with yellow round anal angle. One specimen near Sydney in December (Coll. Lyell). Rather an abnormal-looking species, recalling a large specimen of *Microbela epicona*, Meyr.

PELTOPHORA (?) LEUCOPLACA, n. sp.

Female, 18 mm. Head and palpi snow-white, second joint of palpi infuscated externally, especially towards base. Thorax

fuscous, with a large white quadrate spot on posterior half. Antennæ and legs whitish, posterior legs ochreous. Abdomen greyish ochreous. Forewings elongate, moderate; costa gently arched, apex round pointed, hindmargin obliquely rounded, brownish ochreous; a large snow-white blotch at base, extending along inner-margin to about one-third, and only separated from costa by a line of ground colour; a suffused erect white triangular spot on inner-margin at anal angle; a similar, but more oblique, one from costa just before apex, nearly touching apex of previous spot; a small suffused, whitish spot on middle of costa; a minute fuscous dot in apical white spot; cilia ochreous-brownish, median third white. Hindwings greyish-ochreous; cilia pale-yellowish; underside of wings more yellowish tinged. In the present species, which is doubtfully referred to *Peltophora*, veins 3, 4, and 5 of forewings are closely approximated, yet separately at base—a rather unusual character in this group. The hindwings are normal. The antennal pecten is not traceable, having apparently been denuded. One specimen at Mackay, Queensland, in December.

OROPHIA MARMOREA, n. sp.

Male, 17 mm. Head, thorax, palpi, and antennæ white; antennal ciliations two, terminal joint of palpi hardly more than half of second. Abdomen greyish. Legs grey, posterior pair whitish. Forewings elongate, moderate; costa gently arched, apex hardly pointed, hindmargin oblique, white, markings ochreous brown; a narrow, somewhat indistinct costal streak, attenuated at base; a suffused indistinct line, commencing at base in middle and ending just near apex, a well-defined discal spot at one-third of this streak, a second obliquely below it; a moderately thick fascia from costa at apex to anal angle, strongly indented inwards in median portion; a row of blackish fuscous interrupted spots along hindmargin and apical fourth of costa; cilia pale yellowish. Hindwings and cilia grey, cilia yellowish tinged at base. One specimen at Mackay, Queensland, in April. This species partakes somewhat the characters of both *Saropla*, Meyr., and *Orophia*, Meyr., but seemingly distinct from either by the palpi.

CÆSYRA ARGYRASPIS, n. sp.

Female, 15 mm. Head, palpi, and thorax ochreous-orange. Legs and abdomen greyish. Forewings moderate, elongate; costa hardly arched, apex somewhat pointed; hindmargin oblique, dull-ochreous-orange, with silvery-white markings; a somewhat broad costal streak from base to apex and right through cilia, attenuated towards base; three elongate, hardly connected spots in middle of wing, first narrowly elongate, attenuated at base,

second and third in a direct line with first, obcordate, apices turned towards hindmargin; a narrow streak along inner margin, continued along hindmargin and ending immediately below apex; cilia ochreous-fuscous, terminal-half grey whitish. Hindwings greyish-fuscous; cilia grey, basal-half fuscous. One specimen in November at Bulimba, Queensland. Recalls typical species of *philobota* in markings.

GELECHIADÆ.

Gelechia hemichlæna, n. sp.

Female, 10 mm. Head and thorax whitish. Abdomen greyish. Palpi white, terminal joint fuscous, acute. Legs greyish. Antennæ two-thirds. Forewings narrow, apex hardly pointed, hindmargin oblique; white; markings cloudy-fuscous; a suffused, inwardly-oblique, narrow fascia, reaching half across wing, space between this and base, suffusedly-fuscous, occupying lower half of wing, space towards hindmargin lighter fuscous; five or six suffused costal spots on apical third of wing, separated by small spots of ground colour; an irregular mark at apex; cilia fuscous, with a dark fuscous median line. Hindwings with termen sinuate, light-greyish-fuscous; cilia greyish. One specimen, Broken Hill, in November.

Gelechia monoleuca, n. sp.

Female, 18 mm. Head, palpi, antennæ, and thorax black; antennæ somewhat serrate. Abdomen grey, posterior half black, anal tuft whitish. Legs blackish, middle tibiæ ringed with whitish, posterior legs with tufts of white hairs at base of joints, tibiæ wholly whitish. Forewings elongate, moderate, costa gently arched, apex rounded, hindmargin obliquely rounded; black, somewhat shining; a moderate well defined snow-white spot in middle of wing at two-thirds from base; various minute whitish spots along veins, scarcely perceptible; a hindmarginal row of minute whitish dots; cilia black. Hindwings with termen not sinuate, six and seven stalked, greyish, blackish tinged, except at base; cilia fuscous. One specimen taken at Gosford, N.S.W. (Coll. G. Lyell, jun.)

Gelechia (?) micromela, n. sp.

Female, 10 mm. Head, thorax, abdomen, and legs black; palpi yellowish, second joint fuscous externally on basal half. Antennæ thickened, ochreous, somewhat infuscated. Forewings moderate, rather short, costa gently arched; shining deep purple blackish, without markings, seven to apex; cilia blackish. Hindwings blackish, thinly scaled; three and four long stalked, six and seven stalked; cilia as in forewings. Doubtfully referable

to *Gelechia*. Vein 7 can hardly be said to terminate on costa, more correctly the apex. The stalking of veins 3 and 4 of the hindwings would remove it from the *Gelechiadæ* altogether, but as the species partakes very much of the facies of a *Gelechia*, I place it here until I obtain more material. Superficially it reminds one of the genus *Petalanthes*, one of the *Œcophoridæ*. One specimen; Gisborne, Victoria.

GELECHIA DESMATRA, n. sp.

Male, 9 mm. Head, palpi, antennæ, and thorax ochreous-whitish. Abdomen and legs fuscous. Forewings moderate; costa hardly arched, apex rounded, whitish; a broad, thick, fuscous, transverse fascia from middle of costa to middle of inner margin, dilated on costa; two fuscous, more or less elongate, marks on costa beyond this; apical fourth of wing tinged with fuscous, and becoming darker on hindmargin, and containing a row of small fuscous dots around apex and hindmargin; cilia ochreous. Hindwings and cilia fuscous. One specimen, Broken Hill, in November.

GELECHIA OMBRODES, n. sp.

Male and female, 10 mm. Head snow-white, palpi white, second joint externally golden ochreous, except apex. Antennæ fuscous, with small fine pecten. Ciliations one. Thorax golden ochreous. Abdomen greyish. Legs ochreous brown. Forewings snow-white; a narrow ochreous brown fascia at base; a broad ochreous brown transverse fascia from three-quarters of costa to anal angle, slightly dilated on costa and inner-margin, a light ochreous-brown suffusion on apical portion of hindmargin, continued as a fine line along hindmargin to anal angle; cilia greyish ochreous, becoming darker round anal angle. Hindwings and cilia grey. Two specimens taken at Rockhampton in middle of November. This species will require a new genus. I have not yet sufficient material for dissection, but the neuration of the forewings, so far as can be made out, is as follows:—Vein one is extremely long furcate, in fact the fork reaches half the length of the cell; veins two and three are stalked, seven and eight are stalked, seven terminating on costa. The hindwings are normal, excepting that six and seven are extremely short stalked.

GELECHIA MICRADELPHA, n. sp.

Female, 10 mm. Head, palpi, antennæ, legs, and thorax yellow. Posterior legs with a black band on tibiæ (abdomen broken). Forewings elongate, moderate, narrow; costa nearly straight, hindmargin oblique, hardly sinuate beneath apex, orange-yellow; a small blackish spot on costa at one third from

base; a broad, purplish-fuscous, hindmarginal band, occupying one-third of wing, anterior edge darker, and slightly curved outwards; a yellowish, elongate spot on costal portion of band; cilia fuscous, at base becoming yellowish. Hindwings with termen sinuate, dark-fuscous; cilia nearly one-half, fuscous. One specimen, taken at Broken Hill, N.S.W., in November. Nearest *porphyrloma*, Lower, but differs by the smaller size, different shaped hindmarginal band, and costal spot.

ANARSIA DRYINOPA, n. sp.

Female, 12 mm. Head, palpi, antennæ, thorax, and legs ashy-grey-whitish. Terminal joint of palpi whitish, with blackish ante-apical band. Antennæ annulated with white. Thorax more whitish, with an apparent fuscous, median stripe. Abdomen greyish. Forewings elongate, rather narrow; costa gently arched, apex pointed, hindmargin oblique; ashy-grey-whitish, mixed with fuscous and dark fuscous; markings very obscure; three short, blackish, outwardly oblique, costal spots between base and middle; various black and whitish short dashes towards hindmargin; a blackish, crescentic mark from inner margin at one-fourth, curved round to base beneath costa; cilia fuscous. Hindwings somewhat broader than forewings, termen slightly sinuate, grey; cilia greyish. One specimen from Broken Hill, N.S.W., in October. Nearest *inodes*, Meyr., but smaller, and differently marked; it is not unlike *Gelechia aversella*, Walk.

ANARSIA (?) HOLOMELA, n. sp.

Female, 10 mm. Head, thorax, abdomen, antennæ, palpi, and legs blackish. Antennæ two-thirds, second joint of palpi with a dense loose triangular tuft of hairs; terminal joint as long as second, strongly recurved. Forewings elongate, moderate, costa gently arched, apex rounded, hindmargin obliquely rounded, seven and eight stalked, seven to costa, three and four stalked; black, with hardly perceptible scattered minute blackish spots; an irregular blackish hindmarginal line; cilia light fuscous. Hindwings fuscous, termen slightly sinuate, six and seven stalked; cilia about one-third, fuscous. One specimen; Broken Hill, in June.

ARISTOTELIA (?) MONOSTROPHA, n. sp.

Female, 13 mm. Head, palpi, thorax, and legs greyish; face whitish. Antennæ whitish; ciliations one, with pecten. Second joint of palpi not tufted. Forewings lanceolate, moderately broad; ochreous-brown; a broad, somewhat suffused-white streak from base to apex, broadest in middle, extremities attenuated; a dark-fuscous dot in middle, resting on lower portion of streak; cilia greyish. Hindwings greyish; cilia ochreous-grey. One

specimen in March, Broken Hill, N.S.W. Similar in appearance to *epispila*.

ARISTOTELIA (?) EPISPILA, n. sp.

Female, 12 mm. Head, palpi, antennæ, and legs greyish-fuscous. Apex of second joint of palpi whitish. Posterior legs grey; abdomen broken. Forewings linear, apex pointed; pale-brownish; a broad, whitish, longitudinal streak from base to apex, occupying upper half of wing throughout; two dark fuscous dots, one before and one beyond middle of disc, placed on upper edge of ground colour; some suffused fuscous spots towards hindmargin; cilia grey. Hindwings linear, termen sinuate, whitish; cilia nearly two, colour as in forewings. One specimen, Parkside, S. Australia, in March. I am not quite certain as to the correct location of this species; for instance, veins seven and eight of forewings appear to run out of six, which is unusual in this genus.

YPSOLOPHUS DRYINODES, n. sp.

Female, 25 mm. Head, palpi, thorax, legs, and antennæ fuscous; palpi darker-fuscous on sides; second joint grey-whitish above. Abdomen greyish. Forewings moderate; costa gently arched, hindmargin oblique; fuscous, with innumerable, darker-fuscous, minute dots, more pronounced along costa and veins towards hindmargin, where they appear in longitudinal rows; there also appears to be three oblique, transverse rows of similar spots from one-fourth of costa to about one-fourth inner margin; one from middle of costa to before middle of inner margin; another from near three-fourths of costa to beyond middle of inner-margin; veins two and three stalked; cilia reddish-fuscous. Hindwings and cilia fuscous. Three specimens at Brisbane in December.

EUTORNA (?) NIPHODES, n. sp.

Female, 10 mm. Head, antennæ, palpi, and thorax white; second joint of palpi infuscated beneath. Abdomen grey-whitish. Forewings linear, apex pointed; white, tinged with ochreous towards apical third; a black dot in disc at one-third, another obliquely beyond and below; a third, larger, in middle of disc at two-thirds; a row of three or four black dots along apical fourth of costa; an obscure blackish dot at anal angle. Hindwings grey; cilia three, whitish. One specimen, Gisborne (?), Victoria, in March.

EUTORNA STRATIMERA, n. sp.

Male, 12 mm. Head, antennæ, palpi, thorax, abdomen, and legs dark fuscous; antennæ biserrate, very shortly ciliated; hairs

of upper portion of second joint of palpi white. Forewings linear, apex pointed; dark ashy-grey-whitish; a narrow whitish line along costa from base to apex, finely attenuated along apical three-fifths; extreme edge of costa black at base; cilia fuscous. Hindwings fuscous; cilia one and a half; greyish-fuscous. One specimen, Belair, S. Australia, in November.

Cleodora eumela, n. sp.

Female, 12 mm. Head, palpi, thorax, abdomen, antennæ, and legs black; second joint of palpi with a dense projecting tuft, terminal as long as second, recurved. Forewings moderate, elongate; costa gently arched, apex hardly pointed; hindmargin oblique, seven and eight to costa; black, with faint indications of a few blackish scattered dots in disc and along hindmargin; cilia fuscous-grey. Hindwings slightly sinuate beneath apex; blackish, becoming lighter towards base; cilia as in forewings. One specimen from Stawell, Victoria, in December.

Pogonias (?) leucoma, n. sp.

10 mm. Head, palpi, and thorax snow-white. Antennæ fuscous, white at base. Abdomen and legs greyish. Forewings narrow; costa nearly straight, apex hardly pointed, fuscous; a broad, suffused-white, longitudinal streak from base to middle, thence curved up to costa near apex, sharply defined on basal half, somewhat suffused beyond; a small, elongate, blackish mark in sinuation of white streak; cilia greyish-fuscous. Hindwings narrow, fuscous; cilia three, greyish-fuscous. One specimen at light, Mackay, Queensland, in August.

Pogonias capnopa, Lower.

In my original description, the abdomen of this species was not described. Having obtained an additional specimen, I am enabled to complete the same. The description should read:—"Abdomen fuscous, ochreous in middle." The cilia of the hindwings have an ochreous tinge in the specimen before me, which I captured at Broken Hill, N.S.W., in April.

PLUTELLIDÆ.

Plutella ochroneura, n. sp.

Female, 16 mm. Head, thorax, antennæ, palpi, and legs ochreous-white. Abdomen greyish. Forewings rather narrow; costa gently arched, apex pointed, whitish; all veins outlined with pale-ochreous-yellow, giving the appearance of being ochreous-white; cilia ochreous, at apex becoming ochreous-white. Hindwings lanceolate-linear, whitish; cilia two and a-half, whitish. One specimen, Semaphore, S.A., in November.

TINEIDÆ.

Erechthias polyspila, n. sp.

Male, 8–10 mm. Head black, face and crown white; palpi, thorax, and antennæ blackish; second joint of palpi whitish above. Legs fuscous, posterior pair greyish. Forewings linear, apex pointed, dark fuscous, with whitish markings; a short straight, fine streak from base in middle to one-sixth; a similar shorter, but somewhat thicker one, immediately following, but slightly above; a fine streak along inner-margin from base to anal angle, finely attenuated on posterior third; a fine irregular oblique fascia from just before three-fourths of costa to anal angle, touching end of preceding streak; a rather thick short fascia from costa just before apex, reaching about half across wing; a round black spot at apex, encircled by dull whitish; cilia fuscous, whitish at base, and with a blackish median line. Hindwings and cilia fuscous. One specimen, Parkside, S. Australia, in October.

Notes on the Glacial Features of the Inman Valley, Yankalilla, and Cape Jervis District.

By Prof. T. E. W. David, B.A., F.G.S., and W. Howchin, F.G.S.

[Read June 1, 1897].

In 1859 Mr. Alfred R. C. Selwyn, Government Geologist of Victoria, made a hurried, but extensive geological tour in this colony by request of the South Australian Government. In his official report he says :—"At one point, in the bed of the Inman, I observed a smooth, striated, and grooved rock surface, presenting every indication of glacial action. . . . This is the first and only instance of the kind I have met with in Australia, and it at once attracted my attention." This glacial pavement was not subsequently observed till rediscovered by the authors of this paper and Mr. C. C. Brittlebank in March last. The journey was undertaken with the express object of investigating the glacial features of the neighborhood, with the result that the investigators are much impressed with the clearness of the glacial evidences, as well as their magnitude. It is not intended in the present paper to give a detailed description of the observations made (that will take the form of a Report from the Glacial Committee to the Australian Association for the Advancement of Science), but it was thought desirable to give an early and local statement of some of the leading facts which have been obtained on this subject.

On leaving Port Victor by the Inman Valley road, about one and a-half miles from the township, numerous large blocks of granite are seen in the paddocks on the left hand side of the road. Similar erratics can be noted on the hillsides bordering the road almost the entire length of the valley to Normanville.

In the bed of the Inman, a little west of the seventh mile-post from Port Victor, a very fine exposure of a polished ice-pavement occurs. It is situated on the North side of the stream, within the limits of the flood-waters, and passes under a bank of recent river silt. There is a continuous, highly-polished floor, measuring 20 ft. by 6 ft., with a surface slightly sloping towards the stream. It is deeply grooved and striated, the striæ having a direction of W. $9\frac{1}{2}^{\circ}$ N., conforming to the general trend of the valley. The stone which has taken the polish is a hard, dark-

colored quartzite, very favorable for recording the effects of ice-action. This exposure must take rank as the finest example of a glacially-polished rock known within the limits of Australia. Most likely it is the identical example discovered by Selwyn 38 years ago, and may appropriately be called "Selwyn's Rock." A few yards higher up the stream, in a wash-away on its Southern bank, another polished surface of smaller extent is seen. The striæ are in the same direction as on the larger face, and cross the bed of the stream diagonally. The only other places where striated rock was noticed was in a tributary of the Bungala River, near its source on the Western side of the Bald Hills, about four miles from Yankalilla, where two small patches, a foot or two square, with overlying drift, were seen. Here also the glaciated rock is a highly siliceous quartzite, similar to the large polished surface in the Inman, and the striæ show the same general direction.

On the rising ground above the glaciated floor (already described), near the seventh mile-stone, there are immense blocks and groupings of granite boulders scattered over the sides of the hill. Some of these are so massive that at first sight they look like rocks in situ. Close by, a mountain torrent has cut its way through a bed of drift, studded with glaciated stones at an altitude of about 100 ft. above the glacial floor in the bed of the river.

From this point, for several miles up stream, the glacial drift is seen at intervals in the banks of the river. Its general feature is a soft sand rock carrying glaciated stones, and in places is seen to rest on a dark-colored arenaceous clay with few stones. In some instances the sand rock is considerably indurated and carries beds of conglomerate irregularly distributed. Several readings of these drift beds gave a dip of about 7° to E.S.E.

Between the ninth and tenth mileposts large granite boulders are extremely common in the Inman, in some places almost choking the bed of the river. One hundred large examples were counted in the distance of a hundred yards. Blocks of granite were measured equalling ten, eleven, and twelve feet in their longer diameters.

In the upper reaches of the Inman the erratics are fewer in number, and the glacial drift occurs as a soft, bluish-black clay, which is more or less sandy in composition.

About 15 miles from Port Victor the Bald Hills watershed crosses the valley transversely, cutting off the eastern (*i.e.*, the Inman and Back Valley) drainage, which finds its outlet at Port Victor; from the western (*i.e.*, the Bungala and Yankalilla River systems), which flow into Gulf St. Vincent. The road crosses the watershed at a height of 640 ft. above sea level. The ice has

crossed this barrier in its passage westward, leaving abundant evidences of its former existence by thick deposits of drift and glaciated stones on the summit of the range, with drift beds, numerous erratics, and the polished rock surfaces already referred to on the western or further flanks of the watershed. At the summit of the Bald Hills the soil is deep and remarkably dark in colour, more like a marsh soil than what usually occurs on the crest of a hill. This "rich black soil of the Bald Hills" attracted Selwyn's attention, but he was unable to account for it. It is not unlikely to have been derived from a similar deposit as the bluish-black glacial drift, which has a considerable development in the Inman Valley.

Time prevented a close examination of the lower levels of the Bungala Valley, which near Yankalilla are largely obscured by recent river wash, but glaciated erratics were observed on the hills two miles north of Normanville at a height of about 200 ft. above sea level.

Taking advantage of the Easter holidays, one of us returned to the district for further investigations. The Bald Hills watershed was explored to the northward of the main road, when granitic and other erratics were found scattered over Mr. J. R. Kelly's fields near the crest of the hills, some of them being facetted and scratched.

A high ridge runs up the centre of the main east and west valley between Port Victor and Normanville, separating the Inman Valley from the Back Valley. At a point about seven and a half miles from Yankalilla a district road was followed, which passes over this central ridge. Erratics were seen at intervals on the rise, some of considerable size; and a granite boulder three feet in diameter was noted close to the road near the crest of the hill. As near as could be judged, in the absence of an aneroid, this ridge is about 500 ft. above the bed of the Inman, and about 100 ft. above the greatest height of road that passes over the Bald Hills. After passing the crest of the hill, the ground drops about 100 ft., and the road continues along the crest of a lower range, which has a trend of S.S.E. and N.N.W. On this range there are two road cuttings, each about 100 yards in extent, showing soft yellow sandstones, unstratified, but contorted. Dark-coloured argillaceous bands run most irregularly through the stone, sometimes forming loops. No stones were seen in the sandstone itself, but several striated stones were picked up loose in the cutting. About a quarter of a mile beyond the second cutting a stony patch is exposed on the northern side of the road on the slope of the hill, many of the stones showing glacial features. The bed of the Back Valley Creek is much silted, and only two small patches of the yellow sandstone similar to the

sandy glacial drift of the Inman were noticed in the bed of the stream. It was in this valley that the three bores of the Victor Harbour Coal Company were put down, passing through sandstones, shales, and boulder beds to a depth of 964 feet before the old rocks were touched.

The most remarkable section of glacial drift discovered in the district was in the Government Quarry in Woods Creek, a tributary of the Bungala, and situated about a mile from the centre of the township of Yankalilla. It is a white, yellow, and grey sandstone, soft near the surface, but passing down to very strong posts in the bottom of the quarry, which can only be won by blasting. The stone is much jointed and appears to dip at 20° to N.N.W. There is a vertical exposure of about 50 feet, and the quarry has been opened for a distance of about 150 yards. The appearance of the face is very remarkable. Large and small erratics are plentifully distributed throughout its entire thickness, granite being very conspicuous, but mostly rotten. One of the latter fragments was noticed that measured 18 in. by 10 in. The included stones, where not decomposed, are for the most part glacially smoothed or striated. The quarry has been used for years as a supply for road metal, and has made Yankalilla and neighbourhood famous for its good roads. In the creek, close by, the drift is seen to rest unconformably on quartzite thickly penetrated with a network of syenitic and other igneous veins. No polished pavement at the line of junction was visible.

On the road between Yankalilla and Cape Jervis proofs of glacial action were seen in two places. About nine miles from Yankalilla, in a cutting of the road on the eastern side, a subangular erratic of red quartzite measuring 18 in. by 11 in. lies near the top of the bank. The stone is very highly polished and striated, and close to it is a sharply angular grey quartzite of larger size, but not showing glaciation on the faces exposed. Estimated height above the sea, 300 feet.

On the south side of Fowler's Hill, just past the 59th milepost from Adelaide (13 miles from Yankalilla), a section of glacial drift with striated pebbles is exposed in a road cutting. The drift occurs on the eastern side as a pocket 33 yards long and 12 feet high, enclosed within calcareous shale. Erratics are numerous, the largest observed being a greenish quartzite 12 in. by 6 in., exhibiting striæ. Estimated height above level of sea, 500 feet.

At Cape Jervis there is the most extensive development of glacial Till that has been up to the present observed in South Australia. The morainic material occupies the background to the lighthouse in crescent-shaped hills more than a hundred feet

high. Large single erratics, as well as groups up to 30 in number, can be seen on the hillsides, and where a wash has occurred the glaciated stones can be picked up in great numbers. Amongst these, rounded quartz pebbles are conspicuous and in nearly every case show polished faces. Amongst the larger erratics granite boulders are the most common, and are associated with a few quartzites, one of which measured 7 ft. 6 in. by 3 ft. 9 in., exposed above the Till, in which it is partially buried. On the hillsides above the lighthouse (where these large boulders have been weathered out) the sloping ground is well grassed, which obscures much of the glacial features; but the Till bed follows the northern trend of the coast line, exhibiting a steep and bare cliff face of the most instructive character. It is here seen that the bed is a true unstratified Till crowded with travelled stones, mostly ice-marked. A complete section is visible of a great Till bed of over 100 feet in thickness, resting unconformably on a floor of palæozoic rocks, and capped by variegated (? Miocene) clays and a superficial travertine crust. The bed-rock is soft and much decomposed, and therefore unsuitable for receiving or retaining a glacial face. The glacial outcrop was traced along the line of cliffs for about three-quarters of a mile without reaching its termination.

Observations made from the top of the coach, on the return journey from Yankalilla to Adelaide, it seems highly probable that the glacial sandstone extends for about ten miles from Yankalilla in that direction, as evidenced by *(a)* the road metal; *(b)* on top of hill above Wattle Flat (44 miles from Adelaide) the yellow sandstone characteristic of the glacial beds of the locality outcrops by the roadside; *(c)* on hill north side of Wattle Flat Post Office what appears to be a Till with stones is exposed in road-cutting; *(d)* and at 41½ miles from Adelaide this (?) glacial sandstone is once more seen in outcrop by the roadside.

These observations require to be confirmed by a closer examination of the country, but it seems probable that the glaciation had its Northern limits determined by the lofty Sellick's Hill Range.

General Deductions.

1. The stratigraphical features of the glacial beds of the district have been but imperfectly traced, but they appear to be devisable into two well-marked lithological types—

(a) An unstratified Till, of a dark color, more or less arenaceous, either with or without glaciated stones.

(b) Yellow and grey sandstones and conglomerates varying from a soft, friable sand-rock to a hard, siliceous sandstone, which, in the latter case, is extensively jointed. These sandstones are

mostly destitute of stratification, and generally contain erratics. Even where no stones can be seen in the face, striated stones are almost invariably found on the surface of outcrop as though weathered out from the bed.

The borings put down by the Port Victor Coal Prospecting Company in the Back Valley show throughout their entire depth alternating dark arenaceous mudstones with sandstones and boulder beds similar to those observed at the surface. The continuity of the glacial beds to the 960 ft. depth, as proved by bores, seems beyond doubt. This gives a thickness approximately of 1,500 ft. of glacial deposits in the Back Valley.

[The association of Till beds intercalated with yellow sandstones, as described above, offers a close analogy with the Bacchus Marsh series of Victoria.]

2. The very wide area over which glacial features have now been proved to exist leads to the conclusion that the greater part of the Cape Jervis Peninsula, with Port Victor and Normanville (or even Myponga) as the base of the triangle, has been visited by ice, an area of more than 300 square miles.

3. The direction of the striæ, as well as the distribution of the transported material, point to the region of the Southern coast, from Port Elliot to Kangaroo Island, or even much further into the Southern Ocean, as the probable centre of dispersion. Blocks of Port Victor granite can be traced as far North as Hallett's Cove. The direction in which the ice travelled was therefore in opposition to the present drainage of the land, which is, generally speaking, from North to South.

4. In the present stage of our observations it is a little difficult to say definitely what form the ice took in this extensive glaciation. Was it in the form of glaciers, icebergs, or coast ice? Many of the phenomena seem best explained by the supposition of land ice as the agent—such as the great extent of polished rock surfaces [as at Hallett's Cove], the depth and uniform direction of the striæ, and the great number of scratched and facetted stones contained in the drift. If the ice was in the form of glaciers, it would require a great extent of highlands to the South, sufficient to form vast snowfields, from which tongues of ice radiated. The transported material being essentially local in its origin, is not likely to have been carried by icebergs, so that the only alternative is that of ice-floes or coast-ice being the transporting agent. On this theory the Bald Hills, which are now 600 or 700 feet above sea level, and are capped with glacial drift, must at the time of glaciation have been at or below sea level. When the locality has been more thoroughly examined, it is not unlikely that evidences will be found that will set this question at rest.

5. The presence of variegated (? Miocene) clays and travertine as a capping to the Till at Cape Jervis, although in the absence of fossils cannot be taken as conclusive, seems to point, like the Hallett's Cove section, to a Pre-Miocene age of the glaciation.

6. The additions to our knowledge of this important period of glaciation in Southern Australia tend to confirm the opinion already expressed by us elsewhere,* that the South Australian glaciation was synchronous with the great Victorian glaciation of Permo-Carboniferous age. No palæontological proofs of this have been obtained in the drift beds of this colony, but the lithological characteristics of the South Australian drift agree very closely with the Victorian beds; whilst the great changes that have taken place in the physical features of the country since the ice age, may well draw upon a period of time for their accomplishment equal to that which separates the Permo-Carboniferous age from the present.

Thanks are due to Mr. F. G. Raymond, of Yankalilla, by whose valuable assistance our work was greatly facilitated in examining the Yankalilla and Cape Jervis Districts.

* Aus. Asso. Adv. Science, vol. VI., p. 318.

On Evidences of Glaciation in Central Australia.

By Professor Ralph Tate.

[Read June 1, 1897.]

In the "Geology of the Horn Expedition," vol. II., p. 72, there is described a section of Yellow Cliff, at the south-east bend of the River Finke, near Crown Point Head Station. The chief feature presented by that section is the tumultuously-bedded material, many of the included pebbles, which range up to two feet cube, are standing on end, some of the pebbles are, moreover, sub-angular, smooth, and striated. When on the outward journey, this section was closely studied, and partly in the company of Professor Spencer,* to whom I announced my opinion that some of the pebbles evidenced glaciation. However, as I failed to recognise any similar signs of glaciation or co-ordinate phenomenon during the rest of our exploration, I, on my return to Yellow Cliff, and after a brief re-examination of the pebbles, attributed the striation of the pebbles to bedding-lines.

Professor Spencer, during the early part of this year, collected pebbles from this section, which Professor David informs me are undoubtedly glaciated, and thus confirms my first impression as to the nature of their surface-sculpture.

The occurrence of large boulders on the north side of Cunningham Gap, described by East (Trans. Roy. Soc., vol. XII., p. 44), may therefore be explained as ice-borne.

Date of Glaciation.—Cunningham Gap is a short north and south transverse gorge in a mural line of cliff, which is constituted of the following strata, as determined by me in the tabular mass of it known as Crown Point:—"Desert Sandstone" in three horizontal bands, about 50 feet, resting on false-bedded friable felspathic sandstone and purple hard sandy clays dipping south at about 50°. These latter are probably decomposed Archæan-rocks, such as those described by East (op. cit., p. 45) at Polly Springs, about 20 miles to the north.

The formation of Cunningham Gap is of course posterior to the deposition of the Desert Sandstone and its subsequent structural alteration, and thus inferentially is that of the accumulation of the glacial-debris at Yellow Cliff. Moreover, pebbles of Desert Sandstone occur in large proportion in the debris, and these are readily distinguishable from the Ordovician quartzites or the Archæan glassy quartzites which occur in the Macdonnell Ranges.

* My coadjutor, Mr. A. Watt, in the Department of Geology, had not the opportunity of studying this section.

A List of Plants Collected by the Calvert Expedition.

By Professor Ralph Tate.

[Read July 6, 1897.]

The collection of plants under review is supplemental to the main gathering made by the naturalist to the Expedition (Mr. Keartland) which was abandoned at Joanna Springs. It was made between December 22, 1896, and March 17, 1897; firstly whilst stationed at the junction of the Fitzroy River and Margaret Creek, about 150 miles from Derby; and secondly, whilst on the search for his missing colleagues, embracing 100 miles down the Fitzroy, thence south to near Joanna Springs, and thence to Derby.

The collection comprises about 100 species, but about a moiety of them is represented by foliage, though of the latter a few admit of assignment to specific denomination.

The facies is that of the Eremian botanical province, largely comprised of Indo-Australian species, such as prevails over the table-land skirting the littoral tracts of North-Western Australia.

The region botanically explored by Mr. Keartland has been somewhat extensively reported upon by the late Baron Mueller through the collections made by himself, Mr. F. Gregory, Sir John Forrest, and lately by Mr. Tepper ("Plants of Roebuck Bay") in Trans. Roy. Soc., S. Aust., 1892.

Rare or previously unrecorded species are the following:—*Capparis umbonata*, *Hibiscus panduriformis*, *Polycarpæa violacea*, *Trichinium arthrolasium*, *Gomphrena affinis*, *G. Brownii*, *Cassia concinna*, *Indigofera viscosa*, *Neptunia gracilis*, *Acacia suberosa*, *A. dineura*, *Melaleuca lasiandra*, *Gardenia Keartlandi*, n.sp., *Tragus racemosus*, *Perotis rara*, and *Andropogon gryllus*.

Of the various collections made from this region it is noteworthy how few are the species in common, and though the greatest number enumerated in any one collection does not exceed 250, yet in the aggregate the flora numbers over 600.

Capparideæ.—Cleome viscosa. Capparis umbonata.

Violaceæ.—Hybanthus suffruticosum.

Zygophylleæ.—Tribulus terrestris, T. Solandri.

Malvaceæ.—Abutilon otocarpum. Hibiscus microchlænus, H.

panduriformis. Gossypium australe. Adansonia Gregorii; fruit five inches long and four inches diameter.

Sterculiaceæ.—Brachychiton Gregorii. Seringea integrifolia.

Tiliaceæ.—Corchorus vermicularis, C. sidoides. Triumfetta chætocarpa.

Euphorbiaceæ. — Euphorbia Drummondii, E. alsinæflora. Petalostigma quadriloculare.

Sapindaceæ.—Atalaya hemiglauca.

Caryophylleæ.—Polycarpæa violacea; a stouter plant than usual, and densely fasiciled at the nodes.

Amarantaceæ.—Gomphrena flaccida, G. affinis, G. Brownii. Ptilotus arthrolasius; this species was collected by Sir John Forrest, but as yet unrecorded, so I am informed by the Curator of the National Herbarium, Melbourne.

Salsolaceæ.—Enchylæna tomentosa.

Ficoideæ.—Trianthema pilosa.

Phytolacceæ.—Codonocarpus cotonifolius.

Nyctagineæ.—Boerhaavia diffusa.

Leguminosæ.—Crotolaria Cunninghami. Indigofera viscosa. Tephrosia purpurea. Abrus precatorius. Cassia concinna. Bauhinia Leichhardtii. Neptunia gracilis. Acacia dineura, A. tumida, A. stipuligera, A suberosa.

Combretaceæ.—Gyrocarpus Americanus.

Myrtaceæ.—Melaleuca leucodendron, M. lasiandra. Eucalyptus terminalis. Barringtonia acutangula.

Santalaceæ.—Santalum lanceolatum.

Proteaceæ.—Grevillea refracta. Hakea macrocarpa.

Cucurbitaceæ.—Cucumis trigonus. Mukia scabrella.

Rubiaceæ.—Gardenia Keartlandi, *Tate.*

Shrubby, branchlets thick, the young shoots resinous (the resin collecting as small drops of a clear amber color). Leaves shortly petiolate, oval-oblong, obtuse at both ends, coriaceous, penninerved and reticulate, not exceeding one and a-half inches long, glabrous. Flowers white, terminal, solitary, shortly pedicellate, sweet-smelling. Calyx-limb shortly tubular-campanulate, with six, linear-obtuse lobes (two a little longer and wider than the others); calyx-tube about as long as the lobes (about 4 mm.), not ribbed. Corolla-tube nearly one inch long (23 mm.), slightly dilated upwards; lobes six, oblong, about half-length of tube. Fruit globulose to ovoid-globular, about one inch diameter (25 mm.), crowned by the base of the calyx-tube; endocarp dense, hard, cartilaginous, 2 mm. thick; the rind dry and thin, at least in the dried specimens; placentas three.

One flower only (which has not been dissected), six ripe fruits. Fitzroy River, Calvert Exploring Expedition.

This new species differs from its Australian congeners with

similar calyces in the young shoots being resinous, not pubescent; and from those with resinous shoots by its deeply toothed calyx. It would appear from description that it approximates in general characters to *G. pyriformis* on the one hand and to *G. resinosa* on the other.

Convolvulaceæ.—Ipomœa heterophylla.

Solanaceæ.—Solanum echinatum.

Bignoniaceæ.—Dolichandrone heterophylla; leaves pinnate of three pairs, leaflets oblong-oval up to one and a-half inches long.

Scrophularineæ.—Herpestis floribundus.

Asperifoliæ.—Halgania solanacea.

Commelineæ.—Commelina ensifolia.

Gramineæ.—Panicum decompositum, P. pauciflorum. Perotis rara. Tragus racemosus. Andropogon gryllus. Aristida arenaria. Eriachne obtusa. Cynodon tenellus. Sporobolus virginicus, var. pallidus. Eragrostis tenella; E. chætophylla.

Anthropological Notes relating to the Aborigines of the Lower North of South Australia.

By J. Harris Browne.

[Read August 3, 1897.]

Method of Cooking Cress (Lepidium ruderale) and of Steaming Rushes (Juncus sp.) for Fibre.

A circular hole was dug in the ground, two feet deep by three feet diameter, and into the bottom of the hole large pebbles were placed; a fire was kindled and kept burning until the stones were red hot. The embers were then taken out and sticks laid across the hole; on these a layer of reeds or damp grass was placed, and on them the cress in concentric layers, the root-ends to the outside; over the cress another layer of grass was laid and more grass round the outside of the heap. A "yam stick" was then thrust through the heap from the top, and when withdrawn water was poured down the hole thus made; this reaching the hot stones, came up in steam that permeated the whole heap, more water being added from time to time when necessary. In about an hour the cress was well cooked, and the oven ready for another fire as before.

Rushes were steamed in the same manner. They were kept warm in the heap, and taken two at a time by the women and chewed from end to end to break up the pith; they were then allowed to dry, when the pith was separated from the fibre by combing it with the fingers. The fibre was then rolled up into twine, by the men, by twirling it with the hand on the naked thigh. The twine thus made was used for making nets for fishing and for catching emu and kangaroo; for the latter the twine was about the thickness of "sash cord."

The chewing process was a very severe task for the women, and while still young their splendid teeth were worn down to the gums.

On a Method of Obtaining Game.

The grassy substance, the leaves and stems of *Xerotes effusa*, was used by the natives of the plains of the lower north for the purpose of suffocating kangaroo rats (bokra) in their burrows. The bokra afforded their chief supply of animal food at all times, but more especially during the summer months; and their skins, made into rugs, formed the only clothing they possessed. The

bokras lived in families, as many as 20 individuals in one burrow. Each burrow had several inlets, all of them converging to a central chamber, and from that chamber tunnels ran off in all directions, each one being the private residence of a family.

A burrow having being found that showed by the tracks of the animals that it was well inhabited, the native proceeded to stop up all the holes, except one on the windward side. Into the outlet opposite to and farthest from this he puts, before filling it up, a yam stick or tuft of grass. Into the open hole he then placed lengthwise a handful of the stems and leaves of this plant, set fire to it, and sat down to fan the smoke into the burrow, the fan being either an owl's wing or a bokra's skin sewn on to a forked stick.

The smoking process took from 15 to 20 minutes. When the native thought there was smoke enough in the burrow, he went to the opposite hole into which he had inserted the yam stick or tufts of grass, and if, on removing it, smoke came out freely, he knew there was enough. He then stopped up the fire hole, and, crouching down on the top of the burrow, he listened intently for the movements, coughing or sneezing, of the bokras, making marks on the ground where the sounds indicated the situation of the animals in their last dying struggle. This was often near the outlets of the burrow. When all was quiet, the native opened the outlets at the marked spots and took out all the animals within his reach. If there were not as many as he wanted, he sunk a hole down into the centre of the burrow to get at those that had died in the central chamber.

The hole sunk was about two feet in diameter, quite circular, and often four or five feet deep. Its object was to reach the point to where the different openings and tunnels converged. The tools used were a yam stick and a wooden tray or shovel eight or nine inches long by six or seven inches wide. When the hole was about 15 inches deep, the native got into it, loosening the earth between his legs with the yam stick, and threw it out over his shoulders with the shovel. It required about an hour to sink a hole four feet deep. I once saw eleven bokra taken out of one burrow, six from the outlet holes and five from the bottom of the shaft. A full-grown bokra weighs as much as an average-sized rabbit.

On the Occurrence of Lower Cambrian Fossils in the Mount Lofty Ranges.

By Walter Howchin, F.G.S.

[Read August 3, 1897.]

For the past fifty years the stratigraphical position of the Mount Lofty Ranges has been one of the most difficult, yet interesting, problems in South Australian geology. A great rampart of rock, nearly 500 miles in its longer axis, its western members composed of thick argillites, quartzites, siliceous limestones and marbles; and its easterly flanks passing into crystalline schists and great igneous intrusions, presents a bold physiographical, as well as geological, contrast to the horizontal beds which have gathered around its base. These serried heights form the most conspicuous and extensive feature in our local geology, and yet they have persistently held the secret of their age. With two doubtful exceptions (quoted by the late Tenison Woods) the most diligent search had failed to secure the faintest palæontological remains; they were consequently regarded as azoic and early observers classified them variously as older Palæozoic, or otherwise, Pre-Cambrian or Archæan.

The discovery in 1879 of a sub-crystalline limestone containing fossils of Lower Cambrian age, resting unconformably on a Pre-Cambrian series on Yorke's Peninsula, was regarded as important analogical evidence that the Mount Lofty formations were of Pre-Cambrian age, and from the date of the discovery mentioned the Mount Lofty Ranges have been generally classified as Archæan. Discoveries have been recently made, however, in these so-called Archæan rocks which have an important bearing on this subject, and on the most convincing evidence determines the basal beds of the Mount Lofty Ranges to be in part, if not wholly, of Lower Cambrian age. The locality where the Cambrian fossils were first observed was

Normanville.

It is to Professor T. W. Edgeworth David, of Sydney, that the credit of a quickened interest in these old rocks is due. During the past nine months he has sectioned for microscopical examination a great number of fragments of siliceous limestones and cherty nodules belonging to this series, and in a sample of black marble from Normanville he detected the remains of small organisms, which he supposed to be pteropods. In March last when Prof. David, Mr. C. C. Brittlebank of Victoria, and the

present writer were examining the glacial features of Inman Valley, opportunity was found to visit the outcrop from whence this interesting specimen had been obtained, with the result that *Archæocyathinæ* remains were discovered in the associated marbles. Prof. David was the first to recognise their occurrence on the weathered surface of the stone, and when once noted additional examples were soon found.

The locality where these remains were discovered is about three miles north of the Normanville Hotel, in a valley opening out to the sea, from which it is distant about half a mile. The place is easily fixed by the old Wheal Mary silver-lead mine, several disused shafts being on the immediate ground where the fossils were first discovered. The fossils are not very plentiful, so far as could be judged from the weathered surfaces of the limestone, and appear to run in narrow fossiliferous zones in the direction of the line of strike, such zones being repeated over a considerable width of outcrop. One of these coralline belts crosses the valley obliquely, passing very near one of the old mining shafts.

At Easter I was able to make a second visit to the spot when the fossiliferous belt was followed along a parallel line to previous observations, still further to the north-west, passing through the next lateral valley for a distance of a quarter of a mile when it was lost to view beneath a thick crust of travertine which covered the crest of the hill.

The fossiliferous beds form part of a very thick series of marbles, limestones, and calcareous shales which exhibit a close stratigraphical and lithological correspondence with the Sellick's Hill beds, to be referred to presently. Their outcrops form steep and rugged hills with only a slight amount of soil on their precipitous sides. The most characteristic lithological feature is a grey streaky cryptocrystalline marble which occasionally changes into a coal-black variety, and more rarely to a mottled red colour. Strings of arenaceous and ferruginous material more or less penetrate the limestones in irregular reticulating lines which stand in relief on the weathered surfaces. This heterogeneity of composition is unfortunate, in that it detracts from the value of the marble as an ornamental stone. The *Archæocyathinæ* are found in the grey marble, and are often difficult to distinguish from the matrix in which they are imbedded. It is highly probable that in some portions of the stone the organic remains have been obliterated by the metamorphic action that has converted the limestone into marble. The fossils occur in every stage of definiteness, and in many cases only the faintest evidences of organic structure has been preserved, the outlines shading off into the amorphous matrix.

The beds show a high angle of dip. In the Wheal Mary shaft, as seen from the surface, the dip reading was 65° W. 5° S. About

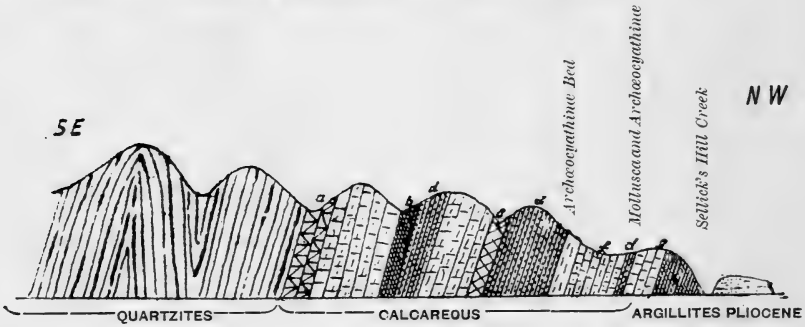
300 yards further up the valley the angle of dip increased to 81° with a due W. direction, and a little higher up again it was found to be 75° in a W.N.W. direction. In a gully about half a mile to the South-West the dip was taken by Mr. Brittlebank at 85° to the N.W.

Sellick's Hill.

In continuation of these researches, last month I visited Sellick's Hill, situated 32 miles to the South of Adelaide, with the hope of finding Cambrian fossils in the neighbourhood, the locality being in the line of strike of the Cambrian limestones of Normanville. The result exceeded my most sanguine expectations. Not only was the fossiliferous horizon easily discovered, but it proved to be much richer in organic remains than the outcrop at Normanville. The principal coralline belt is literally crowded with the remains of *Archæocyathinæ* throughout a vertical section of not less than 100 feet, and was traced in a continuous outcrop of equal richness and thickness for a distance of eight and a-half miles in a North-East and South-West direction.

The main road, in the gradient of Sellick's Hill, passes over the exposed beds nearly at right angles to the line of strike, and in a distance of about a mile and a-half rises to a height of 1,200 feet above sea level. The road cuttings therefore afford excellent sections of the geological features. The beds are much folded and crushed, exhibiting throughout a high angle of dip. These beds can be naturally divided on lithological grounds into three very distinct groups, which, in ascending order, are as follows: —Argillites, Limestones, and Quartzites.

In the following Sketch and Table will be found the leading features of the series as exposed in the road cuttings.



Section of Sellick's Hill.

Distance—One-and-a-quarter Miles.

I. Quartzites.—These occupy the higher elevations of the Ranges and are of great thickness, but sub-divided for the most

part into numerous thin beds. The stone is fine-grained and light-colored, and, where seen from a distance, its blanched boulders present the appearance of a limestone outcrop. The beds are folded into acute anticlinal and synclinal curves, the major anticlinal being about 500 yards in diameter where intersected by the road. The strike of the beds is E.N.E. and W.S.W. Dip S.S.E., nearly vertical.

II. Calcareous Group, including the following sub-divisions—

(a) Crystalline Marbles.—Near a sharp elbow of the road white and cream colored marbles are seen to rise from beneath the quartzites. These light colored, saccharoid marbles have a close resemblance to the "Ardrossan Marbles" of Yorke's Peninsula.

(b) Earthy Shales.—For the distance of half a mile the road runs closer to the line of strike, and passes obliquely over a succession of alternating earthy shales and limestones, the latter varying from a blue siliceous limestone to an earthy, flaggy limestone. Where the laminated earthy shales attain any considerable thickness they are generally crushed and flexured.

(c) Black Impure Limestone, with much earthy matter irregularly distributed throughout the mass, the siliceous portions weathering into brown patches and streaks on the face of the stone.

(d) Flaggy limestones. Dark-coloured limestones and earthy partings, regularly alternating in bands about one inch in their respective thickness. Outcrop serrated and very distinctive. Estimated thickness, 500 feet. Is persistent over many miles of outcrop. Dip, 70° to 76° E.S.E.

(e) Archæocyathinæ marble. Grey to bluish limestones and marbles, outcropping in large tabular masses, often level with the sward. Chiefly composed of *Archæocyathinæ* corals. Thickness about 100 feet.

(f) Impure limestone, more or less siliceous and earthy, including a thin belt of flaggy limestones, resembling *(d)*.

(g) Compact blue limestone. Locally known as "blue metal," and has been quarried in a small way for lime-burning. Sparingly fossiliferous, carrying small mollusca and occasional *Archæocyathinæ*. Several hundred feet in thickness.

III. Argillites. Grey, purple, and black argillaceous shale, which in places becomes more or less calcareous. Strongly jointed, breaking up into numerous rhomboid prisms. The stone

is bleached along lines of joints, but preserves a dark colour in the centre of the prismatic fragments. The grey shale is studded with numerous pellets of small dark-coloured calcareo-siliceous inclusions, which are most numerous in an important cliff section of the same beds seen on the coast at a distance of three miles to the south-west. Strike, N.N.E. and S.S.W. Dip, E.S.E. at 68°.

These argillaceous shales occupy the lowest horizon of the Cambrian rocks exposed in the section. They are seen, both at the base of Sellick's Hill and on the coast, to pass under a thick talus of Pliocene sands, clays, and gravels, which in the sea cliffs have a thickness of from 100 to 200 feet. On the coast these Pliocene beds rest upon gently-rolling Eocene limestones that, in places, are seen to be banked up against the face of the Cambrian shales.

The Fossiliferous Limestones.

The fossiliferous belt crosses the main road a few hundred yards above the Sellick's Hill Hotel, having a North-East and South-West direction. The outcrop follows the foothills, and can be traced for miles on either side of the road.

In a South-West direction fine exposures of the coralline belt are seen by the side of the road and in the adjoining paddock, occurring in large tabular surfaces, which are partially obscured by shallow soil or patches of travertine. At this point the stone is crowded with *Archæocyathinæ* through a vertical thickness of 100 feet. The outcrop can be followed with the greatest ease, the line of strike passing behind the, so-called, "Mount Terrible Farmstead,"* about two miles from Sellick's Hill. Here the soil is deep and cultivated, but large boulders of the fossiliferous marble have been removed, as obstructions to cultivation, to the fence line. The strike, as taken from the superior beds of flaggy limestones on the higher ground behind the farmhouse, was found to be N.E. and S.W. with a nearly vertical dip. The outcrop was followed in the same direction over saddleback hills and deep ravines for about four and a-half miles from the main road. At this extreme distance reached the stone was to all appearance equally as fossiliferous and as important in vertical development as at Sellick's Hill. The strike of the beds at this point is nearly parallel with the coast line, and heading towards Myponga Jetty and Normanville, which could be seen in the distance.

Retracing my steps to the main road, the fossiliferous limestones were followed in their North-Eastern Extension from Sellick's Hill. They are seen in the bed of the creek a little above the bridge where the stream crosses the road. Rising from

* The Mount Terrible of the official map is situated about four miles to the East of this point.

the creek, and on the hill behind the hotel, very massive surfaces of the coralline marbles occur as bare patches, very rich in corals. As in the outcrops on the Western side, the fossiliferous belt follows the course of the foothills, the geological strike having the same general trend as the Ranges.

In the second valley, after leaving the Sellick's Hill Creek, a very excellent section of the Cambrian beds is seen, although the coralline bed is locally denuded. The underlying grey and purple shales are exposed in high cliffs with a dip of 65° to S.E. These shales are overlain by a thick series of blue siliceous limestones, corresponding to the lower fossiliferous horizon, and include a wedge of impure limestone *(f)* and thin quartzite, which seem to have thickened in their easterly extension from Sellick's Hill. In the ascending order, where the *Archæocyathinæ* beds should put on, there are alluvial banks 70 feet high. Higher up the creek the flaggy limestones *(d)* form very high cliffs, which are hard near the surface, but decomposed at depth into soft ochreous beds.

On the rising ground and summit of the next hill the fossiliferous beds are obscured by a thick crust of travertine, but at the North-East slope of the hill there is an extensive exposure of the "blue metal," or lower limestone beds, and on the succeeding hill, both in ascent and descent, the coral beds show through the turf in numerous slabs, maintaining their highly fossiliferous character.

About three miles from Sellick's Hill an important exposure of these beds is seen in the bed of a creek and on the sloping sides of the valley, at a spot which can be easily located as being directly in the line of sight with a district road which runs as a straight line for miles in a northerly direction. The stream has cut the coralline bed at right angles, the latter occupying the bed of the creek for a distance of thirty yards. The overlying flaggy limestone gave the strike as N.E. and S.W., dip 58°. From this point the fossiliferous outcrop was followed for another mile, many good exposures being noted.

At five miles the lower bed *(g)* outcrops with very strong posts of compact limestone in a creek situated a little west of Mr. McBurney's homestead. The gathering darkness of evening prevented further geological observations at this interesting spot.*

The Flaggy Limestones.

The flaggy or earthy limestones which overlie the *Archæocyathinæ* marbles are very constant and characteristic over a long distance, and whilst the fossiliferous marbles are confined to the foot-hills, these overlying impure limestones, with serrated out-

* See Postscript.

crops, follow the crest of the subordinate hills on the Northern side of the Ranges. They occur at Normanville and throughout the eight or nine miles which were under observation near Sellick's Hill. One peculiarity of this bed is that near the surface it is hard and but slightly decomposed, showing only superficial pitting and relief lines, but at depth it is changed to a yellow ochreous earth, sometimes preserving its lines of stratification, and at times with the lines of bedding entirely obliterated. This is the case not only in the instance referred to in the creek section to the East of Sellick's Hill, but still more conspicuously in a gorge 200 feet deep on the South-Western side of Mount Terrible. At one place in the gorge, where there is a fine section of the beds, the latter have been much broken and crushed, large blocks having been turned at right angles to their natural position, the very distinct and thin partings in their stratification making a striking feature when thus broken and twisted. A similar occurrence of crush was noticed (probably on the same line of strike) in a tabular outcrop behind the Mount Terrible farmstead; large blocks, four or five feet square, were seen in juxtaposition with their strata at right angles to each other. These beds (as seen in the gorge referred to) are decomposed into yellow ochre from a few feet from the surface to the lowest point exposed. Dip 55° to 65° Westerly.

It is seldom that so clearly defined an outcrop with distinctive peculiarities can be followed for an equal distance, as is the case with the beds in question. The order of succession, viz., earthy shales, fossiliferous limestones, and flaggy limestones, occurs with equal clearness at Normanville and on the northern flanks of the Sellick's Hill ranges. So constant is this relationship of the beds maintained that it was an easy matter to tell at any moment my exact position on the section. With the "blue metal" outcropping on the one hand, and the calcareous flags with their serrated edges on the other, the coralline horizon was clearly defined even where temporally obscured.

Palæontological.

In the limited time at my disposal, in this rapid survey, but little attention could be devoted to the palæontological features of the rocks other than those which are visible on the weathered surfaces of the stone. The calcareous series, bounded by the argillaceous shales below, and the quartzites above, develop a thickness at Sellick's Hill roughly estimated at 1,800 or 2,000 feet. The fossiliferous portions are towards the base of the series, and are divided into two horizons, separated from each other by earthy limestones, in which no fossil remains were seen. The lower of these horizons is a very strong and comparatively pure

bluish limestone, several hundred feet in thickness. On the Sellick's Hill road these beds are largely covered with travertine, but are exposed in a small quarry close to the road, where the stone has been worked for lime-burning. Better sections of these beds can be seen in the creeks which traverse the outcrops further to the north-east. They are not conspicuously fossiliferous, and the stone is very compact, but in an hour's careful search in the Sellick's Hill quarry three small mollusca and a few *Archæocyathinæ* were obtained.

The upper fossiliferous horizon is a remarkable coralline bed, 100 feet in thickness. The calices of the anomalous *Archæocyathinæ* are crowded together in a manner that must have formed a true coralline reef in the Cambrian seas. The solidity and refractoriness of the matrix rendered it quite impossible to extract these corals from their bed, and the only method in which they can be successfully studied is by polishing and sectioning the rock in which they are entombed. Such a method of investigation is a work of time, and consequently the palæontological results await future elucidation.

The vertical range of the fossiliferous section in the beds marked "e" to "g" in the accompanying table is estimated at 800 feet.

This discovery of Lower Cambrian fossils in the Sellick's Hill Ranges gives a fresh interest to a reputed discovery of fossils in this neighbourhood mentioned by Tenison-Woods in his "Geological Observations in South Australia," p. 20, where, speaking of the Mount Lofty Ranges, he says :—"No fossils have been found except at one portion of the range, about thirty miles south of Adelaide. I was informed that the fossil was a *Pentamerus oblongus*. This would be characteristic of the lowest division of the Upper Silurian rocks. The person who found it is since deceased, so that the observation cannot be traced further or verified, unless new discoveries are made. With this exception ; if, indeed, it can be considered such, nothing is known of the age of the rocks on this range."

The locality indicated for this fossil by Tenison-Woods, although indefinite, is sufficiently precise to make it highly probable that it was obtained from some part of the Cambrian outcrop in the Sellick's Hill Range. The species mentioned is correctly referred to the Upper Silurian, a formation considerably higher in the geological scale than the one we are now dealing with. To explain the discrepancy, we must infer one of two things—either that fossiliferous beds higher in the geological series than the Lower Cambrian occur in the ranges, or otherwise the shell was wrongly determined. The latter is most likely to be the case. We have no information on whose judgment the

determination was made, and it seems more probable to conclude that some Cambrian shell was found, and incorrectly referred to *Pentamerus oblongus* than assume the hypothetical occurrence of a set of beds which are not known to exist in any part of the colony.

Compared with Other Lower Cambrian Localities.

The most Southerly extension of the Cambrian limestone hitherto known in the colony is in the Curramulka District, Yorke's Peninsula, in latitude a little North of Adelaide. The outcrop, which is generally inconspicuous, can be traced at intervals in a Northerly direction from Curramulka to Winulta Creek, a distance of 35 miles. The beds in this area, except at one locality, are but slightly disturbed, and when seen in section, exhibit slight undulations, with a dip usually from 8° to 15°. The exception referred to was observed by the present writer in February last, when an anticlinal axis of some importance was noted parallel with the coast a few miles South of Ardrossan. The Eastern limbs of this anticline can be seen one and a-half miles South of Rogue's Point, in a bold ridge of Ardrossan marble, 20 feet thick, dipping 40° E., as the beds pass out of sight below water level. We have thus the interesting fact that Lower Cambrian beds occupy portions of the coast line on both sides of Gulf St. Vincent, and the dip, respectively, is towards the trough now occupied by this arm of the sea.

Beds of Cambrian age have a great development in the Flinders Ranges, north of Quorn, probably extending nearly 200 miles in a north and south direction. Limestones with *Archæocyathinæ* occur in these ranges at several localities, representing in their extreme positions a geographical line of about 100 miles. The palæontological contents of these beds, as well as those of Yorke's Peninsula, have been elucidated by Prof. R. Tate* and Mr. R. Etheridge, jun.,† but our knowledge of the stratigraphical phenomena of the *Archæocyathinæ* marbles and their associated beds of the Flinders Ranges is very imperfect.

Geological Age of the Mount Lofty Ranges.

It is impossible to ignore the important bearing of this latest discovery of Lower Cambrian fossils on the geological age of the Mount Lofty Ranges. The general uniformity of strike and dip in the rocks throughout this extensive area has led to the opinion held by many that the hill country of the Southern portions of the province represents one great conformable series, and, on various data, its geological position has been commonly referred

* Trans. Roy. Soc., S. Aus., vol. XV. (1892), p. 183.
† *Ibid*, vol. XIII. (1890), p. 10.

to an Archæan, or at least Pre-Cambrian, age.* This hypothesis rested for support mainly on three considerations :—

1. Analogical. Rocks of Pre-Cambrian age are known to occur on Yorke's Peninsula, which exhibit lithological resemblances to many of the rocks in the Mount Lofty Ranges.

2. The discordance in the angle of dip between the Cambrian outcrops (especially those of Yorke's Peninsula) and that which is characteristic of the Mount Lofty Ranges.

3. The fossiliferous features of the Cambrian limestone, compared with the azoic features of the comparatively little altered and pure limestones which are abundantly developed in the Mount Lofty series.

It must be conceded that these considerations have been considerably weakened by the discoveries now placed before the Society, and requires a re-consideration of the whole question. The Cambrian beds at Sellick's Hill occupy a position which has been regarded as near the base of the Mount Lofty series, so that unless the accepted order of succession is to some extent reversed (or otherwise it can be proved that extensive faulting in the rocks has occurred) the Cambrian age of the Mount Lofty Ranges, as a whole, must be accepted.

With regard to the supposed analogy on lithological grounds the Pre-Cambrian rocks of Yorke's Peninsula are uniformly highly metamorphic and igneous in their features and have their analogues, in the Mount Lofty succession, only on the *eastern* flanks. The value of the analogical argument is entirely dependent on the assumption that the more highly metamorphosed beds of the eastern outcrops are *superior* in position, and therefore newer in point of age, to the less altered beds of the western side. For, otherwise, if they underlie instead of overlie the latter, they probably represent an older uncomformable series with the less altered shales, quartzites, and limestones of the western portions as a newer, or Cambrian, formation.

Again, little weight can be given to the consideration of discordance in angle of dip when we take into account that the Cambrians near Ardrossan pass rapidly from a dip of 15° to 40°, and in the Sellick's Hill outcrop in a series of anticlinal and synclinal folds with angles of dip varying from 60° to 90°

Further, the discovery of characteristic fossils in these ranges has not only clearly defined the geological age of the beds in

* As an exception to this opinion, Mr. H. Y. L. Brown, Government Geologist, in his geological map of the colony (1886), divided the Mount Lofty Ranges into three main geological divisions, marked by the degree of metamorphism exhibited. In descending order the divisions are represented as follows :—1. Palæozoic (Lower Silurian). 2. Palæozoic, or Azoic. 3. Archæan.

which they are found, but has thrown doubt on the assumption that the azoic features of the Mount Lofty beds in general are due to a question of age.

The point that awaits determination now is—Are the fundamental rocks of the Mount Lofty Ranges comprehended in one great Cambrian system, or are these rocks divisable into a newer and an older series, a Cambrian and a Pre-Cambrian formation? If the latter, then we must find some line of unconformability by fault or otherwise.

Professor Tate has suggested the probability of a great fault existing in these old rocks somewhere in the vicinity of Adelaide. I believe he has been led to an inference of that kind partly from the great depth of the bed rock in the Croydon bore, amounting to 2,000 feet. The same rocks in the Adelaide bore were proved at a depth of 360 feet, which indicates a gradient of 1,640 feet in a distance of about three and a-half miles. It is not impossible that erosive agencies may be responsible for so great a difference of level, and evidence is not wanting to prove a similar rapid descent of the old rocks below the plains on the eastern side of the ranges,* yet the phenomenon at Croydon is a remarkable one, and may give the clue of a great crust movement, the confirmation of which must be looked for in our hill country. A great downthrow of the beds is capable of preserving outliers of a newer formation, and in this way it is not impossible that Cambrian beds may, by faulting, be thrown against a face of Pre-Cambrian rocks. This is one of the problems which the present discoveries have raised, and which can only be settled by careful and extended observations in the field.

At present no such line of fault is known to exist, and there are some stratigraphical features which seem to indicate that the fossiliferous beds described in this paper are interstratified and conformable with the great geological system of the hills. We have, for example, in the Normanville and Sellick's Hill district a continuous outcrop of Lower Cambrian rocks for a distance of over twenty miles. The general strike and dip of these beds are homologous with that which characterise the hill country in general, and the lithology of the beds bears a close resemblance to the shales, limestones and quartzites of the central and Western parts of the ranges.

As bearing upon the present discoveries, special interest centres in a wide belt of limestones that takes in Brighton, Field River, Reynella, and Noarlunga. These beds vary in composition

* A bore put down at the Pine Hut Creek, on the Murray Flats, within a quarter of a mile of the foot of the hills had to penetrate a depth of 530 feet before reaching the bed rock.

from dolomitic to siliceous and relatively pure limestones.* No marbles such as are found at Normanville and Sellick's Hill are known to occur in this series, and from a number of transparent sections of the limestones of Brighton and Hallett's Cove, made by Prof. David, it has been shown that the minute structure of the stone is largely oolitic. The blue limestones of the last named localities bear a close resemblance to the "blue metal" beds of the Sellick's Hill section, but with the exception of casts of Radiolaria† no fossils have been detected in the Brighton limestones. It is a matter of great interest as to whether the Brighton and Noarlunga limestones are comprehended in the same geological formation as those of Sellick's Hill or not. The former follow a general line of strike almost due North and South, whilst the strike of the latter is from N.E. and S.W. to N.N.E. and S.S.W. This slight discordance of strike in the respective beds is not inconsistent with conformability, but, taking the prevaling south-easterly dip into account we must place the Brighton beds on a somewhat lower geological horizon than the Sellick's Hill beds.

Selwyn notes in his geological map an extensive anticline running nearly parallel to the coast along the Aldinga Plains. This anticline can be traced from Brighton to Normanville, and is marked by a westerly dip on the coast with a general south-easterly dip a few miles inland. This anticlinal area is characterised by remarkable local contortions and overthrusts. It is important to note that these crust movements have included the Cambrians and the foot-hills of Mount Lofty in the same great system of foldings.

The discovery now recorded imparts new interest to the geology of the Hills as a whole, and incites to fresh zeal in searching for such evidences as will eventually unravel the connected story of the origin and development of the great mountain system which forms the geological axis of the colony.

Postcript.

Since reading the above paper I have revisited the neighbourhood of Willunga and followed the outcrop of the Cambrian limestones for several miles beyond the point where left on my previous visit.

Three miles south-west of Willunga, on Section 545, owned by Mr. Culley, sen., the calcareous beds, without making a bold feature, crop out strongly along the foothills. They include the siliceous limestones, flaggy limestones, and overlying quartzites

* These limestones have, in part, been described by Prof. T. W. E. David and W. Howchin, in a joint paper. Proc. Linn. Soc. N.S.W., p. 571, 1896.

† Op. cit. ante.

characteristic of the series with a S.W. and N.E. strike. Dip, S.E., at 45° to 50°. A marked feature of the beds at this point is the thickening of the wedge of flaggy quartzites, which first appear towards the base of the calcareous series near Sellick's Hill, and, thickening as they extend eastward, split the limestones into an upper and lower series.

The lower limestones are well exposed in the next creek, situated a little south-west of Mr. McBurney's homestead, as mentioned in the paper (p.), but the calcareous belt is not seen again until Willunga is reached. At the latter place the limestones are once more bared on the hills behind the town, where the stone is a close-grained white marble, with small crystals of pyrite. From this point the outcrop is clearly defined for several miles, following the foothills, and has been quarried by Mr. F. G. Culley, through whose land the limestone passes. Dip, 60° S.E. It is difficult to tell the exact thickness of the beds, as they are more or less obscured by turf, but the width of visible outcrop varies from 150 to 250 yards.

At Springbrook, two and a-quarter miles from Willunga, the stone has been extensively quarried for road metal. Here the limestone is a dark "blue metal," intercalated with thin earthy shales, and has a dip of 50°. This was the furthest point visited, but the outcrop was visible for a distance of three-quarters of a mile still further to the North-East.

No fossils were seen in this journey, but the limestones in some places included numerous circles filled with radiated crystals of calcite that may possibly represent the cups of *Archæocyathinæ*, although no structure could be detected. I was told, however, by Mr. Brown, the owner of the Springbrook Quarry, that shells had been occasionally seen in the quarry when breaking the stone.

These extended observations have determined the outcrop of the Cambrian beds for a further six miles beyond that mentioned in the paper, or about 25 miles in all, and when last seen the beds were in a line of strike that was directed into the heart of the Mount Lofty Ranges.

My thanks are due to Mr. F. G. Culley, of Willunga, who kindly acted as guide, and facilitated my observations in the Willunga neighbourhood.

September 2, 1897.

On a New Atriplex from South Australia.

By J. H. Maiden, Director of the Botanic Gardens, Sydney, Corresponding Member.

[Read September 7, 1897.]

Atriplex Kochiana, *Maiden.*

A diœcious, occasionally monœcious, erect perennial (or annual with a woody base?) about one to one and a-half feet high, with very angular branches; the whole plant grey with a scaly tomentum. Male flowers in terminal interrupted paniculate spikes, leafy at the base; female flowers in axillary clusters, the upper ones often with a few male flowers. Leaves rather thick, narrowed into a short petiole, ovate-rhomboidal in outline, irregularly sinuate-lobed or almost entire, the largest about one and a-half inches long. Fruiting-perianth nearly sessile, strongly veined as in *A. vesicarium*, two-lobed to near the base, the segments narrow-reniform, twice as broad as long, almost truncate at the top, but slightly denticulate, with two large thick, nearly basal ovate-lanceolate appendages fully twice as long as the calyx-segments.

It is nearest allied to *A. vesicarium*, Hew., which it much resembles in habit and foliage, and from which it is chiefly distinguished by the short and broad segments of the fruiting-calyx, which are scarcely half as long as the dorsal appendages. It is also allied to *A. Quinii*, F. v. M. (in *Victorian Naturalist*, November, 1888), but distinguished from that species chiefly by the much longer appendages of the calyx-segments, the broader leaves, and more herbaceous habit.

Thinly distributed in the vicinity of Mount Distance, near Mount Lyndhurst, *viâ* Farina, South Australia.—Heinrich Ludwig Max Koch, July, 1897.

Named in honor of Mr. Koch, a very intelligent collector, and transmitted to me by Mr. Albert Molineux, F.L.S., General Secretary of the Agricultural Bureau of South Australia.

This large-leaved *Atriplex* is doubtless a valuable fodder plant (it is reported that "it is much liked by stock") and steps will be taken to have it propagated, with the view to experiments being made in this direction.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species.

By the Rev. T. Blackburn, B.A.

[Read October 5, 1897.]

XXII.

CUCUJIDÆ.

PROSTOMIS.

P. intermedius, sp. nov. Statura *P. Atkinsoni*, Waterh.; rufo-brunneus, nitidus; antennis brevibus, articulo 3° minus elongato; capite prothoraceque sparsim subtilissime punctulatis; elytris subtiliter punctulato-striatis; jugulæ calcaribus lateralibus antice approximatis. Long., 3—4 l.; lat., $\frac{3}{5}$—$\frac{3}{4}$ l.

With antennæ resembling those of *P. cornutus*, Waterh., this species has its jugular processes like those of *P. Atkinsoni*, Waterh.

Victoria and N.S. Wales.

PECTINICORNES.

AULACOCYCLUS.

A. collaris, Blackb. In describing this species (Tr. Roy. Soc. S.A., 1896, p. 233) I omitted to state that its habitat is N. Queensland.

LAMELLICORNES.

APHODIUS.

A. Victoriæ, sp. nov. Minus elongatus; minus nitidus; pubescens; colore variabilis, capite prothoraceque nigris vel nigro-piceis, elytris lividis longitudinaliter plus minusve piceo-notatis, corpore subtus nigro-vel brunneo-piceo, pedibus lividis plus minusve picescentibus; capite prothoraceque crebre subgrosse subrugulose punctulatis, illo antice reflexo; prothorace sat transverso postice haud (vel vix manifeste) marginato, lateribus minus arcuatis, angulis posticis fere rectis, disco postice leviter canaliculato; elytris striatis, interstitiis alternis sat convexis.

Maris prothoracis lateribus postice sinuatis, capite antice truncato, tibiis anticis gracilibus extus bidentatis.

Feminæ prothoracis lateribus postice fortiter emarginatis, capite antice fere æqualiter rotundato, tibiis anticis minus gracilibus extus tridentatis. Long., $2\frac{1}{2}$—$2\frac{4}{5}$ l.; lat., $1\frac{1}{2}$ l. (vix).

The markings on the elytra resemble those of *Aphodius sus*, Fabr., but are on the non-costate interstices.

The species may perhaps be placed in the genus not far from *A. sus;* it is allied to *A. lindensis*, Blackb., which is founded on a female example, the male probably presenting characters similar to those of the present insect. The mesosternum is gently carinate. The prothorax is almost without trace of a basal margin and the lateral margin is not continued along the edge of the emarginate portion of the prothorax in the female (in *lindensis* this emarginate portion is margined).

Victoria; Black Spur; also sent by Mr. J. A. Kershaw, of Melbourne.

PROCTAMMODES.

P. minor, sp. nov. Subovalis; nitidus; niger, palpis tarsisque plus minusve rufescentibus; capite subtilius crebre (in medio magis sparsim) haud rugulose punctulato, paullo pone marginem anticum obtuse gibbo (hoc antice emarginato); prothorace leviter transverso, postice canaliculato, fortiter minus crebre punctulato; elytris crenato-striatis, interstitiis convexis sparsim subtiliter punctulatis; tibiis anticis extus tridentatis. Long., $1\frac{3}{5}$ l.; lat., $\frac{4}{5}$ l.

Much like *P. sculptus*, Hope, but notably smaller, with the head much more sparsely, finely, and smoothly punctulate and having its surface even except that it is feebly and obtusely gibbous in the middle behind the base of the clypeus. This genus is most easily distinguished from *Aphodius* by the basal joint of its front tarsi being the longest joint, reaching almost to the apex of the apical spur of the tibia. In this character it resembles *Atænius* but differs from the latter *inter alia* by the structure of the hind tibiæ being of the *Aphodius* type.

Victoria; several localities; also sent by Mr. J. A. Kershaw.

DIPHUCEPHALA.

D. Kershawi, sp. nov. Mas. Viridis, antennis (clava nigra excepta) testaceis, tarsis cyaneis; breviter minus perspicue setosa; capite prothoraceque confertim subtiliter punctulatis et reticulatim subtiliter areolatis; illo sat plano antice recurvo et profunde emarginato, angulis anticis extrorsum paullo directis; prothorace quam longiori paullo (ut 8 ad 7) latiori, longitudinaliter et transversim late sat profunde sulcato (sulco longitudinali postice haud bifido, transverso

sat continuo), antice parum angustato, lateribus bisinuatis in medio dente acuto armatis, angulis dentiformibus; elytris subfortiter subseriatim rugulose punctulatis et sat fortiter bicostatis; corpore subtus albo-piloso; tarsis posticis gracilibus. Long., $2\frac{4}{5}$ l.; lat., $1\frac{1}{5}$ l.

Fem. latet.

In Sir W. Macleay's classification of the *Diphucephalæ* this species falls into the second division of subsection B in Section II. The close fine puncturation of its prothorax separates it at once from all the species that have been attributed to that aggregate except *D. prasina*, Macl. and *D. laticollis*, Lea. Its remarkably elongate prothorax but little narrowed in front separates it readily from those two insects (presuming from the name that *D. laticollis* has a strongly transverse prothorax, the character is not mentioned in the description). It considerably resembles several species in others of Sir W. Macleay's aggregates, *e.g.*, *purpureitarsis*, Macl. and *pygmæa*, Waterh, but these have *inter alia* the prothoracic furrows quite different. *D. purpureitarsis*, Macl., has similar prothoracic sculpture (*i.e.* fine close puncturation and a network of very fine scarcely elevated lines) though with the reticulation less marked. The following characters in combination are sufficient, I think, to distinguish this from all other described *Diphucephalæ*—prothorax very little wider than long and not much narrowed in front, with its longitudinal sulcus simple and its transverse sulci reaching the middle of the segment. The hind tarsi in this species are much more slender and elongate than in any other *Diphucephalæ* known to me, and the basal two joints are of equal length *inter se*. The structure of the hind tarsi furnishes very important characters for the distinction of species in this genus and seems to have been unaccountably overlooked hitherto by describers.

Victoria; sent by Mr. J. A. Kershaw.

PACHYGASTRA.

P. Victoriæ, sp. nov. Ovata; subnitida; nigra, pedibus picescentibus, antennis (harum clava triarticulata) palpisque subferrugineis; subtus et in pedibus ferrugineo-hirsuta; capite crebre aspere (clypeo hoc antice rotundato margine recurvo, minus crebre haud aspere) punctulato; prothorace vix canaliculato, fortiter transverso, antice fortiter angustato, ut caput punctulato, lateribus fortiter dilatato-rotundatis; scutello punctulato; elytris fortiter vix geminatim punctulato-striatis, interstitiis sparsim punctulatis; pygidio crebre subtiliter punctulatis; tibiis anticis late dilatatis, extus obtuse bidentatis.

Maris quam feminæ antennarum clava magis elongato (quam articuli ceteri conjuncti vix breviori) segmento ventrali penultimo breviori. Long., $6\frac{1}{2}$—$7\frac{1}{2}$ l.; lat., $3\frac{1}{2}$—$4\frac{2}{5}$ l.

Agrees with *P. tasmanica*, Germ. in its labrum projecting in a plane parallel with, but considerably below the level of, that of the clypeus and its remarkably dilated (externally bidentate) front tibia which resembles those of the *Dynastid* genus *Cheiroplatys*. The above two characters in combination I take to be the essential characters of *Pachygastra*. The antennæ differ much from those of *P. tasmanica* (which have a 6-jointed club, at any rate in the male), but the difference is not greater than occurs in the antennæ within the limits of allied genera (*e g. Colpochila*). Specifically it is much smaller than *tasmanica* and differently colored, with its elytra strongly punctulate-striate.

Victoria; sent by Mr. French.

ASEMANTUS.

A. subæqualis (? Hope). In describing this species (Tr. Roy. Soc., S.A., 1896, p. 249) I omitted to mention its size, which is, long., 9—12 l.; lat., $4\frac{1}{5}$—6 l.

PIMELOPUS.

P. Sydneyanus, Blackb. In describing this species (Tr. R.S., S.A., 1896, p. 256) I omitted to mention its size, which is, long., 9—11 l.; lat., 5—6 l.

CLERIDÆ.

STIGMATIUM.

S. bimaculatum, sp. nov. Piceo-nigrum, capite elytrorum duabus quintis basalibus antennis sternis coxis abdominisque basi plus minusve rufescentibus, elytris ante apicem maculis singulis testaceis fere circularibus ornatis; capite et elytrorum maculis pilis albidis sat dense vestitis, prothorace elytris ad basin et apicem pedibusque setis erectis elongatis sparsius ornatis (his in prothorace nigris in elytris pedibusque albidis), elytrorum ceteris partibus setis minus elongatis (his ut superficies coloratis) instructis, sternis sat dense sat breviter albido-pilosis; oculis inter se modice approximatis; antennis modice elongatis, articulorum singulorum latitudine majori prope apicem posita; prothorace paullo ante medium transversim sinuatim sulcato, trans basin transversim bisulcato, subtiliter sat crebre punctulato; elytris in duabus quintis basalibus punctulato-striatis (interstitiis convexis granulatis), in cetera parte sparsim seriatim minus perspicue granulatis. Long., 4 l.; lat., $1\frac{1}{4}$ l.

Resembles *S. Gilberti*, from which it differs *inter alia* by the red basal piece of the elytra not extending so far hindward and having its hindmargin not (or only very narrowly) clothed with dense pubescence, by the black apical piece of the elytra being less evidently granulose, and by the subapical spot on each elytron being (not an obliquely placed oval mark but) almost perfectly circular. *S. dispar*, Kuwert, appears to be distinguished from this species by the hinder part of the elytra being punctulate-striate, and *Victoriæ*, Kuwert, by the front part of the elytra being black. The other described species seem to differ by structural characters that may be regarded as subgeneric, especially by the shape of the joints of their antennæ.

W. Australia.

BOSTRICHIDÆ.

XYLOPERTHA.

X. hirticollis, sp. nov. Sat nitidus; ferrugineus, prothorace sternisque obscuris; capite utrinque supra oculos pilis elongatis crispatis densissime fimbriato; antennis 10-articulatis, articulis ultimis 3 conjunctis quam ceteri conjuncti manifeste longioribus; prothorace subcylindrico sublævi sed in parte antica sat grosse granuloso-ruguloso et in margine antico utrinque (ut caput) densissime pilis elongatis vestito; elytris obsolete nec crebre nec seriatim punctulatis, postice oblique parum abrupte subtruncatis, parte declivi a medio retrorsum carina cincta, sutura postice leviter cariniformi, angulo suturali acuto sat prominulo; segmentis ventralibus penultimo antepenultimoque fortiter emarginatis (ultimo magno subcompresso); tarsis posticis sat elongatis, articulis basalibus 3 valde compressis (articulo basali brevissimo, 2° 3° 4° que conjunctis longitudine sat æquali, 3° quam 4^us^ triplo longiori, 5° 3° longitudine sat æquali; tibiis anticis (intermediis exempli typici carentibus) extus sat fortiter denticulatis. Long., $1\frac{4}{5}$ l.; lat. $\frac{4}{5}$ l.

I have no doubt that the specimen described above is a male. It is easily recognizable by the remarkable shaggy and curled pilosity on its head and prothorax. Each mass of hairs is about as long as one of the antennæ. The masses are placed one on either side of the head running longitudinally, and one on either side of the front margin of the prothorax running transversely. The penultimate and antepenultimate ventral segments are strongly and widely emarginate, so that their hind margins in the middle are very close to each other and to the preceding segment, but much farther apart on the sides. The strong compression of the basal part of the hind tarsi and the denticulation of the front (and perhaps also the intermediate) tibiæ are also noteworthy characters.

Roebuck Bay, W. Australia; sent by Mr. French.

TENEBRIONIDÆ.

EXANGELTUS, gen. nov. *(? Scauridarum).*

Ligula sat producta; mentum subquadratum planatum setosum; palporum articulus ultimus securiformis; caput subtus ante oculos profunde transversim sulcatum; labrum modicum horizontale antice dense ciliatum; caput declive pone oculos parum angustatum; oculi sat convexi minus angusti sat grosse granulati antice emarginati; antennæ sat graciles sat elongatæ filiformes, articulo 2° brevi, 3° quam 4^{us} 5^{us} que conjuncti vix breviori, 10° quam 9^{us} sat minori, 11° minimo subglobulo; prothorax antice et ad latera vix marginatus quam elytra multo angustior; elytra convexa sat angusta quam prothorax circiter quadruplo longiora ad latera vix perspicue marginata; prosternum ante quam pone coxas vix magis productum, parte mediana postice sat recurvo; mesosternum sat angustum declive; metasternum elongatum; segmenta ventralia 3^{um} 4^{um} que postice haud coriaceo-marginata; coxarum intermediarum trochantina manifesta; pedes minus elongati minus robusti; tarsi subtus pubescentes, posticorum articulo basali apicali longitudine sat æquali; corpus setis brevibus adpressis minus crebre vestitum.

The insect on which this genus is founded is an extremely perplexing one. I received it from Central Australia many years ago and have never been able to make up my mind where in the *Tenebrionidæ* to place it. Most of its characters associate it with the "Tribes" that form the first "Cohort" of the second "Section" in M. Lacordaire's arrangement, but I have felt great difficulty in placing it among them on account of its tarsi pubescent beneath and the structure of its prosternum which is such that the front margin of the front coxæ is scarcely further from the front margin of the prosternum than the hindmargin of the same coxæ is from the hindmargin of the prosternum. Lately I have submitted an example to that accomplished specialist in the *Tenebrionidæ* Mr. G. C. Champion and with his usual courtesy he has written me his opinion that it ought to be placed in the "Cohort" to which I was disposed to refer it, pointing out a character confirming it in this position, the importance of which seems to have escaped the attention of M. Lacordaire; viz., the absence of a coriaceous hindmargin to the third and fourth ventral segments. Mr. Champion thinks it in some respects allied to *Asida* (belonging to a "Tribe" not hitherto known as Australian) though of entirely different facies, and also notes its relationship to *Nyctoporis*,—near which (and therefore, according to M. Lacordaire's arrangement, in the Tribe *Scaurides*) I had myself been inclined to think it seemed least out of place. I

therefore, though not without hesitation, assign it to that position in order to bring forward a description of it.

E. angustus, sp. nov. Nigro-piceus; opacus; anguste elongatus, modice convexus (*Tenebrionem molitorem*, Linn., forma nonnihil simulans); prothorace transverso, antice parum emarginato (quam postice paullo angustiori), longitudinaliter confertim æqualiter strigato, lateribus antice sat arcuatis postice subrectis, angulis posticis dentiformibus retrorsum directis; elytris sat parallelis quam prothorax sat latioribus, striis circiter 17 crebre punctulatis instructis, interstitiis angustis sat cariniformibus; corpore subtus crebre sat fortiter punctulato. Long., $5\frac{1}{4}$ l.; lat, $1\frac{7}{10}$ l.

The close striation of the elytra (about 17 striæ on each elytron) is a notable superficial character.

Central Australia; McDonnell Ranges; taken by Mr. Wild.

OSPIDUS.

O. gibbus, sp. nov. Latus, fortiter convexus; nitidus; rufo-brunneus, elytris sparsim parum manifeste fusco-maculatis, antennis apicem versus piceis; capite subtilius sat crebre punctulato; prothorace fortiter transverso, longitudinaliter vix manifeste canaliculato, disco subtiliter sparsim punctulato, lateribus late planatis transversim rugatis; scutello sublævi; elytris subfortiter sat crebre vix subseriatim punctulatis, parum perspicue 3-costatis. Long., 8 l.; lat., 5 l.

Larger than *O. chrysomeloides*, Pasc., more nitid, more convex, and differently colored; also the prothorax is more sparsely punctured on the disc with its lateral portions much more flattened (they are scarcely flattened at all in *chrysomeloides*), wider, and more rugulose, and the lateral flattened part of the elytra is wider and less rugulose.

As I did not feel sure that my example of Mr. Pascoe's species was correctly named from his description, I have sent an example of this insect to Mr. Champion (who has access to Mr. Pascoe's types) and he reports it quite distinct from *O. chrysomeloides*.

N. Queensland; sent by Mr. French.

MELANDRYIDÆ.

PAROMARTEON, gen. nov. *(? Melandryidarum).*

Caput breve transversum; oculi modici convexi, sat fortiter granulati; palporum maxillarium articulus apicalis sat parvus antice oblique truncatus; mandibula ad apicem bifida; antennæ sat breves robustæ (articulo 3° quam 2^{us} perspicue longiori 4°—10° sat æqualibus fere transversis, 11° quam precedentes manifeste longiori); pronotum transver-

sum, a prosterno carina haud distinctum ; quam caput paullo latius, lateribus fortiter rotundatis, angulis fere nullis ; scutellum modicum fortiter transversum ; elytra quam prothorax latiora sat elongata ; coxæ anticæ longitudinales inter se fere contiguæ postice late apertæ ; coxæ intermediæ longitudinales inter se sat approximatæ ; coxæ posticæ inter se sat approximatæ ; processus intercoxalis angustus brevis ; pedes modici, tibiis ad apicem minute mucronatis, tarsorum posticorum articulo basali ceteris conjunctis longitudine æquali (3° breviter bilobo) ; forma nonnihil *Telephorum* simulans ; corpus supra capillis erectis minus elongatis crebre vestitum.

This is another perplexing Heteromerous insect on which I have asked the opinion of Mr. Champion. He thinks it must be a *Melandryid* near *Trichosalpingus*, which when I characterised it I referred with much hesitation to the *Pythidæ* noting that its tarsal structure was not of the *Pythid* type. Its tarsi are *Melandryid* in character, but its pronotum not divided by a carina from the prosternum excludes it (according to M. Lacordaire) from the *Melandryidæ*. Mr. Champion however evidently considers that the tarsal rather than the prothoracic structure should be the determining character (and I regard his opinion as very conclusive) as he refers *Trichosalpingus* to the *Melandryidæ*. There is no doubt of *Trichosalpingus* and *Paromarteon* being structurally near each other—although they are superficially very unlike, the former having an apparent *Pythid* aspect and the latter a facies more suggestive of a *Telephorid*.

P. mutabile, sp. nov. Sat nitidum ; capite prothoraceque rufis, elytris pedibusque (tarsorum apice piceo excepto) testaceis, corpore subtus (prosterno excepto) antennisque (basi testacea excepta) piceis ; nonnullorum exemplorum capite elytrisque plus minusve vel omni no picescentibus ; capite prothoraceque subtiliter sparsissime, elytris sat crebre minus subtiliter, corpore subtus sparsim minus perspicue, punctulatis. Long., $1\frac{4}{5}$ l. ; lat., $\frac{3}{5}$ l.

Victoria ; Alpine Region.

SCRAPTIA.

S. lunulata, sp. nov. Minus elongata ; minus nitida ; sat longe pubescens ; piceo-brunnea ; in elytris macula communi antemediana sublunata et apice toto, antennis, pedibusque, sordide testaceis ; oculis sat magnis grosse granulatis ; antennis elongatis sat gracilibus, articulo 3° quam 2^{us} fere duplo longiori 4° longitudine sat æquali ; prothorace fortiter transverso, cum capite æqualiter crebre subfortiter aspere punctulato, angulis posticis acutis, basi media late lobata ; elytris

quam prothorax parum fortius vix magis aspere punctulatis. Long., $1\frac{1}{2}$ l. ; lat., $\frac{1}{2}$ l.

This is another species that I have referred to Mr. Champion. He reports that in spite of its considerably different facies from that of a typical *Scraptia* he does not see much in the way of structure on which to found a distinct genus. Failing to discover any such distinction myself, I have no hesitation therefore in attributing the insect to *Scraptia*.

N. Queensland ; sent to me by Mr. Koebele.

CURCULIONIDÆ.

CUBICORHYNCHUS.

C. tortipes, sp. nov. Mas. subovalis, postice truncatus ; niger, squamis parvis silaceis (exemplis visis fere omnino abrasis) et setis sparsis brevibus minus perspicuis albidis vestitus ; capite postice sparsim granulato, supra oculos crista parva acuta instructo ; antennarum clava longe pediculata ; rostro minus lato supra costis obtusis nonnullis instructo, antice profunde triangulariter impresso (partis impressæ marginibus lateralibus cariniformibus) ; prothorace quam longiori vix latiori, pone apicem transversim anguste fortiter impresso et longitudinaliter linea subtili distincte notato (his canalibus fere ut *C. calcarati*, Macl.), crebre æqualiter granuloso (ut *C. occulti*, Sloane), lateribus fortiter dilatato-rotundatis ; elytris supra planatis, postice perpendicularibus, ad latera planis perpendicularibus (vel potius deorsum convergentibus), sat fortiter striatis, interstitiis transversim striatis et subseriatim granulosis (granularum magnitudine maximam partem ut *C. occulti*, Sloane, sed in interstitii 5^{i} parte ante-apicali sat majori) ; coxis anticis inter se sat remotis ; femoribus anticis basin versus fortiter curvatis ; tibiis anticis fortiter, posticis paullo minus fortiter, falciformibus ; tibiis intermediis sat fortiter flexuosis. Long., 7 l. ; lat., 3 l.

Fem. latet.

This is the most remarkable *Cubicorhynchus* yet described I think and can hardly be identical with any hitherto named ; for, although some of them are so briefly and vaguely characterised as to be incapable of certain identification, it is doubtless safe to assume that no describer could have passed over without remark the extraordinary shape of the legs and the elytra if he had had this insect before him. Looked at from directly above the present species appears to be sharply truncate at the commencement of the posterior declivity of the elytra, while looked at from directly behind (or obliquely from in front)

the upper outline of the elytra across the commencement of the posterior declivity is distinctly concave, while the lateral part of the elytra descends so abruptly that in the hinder part the 5th interstice appears as the line of contact between two planes placed at a right (or even slightly acute) angle to each other. The extraordinary strongly pediculated and bent front femora, and the remarkable shape of all the tibiæ as well as the strangely shaped antennal club (with a pedicle scarcely shorter than the dilated apex) also furnish unmistakeable characters, and the sculpture of the elytra (especially their transversely furrowed appearance almost as in *Sclerorhinus rufipes*, Blackb.) is also noteworthy. Probably the structural characters of the female are very different, but no female has been described in terms that seem to associate it with the male before me.

W. Australia; Upper Murchison R. district; sent by Mr. French.

LONGICORNES.

PENTHEA.

P Mastersi, sp. nov. Mas. Dense pubescens et sparsissime nigro-setulosa; pube albida ochraceo-variegata et passim maculis parvis nigris ornata; antennis quam corpus parum longioribus, subtus sparsim capillis nigris fimbriatis, articulo 3° quam 4^{us} vix longiori, articulis 1° 2° que griseis nigro-maculatis (ceteris piceis ad basin et ad apicem anguste griseis); capite inter antennas leviter concavo, linea subtili integra longitudinali media impresso; prothorace transverso, pone medium leviter transversim sulcato, ante sulcum transversim 6-tuberculato, pone sulcum utrinque tuberculo parvo obtuso armato; scutello transverso postice subtruncato; elytrorum sculptura sub pubem fere abdita (costis 3 manifeste apparentibus, internis 2 ante medium desinentibus), granulis nonnullis prope basin exstantibus, apicibus subtruncatis. Long., 7 l.; lat., $2\frac{1}{2}$ l.

This species is I think congeneric with certain small Longicorns which Mr. Pascoe described as forming a distinct section of *Penthea* (*P. scenica*, *melanosticta*, &c.). Mr. Pascoe associated with them *P. picta*, which differs from *P. scenica*, &c., in being clothed with long fine hairs and having very finely granulated eyes, and which should I think be placed in *Corrhenes*; and I should judge from the descriptions that *P. crassicollis*, Pasc., and *sectator*, Pasc., should also be referred to *Corrhenes*. The present insect is of narrower form than *P. scenica* and *melanosticta* from both of which it also differs *inter alia* in having a well-marked transverse sulcus on the prothorax *behind* the middle (so well marked that its extremities viewed from above look like emargin-

ations of the lateral margins) in addition to the usual transverse depression *in front of* the middle. From *P. macularia*, Pasc. (which I know only by description) it seems to differ by the presence of ochraceous pubescence, of a well-defined longitudinal line on the head, and of evident elytral costæ, as well as by the absence of a smooth glabrous line on the prothorax; from *P. miliaris*, Pasc., by the presence of white as well as *ochraceous* pubescence on the elytra, the shape of the scutellum, &c.; and from *P. pullina*, Pasc., by its elytra not having "two prominent costæ marked at intervals by coarse tubercles." Its colours and markings are as follows:—on a ground of whitish pubescence ochraceous pubescence occupies the hind part of the head, runs forward between the antennæ (not extending to the eyes) and spreads out on the front of the antennal tubers, is distributed in a kind of linear reticulation on the prothorax and runs similarly over the disc of each elytron but is almost absent on the marginal sutural and apical portions; the whole upper surface is studded with small black spots (evidently smaller than those of *P. melanosticta* and much smaller than those of *P. scenica*) which on the front of the elytra are raised granules but elsewhere are even with the general surface.

N.W. Australia; sent by Mr. Masters.

ABSTRACT OF PROCEEDINGS

OF THE

Royal Society of South Australia,

FOR 1896-97.

ORDINARY MEETING, NOVEMBER 3, 1896.

WALTER HOWCHIN, F.G.S. (President), in the chair.

EXHIBITS.—J. G. O. TEPPER, F.L.S., laid on the table a case of *Lepidoptera*. Dr. MORGAN exhibited a large collection of birds in illustration of his paper.

OBITUARY NOTICE.—The President referred in feeling terms to the loss science had substained in the death of Baron F. von Mueller; and it was decided to place a minute on record testifying to the high value of his achievements in the fields of science.

IMPORTANT DISCOVERY.—The President announced that Prof. David, of the Sydney University, had discovered fossils, *Radiolaria*, in black cherty bands in silicious shales at Crystal Brook, S.A. These rocks had previously been considered of Archæan age.

ELECTION OF HON. SEC.—G. G. Mayo was elected an additional Hon. Sec., vice W. B. Poole resigned.

PAPERS.—"List of Birds in the Neighbourhood of Laura, S.A.," by Dr. Morgan. "Corrosion of Brass Pins in Entomological Specimens," by J. G. O. TEPPER, F.L.S.

ORDINARY MEETING, APRIL 6, 1897.

WALTER HOWCHIN, F.G.S. (President), in the chair.

EXHIBITS. — Prof. TATE, F.G.S., exhibited the following minerals: — *Plumosite*, the capillary form of *Jamesonite; Monazite*, the source of *cerium* and *lanthanum;* an unnamed form of calcic borate, possibly an anhydrous form of *Bechelite; Coquimbite*, a tersulphate of iron in its exceedingly rare purplish form; and a specimen of telluride of gold, W.A. Also rock specimens illustrating crush-conglomerate, a specimen of contact metamorphism, and a specimen of the alteration of *diorite* to *serpentine*. J. G. O. TEPPER, F.L.S., laid on the table a collection of *Lepidoptera* from the Solomon Islands, consisting of 191

specimens, comprising 65 species. They had been presented to the Museum by the Rev. R. T. Mathews, of Port Lincoln.

Ballot.—Prof. T. W. E. David, B.A., of the Sydney University, N.S.W., and John Dennant, F.G.S., of the Education Department, Victoria, were elected Hon. Fellows; and Dr. Morgan and A. M. Lee, Colonial Entomologist, W.A., were elected Fellows.

Papers.—"Descriptions of *Coleoptera*," by Rev. Thomas Blackburn, B.A. "*Opisthobranchs* of the Older Tertiaries of Australia," by M. Cossmann, of Paris, an Hon. Fellow. "Notes on Australian Typhlopidæ," by E. R. Waite, Australian Museum. "Descriptions of *Lepidoptera*," by Oswald Lower, F. Ent. S. "Catalogue of the Native Flora about Port Elliot," by Miss Jessie Hussey. The catalogued names number 355; of these the following 25, including three new species to the province, are additional to the region (*vide* Trans. Roy. Soc. S.A., p. 68, 1889) —*Claytonia corrigiolacea*, *Casuarina paludosa*, *Atriplex Muelleri*, *A. prostratum*, *Dodonœa Baueri*, *D. humilis*, *Pimelea Husseyana* (new species), *Daviesia genistifolia*, *Pultenea tenuifolia*, *Helichrysum cinereum*, *Cassinia punctulata*, *Logania crassifolia*, *Styphelia costata*, *Scutellaria humilis*, *Pterostylis nutans*, *P. nana*, *P. præcox*, *P. obtusa*, *Acianthus caudatus*, *Centrolepis polygna*, and *Danthonia bipartita*.

Ordinary Meeting, May 4, 1897.

Walter Howchin, F.G.S. (President), in the chair.

Exhibits.—J. G. O. Tepper, F.L.S., exhibited a case of Indian *Lepidoptera*. Prof. Tate, F.G.S., laid on the table a fossil species of nautilus obtained near Port Pirie, S.A. W. H. Selway showed an autumnal species of *Pterostylis*.

Ballot.—C. W. Marsh was elected a Fellow.

Paper.—Prof. Tate, F.G.S., read a paper dealing with the conchological collections in the London and Paris Museums.

Ordinary Meeting, June 1, 1897.

Walter Howchin, F.G.S. (President), in the chair.

Exhibits.—W. Howchin, F.G.S., exhibited a large number of glaciated pebbles and rocks illustrative of the glacial features at Inman Valley, S.A.; also photograph of polished surface of Selwyn's Rock, Inman Valley, S.A. Prof. Tate, F.G.S., laid on the table photographs of evidences of glaciation at Crown Gorge and Yellow Cliff, on the River Finke, Central Australia.

Election of Sub-Committee.—After a discussion on the best methods of disseminating information on local predatory insects

and insectivorous birds, it was decided to elect a sub-committee to consider and report on the matter, consisting of W. Howchin, F.G.S. (President), Prof. Tate, F.G.S., Messrs. S Dixon, W. C. Grasby, and J. G. O. Tepper, F.L.S.

Papers.—"Notes on the Glacial Features of Inman Valley, Yankalilla, S.A., and Cape Jervis Districts," by Prof. David, F.G.S., and Walter Howchin, F.G.S. "Evidences of Glacial Action in Central Australia." by Prof. Tate, F.G.S.

Ordinary Meeting, July 6, 1897.

Walter Howchin, F.G.S. (President), in the chair.

Exhibits.—J. G. O. Tepper, F.L.S., laid on the table specimens of all the *Odanati* and genuine *Neuroptera* from South Australia in the Museum. A. Zietz, F.L.S., Assistant-Director S.A. Museum, laid on the table, the nest, egg, and skin of the Queensland rifle bird. The specimens shown belong to *Craspedophora Alberti*, from Cape York. The specimens were collected by Mr. D. LeSouef. Prof. Tate, F.G.S., exhibited the following specimens of mollusca cellected by the Calvert Exploring Expedition: —*Melania onca*, previously only known from the River Adelaide, N.T.; *Vivipara australis*, a widely diffused species in Tropical Australia; and *Unio Sturtii*, a species of Northern and Central Australia. W. Howchin, F.G.S., exhibited rock specimens containing *Radiolaria*, from England, New South Wales, and South Australia (Brighton and Crystal Brook).

Papers.—"Notes on a hitherto undescribed Parrot for S.A.," by A. Zietz, F.L.S, Assist. Director S.A. Museum. "List of Plants collected by the Calvert Exploring Expedition," by Prof. Tate, F.G.S.

Ordinary Meeting, August 3, 1897.

Walter Howchin, F.G.S. (President) in the chair.

Exhibits.—A. Zietz, F.L.S., exhibited native weapons and other articles collected by members of the Calvert Exploring Expedition, from the Fitzroy River and Joanna Springs, W.A. J. G. O. Tepper showed galls from West Australia, consisting of species of *Brachyscelis*; also three specimens of *Cordiceps larvatum*, a fungus growing on caterpillars in New Zealand; also a specimen of the "tsetse fly" (*Glossina marsitans*) from South Africa; also a specimen of the genus *Chelifer* of the *Scorpionidæ* obtained near Mt. Lofty, S.A.

Papers.—"Anthropological Notes," by J. H. Browne, communicated by Dr. Stirling. "On the Occurrence of Lower Cambrian Fossils in the Mt. Lofty, S.A., Range," by W. Howchin, F.G.S.

Ordinary Meeting, September 7, 1897.

Walter Howchin, F.G.S. (President), in the chair.

Exhibits.—J. G. O. Tepper, F.L.S., showed roots of the apple-tree affected with *Schizoneura lanigera*. W. Howchin, F.G.S., exhibited a portion of rock obtained from near Sellick's Hill, S.A., containing Cambrian corals. W. H. Selway laid on the table orchids from between Middleton and Goolwa, which he considered very early. A Zietz, F.L.S., Assistant-Director of S.A. Museum, exhibited the completely restored fore and hind left feet of *Diprotodon*, and contrasted them with those of such living marsupials as the wombat, kangaroo, native bear, and opossum.

Ballot.—J. H. Browne was elected a Fellow.

Paper.—"On a New *Atriplex* from South Australia," by J. H. Maiden, F.L.S.

Annual Meeting, October 5, 1897.

Walter Howchin, F.G.S. (President), in the chair.

Exhibits. — Botanical and entomological specimens were exhibited by Messrs. Edwin Ashby and J. G. O. Tepper, F.L.S.

Annual Report and Balance-sheet were read and adopted.

Election of Council.—President, W. L. Cleland, M.B.; Vice-Presidents, Prof. Tate, F.G.S., and Walter Howchin, F.G.S.; Hon. Treasurer, Walter Rutt, C.E.; Hon. Secretary, G. G. Mayo, C.E.; Members of Council, Prof. Rennie, D.Sc., E. C. Stirling, M.D., F.R.S., Rev. Thomas Blackburn, B.A., S. Dixon, J. S. Lloyd, and W. H. Selway.

Election of Auditor.—D. J. Adcock was elected Auditor for the ensuing year.

Paper.—"New Genera and Species of Australian Coleoptera," by Rev. Thos. Blackburn, B.A.

Presidential Address.—"On Recent Investigations on the Foraminifera," by Walter Howchin, F.G.S.

ANNUAL REPORT.

The Council has to report that a variety of new matter relating to mollusca, cœlenterata, insecta, marsupialia, anthropology, botany and geology has been brought under the notice of the Fellows and Members during the past year. Amongst the most noteworthy is the discovery of *Radiolaria* and Lower Cambrian fossils in new localities for the Province. The exhibition of the restored fore and hind left feet of *Diprotodon* at the September Meeting is an event which is unique in the history of science; and that it was possible, is largely due to the technical skill of the Assistant Director of the Adelaide Museum, A. H. L. Zietz, F.L.S., who was able to preserve the extremely brittle remains found at Lake Callabonna, South Australia.

During the past year two gentlemen were elected Hon. Fellows on account of the distinguished services which they had rendered to science through the Society. They were Prof. T. W. E. David, B.A., of the Sydney University, and John Dennant, F.G.S., of the Education Department, Victoria. Four new Fellows have been elected, and seven removed by death or otherwise. The Society consists now of 12 Hon. Fellows, 71 Fellows, 13 Corresponding Members, and 1 Associate.

The obituary includes the name of an Hon. Fellow, Baron F. von Muller, whose death has occasioned a loss which it will be difficult to fill, not only to Australian workers, but to the scientific world generally. At the proper time and place this Society will hope to co-operate with Australian learned societies in raising to his memory some fitting memorials. Another Hon. Fellow has also died, namely, Sir W. F. D. Jervois, K.C.M.G., L.B., &c., ex-Governor of South Australia. In the death of Sir Thomas Elder, K.C.M.G., science and art have lost a generous benefactor and this Society a Fellow. Volume XVI. of the Society's Transactions will remain a memorial of the scientific results of one of the expeditions fitted out to explore Central Australia at his expense.

Whilst the principal attention of the Society has naturally been devoted to the receiving and recording of new scientific facts, other matters relating to the economic application of science have not been neglected. A Sub-Committee of the Council was appointed to ascertain the best methods of disseminating information respecting local predatory insects and insectivorous birds. This important matter has received very careful consideration,

and a report may be expected shortly offering some valuable suggestions. In sympathy with this subject may be mentioned the results of the action of the Field Naturalists' Section of the Society through its Native Fauna and Flora Protection Commit tee. Through its energy and instrumentality a Bill is now before Parliament entitled "Protection of Birds Act."

In presenting this report of the year's proceedings the retiring Council fells that although some substantial work has been recorded, yet that much more might have been effected had the Council had ampler means at its disposal. There is an abundance of scientific material awaiting publication, but the Council has had to hesitate about attempting it owing to its straitened means. Happily, owing to the generous action of the Government in subsidising the subscriptions of the Fellows, a little has been accomplished, but this could easily be expanded to three or four times the amount if financial circumstances were propitious. Whilst the Council feels a debt of gratitude to that small branch of Fellows who have year by year so steadily contributed to the funds of the Society, yet it would ask them further to use their influence in persuading others to join the Society and assist in this way the recording of matter pertaining to South Australia of the greatest scientific value.

THE TREASURER IN ACCOUNT WITH THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Dr.	£	s.	d.	£	s.	d.
October 1st, 1896.						
To Balance				140	14	8
" Subscriptions—						
Royal Society	64	6	0			
Field Naturalist's Section ...	15	0	0			
Astronomical Section (two years)	16	0	0			
Malacological Section	4	0	0			
				99	6	0
" Donations—						
Dr. Verco	7	10	0			
Dr. Stirling...	12	0	0			
				19	10	0
" Grant from Government				91	1	0
" Interest				1	19	0
				£352	10	8

Cr.	£	s.	d.	£	s.	d.
By Cost of Transactions—						
Printing (1½ years)	141	2	6			
Illustrating	65	14	1			
Publishing (1½ years)	12	0	0			
				218	16	7
" Wages—Caretaker				3	0	0
" Printing, Postage, and Stationery				10	10	0
" Library—Carriage of Books ...				0	10	0
" Grants in Aid—						
Field Naturalists' Section ...	10	0	0			
Astronomical Section	15	0	0			
Malacological Section	3	0	0			
				28	0	0
" Sundries				0	9	10
" Balance in Savings Bank, October 1, 1897				91	4	3
				£352	10	8

Audited and found correct.

D. J. ADCOCK, Auditor.

Oct. 4, 1897.

WALTER RUTT, Hon. Treasurer.

The Anniversary Address by Walter Howchin, F.G.S. (President).

In vacating the Chair, which I have had the honour to occupy for the past two years, I shall be following traditional usage if I make a brief reference to the present position and prospects of the Society. With the current year we publish the twenty-first volume of the Transactions and proceedings of the Royal Society of South Australia. The Society has completed the second decade of its existence, and has a record of work which, if considered with a due regard to its limited membership, and equally limited means, is a matter for congratulation. When we consider the great geographical extent of the colony, and the comparatively recent settlement of its population, it will be understood that the scientific workers have been hitherto mainly engaged in pioneering work, sketching the broader outlines, and gathering the more evident facts in this vast scientific field.

The past year has not been destitute of work done by Fellows of the Society which mark distinct stages in scientific achievements. The first-fruits of Dr. Stirling's and Mr. Zietz's patient elaboration of the Callabonna fossil faunæ has been published in our Transactions in elucidation of the feet and leg-bones of the great struthious birds which have become extinct on Australian soil within comparatively recent geological time. The same authors have had the honor to place a unique exhibit before the Society in a complete osteological restoration of the fore and hind feet of the *Diprotodon*, the first occasion in which these much-debated appendages have been discovered and placed before a scientific society. Dr. J. C. Verco's further descriptions of new species of marine mollusca from his dredgings in South Australian waters, and the Monograph on the Opisthobranchs of the Older Tertiary of Australia by the French specialist and Honorary Fellow of this Society, Maurice Cossmann, are respectively contributions of great value. Within the sphere of new geological observations may be noted the glacial discoveries in the Inman Valley, Yankalilla, and Cape Jervis districts, which have revealed an extinct icefield of vast extent, of which the Hallett's Cove deposits form but a distant outlier. The discovery of a thick group of Lower Cambrian limestones, with characteristic fossils, in the Ranges extending from Normanville to Willunga is of great interest as bearing on the possible age of the Mount Lofty series, it being the only clearly determined datum line in

the older rocks of the hill country to the south of Quorn. The discovery of Radiolaria in the cherty nodules of the Crystal Brook limestones, as well as in the siliceous limestones of Brighton, has opened a new chapter in the palæontology of the older rocks of the colony. At the instant when Professor David and myself thought that in this discovery we had secured organic remains in rocks of Archæan age, the find of Cambrian fossils shortly afterwards in the associated beds has rendered this conclusion exceedingly doubtful.

Our review of the present position of the Society is overshadowed with two regrets. First, that the number of those who either actively or by Fellowship with the Society show practical sympathy with scientific research is so small—a roll of 75 contributing Fellows cannot be regarded as satisfactory in this respect; and second, scientific investigators have reason to be discouraged that the financial resources of our Society—the only Society in the colony devoted to the cause of original research—are inadequate for the effective illustration of scientific discoveries which may have occupied years of patient labor. The scientific investigator takes upon himself honorary and onerous duties, and is content to find his reward in the pleasures of his work and the privilege of adding to the sum of human knowledge. All he asks in return for his voluntary labors is the means of communicating his special knowledge by a suitable channel to others. During recent years original observations of great scientific value have been held back from publication through this lack of monetary means, and unless in the near future the burden is shared by a larger circle in the community, we shall witness the humiliating consequences that discoveries of great national interest will have to go to foreign societies to obtain a voice in the scientific world.

I would now crave your indulgence for a short time whilst reviewing in a brief manner some

RECENT RESEARCHES BEARING ON THE FORAMINIFERA.

Much interest attaches to the occurrence of the Rhizopoda in the older stratified rocks. We may, therefore, in the first place, draw attention to our present knowledge of

The Early Geological History of the Foraminifera.

The lowly organisation of these protean forms of life is suggestive of a remote ancestry that may possibly take us back link by link in an unbroken chain of vitality to the pregnant moment that witnessed the dawn of life on this planet. On evolutional grounds we may plausibly infer that there was a time when the Protozoa formed the characteristic—perhaps the only type of animal life on the earth—a protozoan age that antedated the age of the higher

invertebrates. If such was the case it has left scant evidence of its existence. The practical results of a search in the Archæan and older Palæozoic rocks for these palæontological proofs are extremely disappointing. Instead of finding the limestones of these early periods crowded with the remains of what might be deemed the primitive type of animal life, the Archæan limestones are singularly destitute of organic remains; and when we pass the great interval marked by the unconformability between the Archæans and the Cambrians, we find in the latter a richly differentiated invertebrate fauna with scarcely a trace of the more primitive Rhizopod. It is only when we rise in the geological series as high as the Carboniferous limestone that the Foraminifera become at all a characteristic feature of the deposits, and the maximum of the order was only attained with the Cretaceous and Tertiary formations, or, possibly, in the foraminiferal fauna of the present seas.

It is not improbable that the unclothed amœboid organism was the earlier prevailing type of this class, and that on the gradual increase of carnivorous and predatory forms of life, the *Amœba* obtained a distinct advantage in the struggle for life in the formation of a testaceous covering for its sarcode, either by the secretion of carbonate of lime or by the agglutination of sand grains and other foreign bodies. Such an important modification of habit prepared the way for an endless morphological variation of the organism—gave birth to a new order of Protozoans, and made the Foraminifera the most important member of its class. If the naked condition was the primitive form of the Protozoan type, and the testaceous covering a later and slowly developed modification, this will sufficiently account for the comparative absence of the Foraminifera from the older geological formations.

The discussion on the organic or inorganic nature of Eozöon, which has lasted over 30 years, still continues. A fascination gathers around this so-called "Dawn Animal," "the lone occupant of Laurentian seas," that has called forth laboured investigations and an elaborate literature. Eozöon was first described by Dr. Carpenter and Principal Dawson in 1864. Its organic origin was hotly contested by Professors W. King and T. H. Rowney in numerous publications distributed over a period of 16 years. Their contention was that the so-called organic structure of Eozöon was nothing more than an inorganic arrangement of minerals in a laminar structure that was not uncommon in serpentine rocks, and could be paralleled in the serpentine marble or ophite of Skye, the serpentine of the Lizard, and other examples. Mr. H. J. Carter took up a similar position of scepticism. In 1884 Prof. J. F. Blake examined the typical locality for Eozöon at Côte St. Pierre, in Canada, with the result that he concluded

the nodules of so-called Eozöon were simply concretionary under metamorphic rearrangements, and in a letter to Prof. H. J. Johnston-Lavis, said, "I came away with the clear conviction that we need no longer trouble about its organic nature."*

The latest and most important contribution on this subject is a joint paper read before the Royal Dublin Society by Prof. H. J. Johnston and Dr. J. W. Gregory, and is published in the Transactions of that Society for 1894.† The exhaustive observations which the first-named of these authors has made on the geology of Monte Somma brought to his notice some remarkable lithological features in certain ejectamenta from this old crater, and has supplied the material for the joint paper now referred to, on the "Eozöonal Structure of the Ejected Blocks of Monte Somma.' The blocks in which this structure is seen were derived, according to the authors of the paper, from limestones of Mesozoic age situated at a considerable depth in the funnel of the volcano, and the specimens show an intermediate degree of metamorphism between the comparatively unaltered Tertiary beds in the upper part of the sub-volcanic platform and the more completely fused ultra-basic and basic rocks of greater depth. The genesis of this eozöonal structure can be gathered from the examination of a series of specimens in which it is more or less perfectly developed. As the result of an examination of a large number of these ejected fragments, the authors conclude that "the Eozöon structure has been produced in those limestones which have, under great pressure, in the presence of different gases, and in the neighbourhood of a comparatively basic magma, undergone whole or partial fusion."‡

The remarkable concentric and laminar structure of the eozöonal nodules is accounted for by the interaction of the limestone and the more or less acid magma when brought into contact. Along the line of contact a process of mutual modification takes place. The limestone extracts a proportion of silica from the magma, and the magma is rendered more basic, not only by a loss of silica, but by the absorption of lime and magnesia from the limestones with which it is in contact. The so-called "acervuline layer" in Eozöon is accounted for by this process of interchange and chemical reaction, attenuated and irregular silicate bands being produced by the exhaustion of the silicic substances in penetrating into the limestone. The presence of *tubuli* in Eozöon structure is the strong point of evidence with

* "Eozöonal Structure of Ejected Blocks of Monte Somma," by Prof. H. J. Johnston-Lavis and J. W. Gregory, D.Sc., Sc. Trans. Roy. Dublin Soc., Vol. V. (Ser. 2), 1894, p. 274.

† Op. cit.

‡ Op. cit., p. 264.

those who assert the organic origin of the specimens, and supplies the characteristic feature that has led to its classification with the Nummulinidæ. Similar tubuli or stoloniferous passages, filled with mineral matter, are seen in the Monte Somma specimens passing through the calcareous layers, and communicating with the intermediate bands. These tubuli are supposed by the authors to mark the main passages along which the fluid or gases penetrated.

The photographic figures given in illustration of the work are extremely suggestive of the anomalous Laurentian fossil, although, judging from the plates, the cell walls and canal system lack the definiteness and clear outline of the type specimens. Sir J. W. Dawson has given a short rejoinder to Professors Johnston-Lavis and Gregory, in *Nat. Science* of June, 1895, in which article he says—"I must emphatically deny that they resemble either in composition, mode of occurrence, or form and structure the Laurentian Eozöon of Canada." Nothwithstanding this rejoinder the latest evidences tend to weaken the proofs of the organic origin of this doubtful object rather than confirm the conclusions which in the early years of its discussion were generally accepted. One result of this prolonged discussion has been to illustrate in how many instances petrological structure may simulate organic features, and emphasizes the caution that should be exercised in referring doubtful structures, especially when included in altered and metamorphic rocks, to organic agencies.

The discovery of Foraminifera in the Cambrian rocks of southern New Brunswick by Messrs. W. D. and G. F. Matthew is of considerable interest. So far as I am aware, this is the first case in which Foraminifera have been noted in rocks of Cambrian age. They were discovered in the first instance by sectioning the phosphatic nodules contained in the St. John series near the base of the Lower Cambrians, and are associated with a group of fossils of a distinctive character, which Mr. G. F. Matthew has described in the Transactions of the New York Academy of Science, vol. XIV. (1894-95), as "The Protolenus Fauna." The Foraminifera are referred to the genera *Orbulina* and *Globigerina*, two of the commonest genera of the present seas, and whilst seven new species are described, the remaining one, *Orbulina universa*, is said to be indistinguishable from the same species which makes up so large a proportion of the Atlantic ooze of to-day. Without calling in question Mr. Matthew's determination, it is well to remember that extreme caution is demanded in the determination of fossils of so great a geological age, and particularly those (as in the case of the genera referred to) which have a spherical form, as this is more easily simulated by inorganic structure than any other outline. The previous records for the geological distribu-

tion of *Globigerina* do not go further back than the Jurassic, and those of *Orbulina*, not earlier than the Lias. In view of the present discovery, it is remarkable that no trace of either genus has been found in the comparatively rich foraminiferal fauna of the Carboniferous Limestone. Assuming the determination of the author to be correct, it places *Orbulina universa* in a unique position as the oldest surviving species among living things ; and if the claims of Eozöon be disallowed, the Protolenus horizon of St. John has the earliest record for the occurrence of Foraminifera in any part of the world.*

If I may be allowed a moment's digression from the immediate subject of my address, I would draw attention to the fact that it seems probable that more success will attend the search for the Radiolarian representatives of the Rhizopoda in the older stratified rocks than remains the Foraminifera. L. Cayeux has recently announced the discovery of Radiolaria in the Pre-Cambrian rocks of Brittany. Whilst there are some aspects of this supposed discovery that have led other specialists to regard Cayeux's determinations with some scepticism, it will quicken the interest in these old and so-called azoic rocks that will no doubt shortly place the matter beyond question. During the last three years simultaneous discoveries of Radiolaria have been made in many countries and from most formations, ranging from the Cambrian to the present day. These results have been in many cases, particularly those pertaining to the older rocks, obtained from the examination of the much neglected cherty bands and nodules which frequently accompany calcareous beds of all ages.

BIOLOGICAL INVESTIGATIONS.

From the days of Conrad Gesner in the middle of the sixteenth century the delicate and varied forms of the Foraminifera have commanded an increasing attention from scientific workers, yet it is only within the last few years that any definite knowledge has been obtained of the life history of this interesting Order. The opacity of the investment has made the investigation of the soft parts of the animal, in most cases, practically impossible and, even where the shell exhibited some translucency, as soon as the animal was removed from its normal conditions for observation it withdrew its body to the central portions of the shell, whilst the vital functions either ceased or were for the time being suspended. Two improved methods of enquiry have led up to the present advance in our knowledge of the biology of the Foraminifera. The first of these is an improved method of sectioning the shell introduced by Mons. C. Schlumberger, of Paris, by means of

* Unless we accept the statement of L. Cayeux that he has obtained Foraminifera, as well as Radiolaria, from the Pre-Cambrians of Brittany.

which the excessively delicate central chambers of the test are preserved from destruction in the mechanical process; the second, an ingenious contrivance of Mons. F. Schaudinn, assistant at the Zoological Institute of Berlin, by which Foraminifera can be placed under observation throughout all the phases of their existence.

As far back as 1841, Ehrenberg noticed a *Spirillina* with a great number of young examples within the chambers of the parent shell, and as the observation was unique he conferred upon it the trivial name of *vivipara*. Similar phenomena were subsequently seen by Schultz and other observers in individuals belonging to several different genera. In 1861 Mr. Carter detected the existence of spherules in the chambers of some fossil Foraminifera, which he regarded as "propagative agents." * About the same time attention became directed to the structure of the sarcode or protoplasm that formed the living body of the animal, and in 1878 A. Schneider published † the results of his researches with regard to the reproductive processes pertaining to the genus *Miliolina*. The most striking point of Schneider's researches was, that in some instances the protoplasmic body became broken up into two kinds of minute bodies, the smaller of these, possessing spontaneous movement, he regarded in the light of spermatozoa, and the larger as ova. The latter developed into young *Miliolina*, and after secreting a delicate calcareous test passed into a free condition. These observations of Schneider require confirmation. The first definite step in elucidating the life history of the Foraminifera was taken, however, in 1880, when Munier-Chalmas, the distinguished French microscopist, announced that in the case of certain species of *Nummulites* and *Assilina* the initial chambers were formed on two distinct plans. In the one case the primordial chamber was large, and in the other the same primordial space was occupied by a number of small chambers. Thus the individuals of a species were divided into two natural groups (1) those which had a megalospheric central chamber, and (2) those with a microspheric centre. The external features of the two groups were identical, except that those individuals which had the large central chambers were, in most species, smaller in size than those which had the smaller but more numerous central chambers. This "dimorphism," as it was called by Munier-Chalmas, has been made the subject of careful and systematic investigation by the last-named eminent savant in conjuction with the able and energetic specialist, Charles

---

* Ann. Mag., Nat. His. Ser. 3, Vol. VIII., 1861, p. 309.

† Beiträge zur Kenntniss der Protozoen. Zeits. f. Wiss., Zool., Vol. 30, Sup. 1878, p. 446.

Schlumberger, and by their united efforts the existence of a dimorphic origin has been demonstrated in the case of over twenty genera.

The question that immediately arose, and awaited solution, was, "What is the meaning of this dimorphism?" That it had a distinct relationship to the process of reproduction was generally inferred, and its significance in this respect has given rise to much discussion. The first point that required determination was whether the dimorphic features were aboriginal in the history of the individual, or caused subsequently to birth by a secondary growth of smaller chambers within the macrospheric chamber, an alternative that was soon decided in favour of the view that the difference was aboriginal.

In 1894 Mr. J. J. Lister, in a paper read before the Royal Society of London on "The Life History of the Foraminifera," gave a full and lucid resumé of the state of knowledge on this subject to date, with many valuable, original observations. Lister's researches have been directed chiefly to the study of the nuclei of Foraminifera in relation to reproduction. His observations were confined to a limited number of forms, and chiefly the cosmopolitan species, *Polystomella crispa*. This careful observer was able to note that the nuclei of the megalospheric and microspheric individuals of a species differed essentially from each other. The megalospheric form carries but one large nucleus during the greater part of the life of the individual, whilst the microspheric form, in the place of a large central nucleus, contains several small nuclei. This discovery of a physiological, as well as a morphological difference, in the two forms strengthened the assumption that they owed their difference of form to aboriginal causes.

The next point was to establish what relationship the two forms bore to each other in the life history of the species. Did the difference of form mark a difference of sex? Or did the two forms represent a cycle of recurring generations, as may be seen in some other departments of Natural History? Lister was led to discard the sexual hypothesis chiefly from the study of *Orbitolites complanata*, in which he found the young of the megalospheric form in the brood chambers of both megalospheric and microspheric individuals; "hence," he says, "it is impossible to regard either form as male." In a postscript to his paper, of slightly later date, he reaches a definite conclusion on this point in the following words, "The fact that the whole of the protoplasm of the parent is used in the production of the young, and that these are all of one form, supports the view that the two forms of the Foraminifera belong to different generations."*

* Op. cit., p. 446.

We must now refer to the brilliant work done by Schaudinn in the elucidation of this interesting biological problem, who quite independently of Lister has been engaged on the same investigations, and by a curious coincidence has taken the same species as Lister (*Polystomella crispa*) as his principal type. Not only have these two eminent naturalists been independently led to the same conclusion, but Schaudinn has thrown much additional light on the reproductive phenomena of the Foraminifera.* By the use of very high magnifying powers (up to 2,000 diameters) he has watched the changes that take place in the nuclei during the reproductive process, and are of the greatest interest. In the first place he has never seen a nucleus multiply by *constriction*, as is frequently the case in some Orders of the Protozoa, but the nucleus passes through a succession of very remarkable and complex changes which cannot well be made intelligible without reference to the diagrammatic figures by which his work is illustrated. Stated generally, however, the nucleus when passing into the reproductive stage first develops a granular centre, around which gathers a sphere of droplets like an alveolary border. A process of segregation goes on and a cyst is formed, the inner surface of which is covered by a number of compact spheroidal bodies. When matured, the cyst bursts and the spheroids are distributed throughout the protoplasm of the animal as embryonic nucleoids.

The next question was to determine the distinctive changes which take place respectively in the megalospheric and microspheric forms of propagation. In the case of microspheric generation there develops the cyst-like bodies with included zoospores, as already described. In the crisis of reproduction, the cyst bursts, the corpuscular bodies are set free, and by a rapid circulatory movement, that is set up concurrently in the protoplasm, they are evenly distributed throughout the mass. At this stage the whole of the protoplasm vacates the shell, forming an irregular mass. The protoplasm then divides into sections of various sizes, each fragment assumes a rounded form, secretes a calcareous test, and this globular test constitutes the primordial chamber of a *Polystomella crispa*, of the megalospheric form. In these observations two points were established; first, that the whole of the parent body was used up in the formation of offspring; and, secondly, a microspheric individual gave birth to a megalospheric progeny.

* For particulars of M. Schaudinn's investigations I am chiefly indebted to M. Schlumberger, who in the following two papers has given an excellent resumé of Schaudinn's Preliminary Notes, with a reproduction of Schaudinn's figures. *Note sur la Biologie des Foraminifères. La Plastogamie dans les Foraminifères*, par Ch. Schlumberger, in *La Feuille des Jeunes Naturalistes*, in Mars et Mai, 1896.

It now became the task of the investigators to watch the evolution of the megalospheric form. A considerable proportion of the nucleoid bodies that during the embryonic condition were scattered through the protoplasm of the microspherical individual were seen to unite and form a compact mass, which became the nucleus of a new megalospheric individual, and, according to Lister, such nucleus generally occupies the primordial chamber. When this individual of the megalospherical plan of growth has reached the reproductive stage, the principal nucleus disappears, broken up and absorbed into the protoplasmic mass, and minute nuclei make their appearance. A karyokinetic division of all the nuclei follows, the latter acting as centres around which the protoplasm arranges itself, forming small spherical masses which gradually and uniformly become distributed throughout the protoplasmic body until the whole of the body substance is used up in their formation, and the minute spheroids, which are the ultimate product of this extended process of division, are set free as flagellated zoospores of uniform size. These zoospores form the embryos of the microspheric form of *Polystomella crispa*.

In these results the biological significance of the megalospheric and microspheric plans of growth among the Foraminifera has been explained. It has been demonstrated there are two methods of reproduction—one by the production of embryos, and the other by the emission of spores. The microspherical group produce young in the form of embryos, which develop into megalospheric individuals; and the megalospherical group produce spores, which in turn reproduce the species on the microspherical plan of growth. In a few rare cases, however (Schaudinn noticed three in 4,300), it has been observed that where no principal nucleus was formed in a megalospherical individual, the small nucleoid bodies multiply directly from themselves, forming embryos instead of spores. In this case a megalospherical parent produces megalospheric offspring without an intermediate microspheric generation. The proportion of numbers in the two forms is worthy of note. The megalospheric form is much more common than the microspheric. The proportion in *Polystomella crispa*, according to Lister, is in the ratio of 34 to 1; and in *Adelosina polygonia*, according to Schlumberger, the relative proportions are as 8 to 1. The season of the year has apparently something to do with these relative numbers, for the microspheric, or spore-produced forms, on Lister's observations, occur in greater numbers in the height of summer than in other parts of the year.

If I may for a moment longer tax your patience in reviewing these biological researches I would refer to a recent discovery in which M. Schaudinn has still further advanced our knowledge of the life history of the Foraminifera. He has obtained abundant

evidence of the occurrence of copulation in some species which he has had under observation. His preliminary notes * on this subject have, by the consent of the author, been summarized and translated into French by M. Schlumberger in a paper published in *La Feuille des Jeunes Naturalistes*, in May, 1896, to which I am indebted for a knowledge of this part of M. Schaudinn's discoveries.

Prior to the discovery now referred to, copulation had been observed to take place among some of the Rhizopoda, but no exact determination had been made of the changes that were thereby induced in the individuals concerned in the act; and, prior to the observations made by Schaudinn, no one had noted the occurrence of copulation among the Foraminifera. The researches of Maupas and Hartog on the methods of reproduction among the lower forms of life, both in the vegetable and animal kingdoms, published about five years ago, undoubtedly prepared the way for the recent discoveries among the Foraminifera. Maupas had pointed out that in the lower organisms long-continued propagation by fission without fusion resulted in a state of senescene and ultimate extinction. This has been abundantly confirmed by Professor Hartog, who says:—"We have evidence on all sides to show that a sexual reproduction, colonial or cellular, is rarely continued indefinitely in those organisms which have a sexual process. After a certain continuance of asexual reproduction the strain deteriorates." † What the author calls a "rejuvenescence" must be attained by fusion of individuals to prevent degeneration, and maintain the vigour of the organism. To reach this rejuvenescence, in the case of the Protozoa, Hartog notes that there are two leading types of reproduction, which he designates respectively Karyogamy and Plastogamy. Karyogamy (a term first used by Maupas) is defined by Hartog to be "the fusion of two or more nuclei as well as of the cytoplasts into a uninucleate cell." ‡ "Plastogamy is the cytoplastic union of cells without nuclear fusion. This, of course, brings about complete mixture of the cytoplasts, comparable to that of the nuclei in Karyogamy." § In the discoveries of Schaudinn, to be immediately referred to, it will be seen that copulation among the Foraminifera is plastogamic rather than karyogamic.

For the purposes in view, Schaudinn has chiefly confined his observations to two species of Foraminifera, *Patellina corrugata* and *Discorbina globularis*, both of which are common forms in

---

* F. Schaudinn, *Ueber Plastogamie bei Foram.; Sitz. Bericht. d. Gesellsch. Naturforsch. Freunde*, 1895, No. 10.

† "Some Problems of Reproduction," by M. M. Hartog, Quar. Jour. Micro. Soc., vol. XXXIII. (1892), p. 64.

‡ Ibid. § Ibid.

Australian waters. One point clearly demonstrated is that copulation can only take place under conditions in which the respective individuals are qualified for copulation. These conditions are apparently determined by the state of the nucleus. Copulation only ensues when the individuals concerned have but a single nucleus and this nucleus at rest, that is to say, not undergoing sub-division. In every case observed where one or both of the individuals of the same species had their nuclei on the way to divide, the pseudopodia instead of fusing shrank away from each other, but when two individuals approached each other having their nuclei in the embryonic chamber, in a quiescent condition, copulation ensued. These results were observed, not only in the case of such examples as happened to come into contact fortuitously, but were repeatedly experimentally confirmed by Schaudinn, who used artificial means in bringing individuals together in various states with regard to their nuclear condition.

The act of copulation in the case of *Patellina* consists apparently in the fusion of the protoplasm—that is, the *cytoplast* as distinct from the *nucleus* in the individuals concerned. First the pseudopodial extensions touch and merge and ultimately the main portions blend, by which means the respective tests are raised until they touch, not face to face, but at an angle forming a V shaped space between the two shells. The open sides are rapidly built up by the organisms with grains of sand and other fortuitous fragments that may be at hand, to give the greater protection, and (as we have already seen taken place in the case of *Polystomella crispa* when in the act of reproduction) the whole of the animal substance leaves the shells and is united into one mass enclosed within the chamber formed for the occasion. After the lapse of an hour or two, or even days, the protoplasmic mass breaks up and concentrates around the nuclei ; each little fragment takes a globular form and secretes a test which forms the embryological chamber of the new life. When the embryos are ready for independent existence the temporary barriers are broken and they escape from the " nuptial cavern." In this act of copulation several individuals can take part concurrently (Schaudinn actually observed groups up to five) but they must all be mononucleary in condition, and the fusion is limited to the protoplasm as distinct from the nuclei.

The process of copulation in *Discorbina* is very similar to that already described in the case of *Patellina*. The flat faces of the tests are brought together so that the respective apertures can readily communicate. Portions of the walls of the final chambers are even reabsorbed to permit of freer intercourse, and the open space between the shells temporally enclosed by a film of carbonate of lime. The multiplication of the nuclei and the formation of

embryos go on simultaneously in the two individuals. Each nucleus forms an embryo—only one nucleus to each embryo—and the latter develops two or three chambers by growth before it escapes from the conjugal enclosure.

It is therefore clear that, whilst an agamic reproduction is the commonest method of increase among the Foraminifera, a conjugal union of individuals is necessary at certain times and under fit conditions as a means of preventing the deterioration of the species. It has also been established, so far as the species placed under observation are concerned, that the act of copulation is exclusively of the nature of plastogamy.

Quite recently Mr. J. J. Lister has propounded a very ingenious theory to explain the alteration of plan of growth which takes place in the microspheric forms of *Biloculina* and *Triloculina*.* Among the Miliolidæ the principal types exhibit a biloculine, triloculine, or quinqueloculine test, according as two, three, or five chambers are exposed externally. It has been observed that in the case of the (? sexually produced) microspheric forms of *Triloculina* the early chambers of the shell are arranged on a quinqueloculine plan, changing in the later stages to the triloculine arrangement; and in the case of *Biloculina*, the early chambers are quinqueloculine, then triloculine, and finally biloculine. No such transmutations of form occur in the (asexual) megalospheric forms, but these are respectively either triloculine or biloculine throughout their growth. The questions Mr. Lister has attempted to solve are—First, why this remarkable change should take place in the growth of the genera referred to; and, second, why such a change should be characteristic of the microspheric and not the megalospheric form. The assumption is, that the sexually-produced microspheric form goes out of its way to repeat the arrangement characteristic of allied forms before it attains the arrangement proper to its own genus. Mr. Lister says—"Is not this a particular instance of a phenomenon widely met with in higher forms of animals, in which the individuals produced by budding attain the adult structure by a direct development, while those produced from the egg often develop by an indirect course, going out of their way to repeat lost features characteristic of the archaic forms of their race? . . In the case of higher animals the larval stages are lost, the body of the larva being fashioned into that of the adult, but in this group of the Protozoa, the Miliolidæ, the peculiar structure of the young is permanently recorded, being built in and retained in the centre of the chambers subsequently added."† If Mr. Lister's

* "A Possible Explanation of the Quinqueloculine arrangement of the Chambers in the Young of the Microspheric Forms of *Triloculina* and *Biloculina*," Proc. Cambridge Phil. Soc., vol. IX., p. 236 (1897).

† Op. cit.

interpretation of these structural phenomena be correct, it follows that the quinqueloculine plan of growth is the primitive type of the group, whilst the triloculine and biloculine varieties represent later modifications of the primitive form in its successive stages of evolution.

FORAMINIFERA IN BOULDER CLAY.

What promises to have an important bearing on the theory of the formation of Boulder Clay in the Northern Hemisphere is the discovery of Foraminifera in the glacial deposits of Ireland, Scotland, England, Denmark and other Continental countries. As far back as 1879, Mr. Joseph Wright, of Belfast, began an examination of the Boulder Clay for Foraminifera, and has summarised his latest results in two papers published in the Transactions of the Geological Society of Glasgow for 1894 and 1895. In almost every instance in which he examined the unstratified Till of Ireland and Scotland, he found Foraminifera present in the material. The shells, which in the majority of cases were rare, were found free from either weathering or abrasion, and had evidently lived and died *in situ*. It would have been of great interest if Mr. Wright had indicated at what height above the sea the samples were taken from, and whether the Boulder Clay of high altitudes carried the same evidences of foraminiferal life as the Clay at lower levels. The attention of other investigators having been called to these occurrences, Mr. T. Mellard Reade * has been successful in finding Foraminifera in the Boulder Clay of England. Dr. Madsen † has made a similar discovery in Denmark, and Johannes Korn ‡ in Germany. The unstratified Till has been hitherto generally considered as a *moraine profunde*, but if the evidences now adduced be confirmed as a feature pertaining to the Till in general, it will prove beyond question that it has been laid down under marine conditions.

THE DETERMINATION OF LOCAL FAUNÆ.

The recent work done among the Foraminifera in determination of local faunæ commands a moments notice. In the lamented death of my friend and frequent helper (Henry B. Brady, F.R.S.) in 1891, the most conspicuous British authority on the Foraminifera was removed from us. His death left a gap in the British ranks that has not been adequately filled by any one particular worker in this department of natural history, but there are not a few whose labors are worthy of honorable mention. The monograph on "The Foraminifera of the Crag," which was begun

* Proc. Liverpool Geo. Soc., 1896.
† Middelelser Fra Dansk. Geologisk Forening, 1895.
‡ Ueber Foraminiferen in Glacialthonen. Neus Jahrbuch für Mineral, Geol. und Paläontol. Stuttgart, 1895.

by the publication of Part I. in the Palæontographical Society's volume for 1865, has, after an interval of thirty years, been completed in the Society's volume for 1895. The authorship of the earlier part was by Messrs. Rupert Jones, W. K. Parker, and H. B. Brady. Of this distinguished triad only the first-named remains with us to-day. Prof. Rupert Jones, whose name will ever stand in the first rank of students of the Foraminifera, and who has nearly completed his half century of observations in this department of study, takes the leading position in the completion of the monograph. He has been ably assisted by H. W. Burrows, C. D. Sherborn, F. W. Millett, R. Holland, and F. Chapman, each of whom brings a special knowledge to bear on the branch of the work entrusted to him. It is significant of the progress the science has made in the interval that no less than thirty-one of the specific determinations made in Part I. have had to be corrected in their classification in the Part just published. Mr. Frederick Chapman, F.R.M.S., who either independently or as collaborator with other well known naturalists, has greatly enriched our knowledge of the British fossil Foraminifera, has for more than ten years been engaged on a monograph of the Foraminifera of the Gault, of which nine Parts have already been published and about 250 species figured. Mr. Chapman's patient and exhaustive labors are all the more valuable in that he has worked out the foraminiferal fauna of the Gault in relation to the zonal distribution of the species.

Deep sea dredging for scientific purposes has, of late years, been prosecuted by many of the leading nations of the world. An expedition of this kind was carried out by the U.S. Fish Commission steamer "Albatross" in 1891, under the scientific control of Alexander Agassiz, the able Director of the Museum of Comparative Zoology at Harvard College. The ground investigated was an unexplored region of the ocean floor off the West coast of Central America, from the Galapagos on the Equator to the Gulf of California as the northern limits of the explorations, and has yielded material for a large number of monographs in elucidation of the rich and interesting faunæ then obtained. The Foraminifera were intrusted to Axel Goës, the eminent Swedish naturalist, who has worked out with distinguished ability the very rich foraminiferal material obtained in these dredgings, and has added to our knowledge a large number of new forms. Goës' Work forms the XX Bulletin of the series, and was published in 1896.

One of the most valuable contributions to our subject within recent years is that of Dr. R. D. M. Verbeek and R. Fennema in a joint description of the Geology of Java and Madoura*,

* Description geologique de Java et Madoura. Tomes II. Amsterdam, 1896.

published last year in two volumes by order of the Governor-General of the Netherlands East India. The islands of Java, Sumatra, and others that are adjacent, possess a remarkable assemblage of large Foraminifera, chiefly of Tertiary age, belonging to several genera. The authors referred to have confined their attention mainly to these conspicuous forms, and particularly those belonging to the Family Nummulinidæ, which they have described with great care and illustrated by detailed drawings that are models in their clear and faithful representation of the objects described. The Work must rank as one of the most important contributions in the elucidation of this important family of the Foraminifera.

BIBLIOGRAPHY.

Before I conclude, I must refer to one more important contribution to the study of the Foraminifera, which, though not dealing with research in the ordinary use of that term, has placed all original workers under lasting obligations to its author. I refer to Mr. Charles Davies Sherborn's exhaustive work, "An Index to the Genera and Species of the Foraminifera," published by the Smithsonian Institution, in two parts; Part I. being issued in 1893, and Part II. in 1896. Mr. Sherborn had already secured a world-wide reputation by his "Bibliography of the Foraminifera," brought down to the year 1888, and his "Index" supplies a ready reference to all species that have been described up to 1889. The work is an inestimable boon to the specialist, not only minimising the labour of wading through a voluminous and scattered literature, but has greatly limited the chances of duplication in the description and naming of species. In the same direction I cannot forbear mentioning the valuable aid which naturalists, in general, will in future obtain from the "Record of Geological Literature," which the Geological Society of London has recently undertaken to publish as an annual volume. The scheme followed will practically amount to a Bibliography, in at least the geological field of investigation, and be the means of calling attention to the published results of of workers in the same departments of study that might otherwise be overlooked.

DONATIONS TO THE LIBRARY

For the Year 1896-97.

TRANSACTIONS, JOURNALS, AND REPORTS.

Presented by the respective Societies, Editors, and Governments.

Austria and Germany.

Berlin—Zeitschrift der Gesellschaft für Erdkunde, band XXX. No. 6 ; XXXI., No. 1.

——— Verhandlungen, ditto, band XXIII., Nos. 1 to 3.

——— Sitzungberichte der Königlich Preuss. Akad. der Wissenschaft. zu Berlin, Nos. 40 to 53 (1895), and Nos. 1 to 25 (1897).

——— Abhand. der König. Preuss. Metereolog. Instituts, Ergeb. der Beobacht. an den Stationen, 1893, 1894, 1896. Bericht über die Thätigkeit, ditto, 1896.

Gottingen—Nachricht. von der K. Gesellschaft der Wissensch. u. d. Georg-August. Universität, heft 3 to 4 (1896), heft 1 (1897).

Halle—Leopoldina, heft 31.

—— Nova Acta der K. Leopold-Carol. Deut. Akad. der Naturforscher, band LXIII., No. 1 ; LXVI., No. 1.

Kiel—Schrift. der Naturwiss. Vereins für Schleswig-Holstein, band X., heft 2.

Munich—Sitzungsb. der Mathem.-Physik. Classe der K. B. Akad. der Wissensch. zu Munich, heft 3-4 (1896), heft 1 (1897).

Vienna—Sitzungsb. der Mathem.-Naturwissen. Classe Kaiser. Akad. der Wissensch., Nos. 7, 13, 14, 17 (1897).

——— Verhand. der K. Geolog. Reichenstalt, Nos. 13-15 (1896), Nos. 1, 2, 3, 7, 8, 10, 11, 12 (1897)

——— K.K. Gradmess.-Bureau, Astronom. Arbeiten, band VIII. (1896).

——— Verhand. der K.K. Zoolog.-Botan. Gesellsch. in Wien, band XLVI., heft 9, 10.

——— Annalen der K.K. Naturhist. Hofmuseums, band X., Nos. 2-4 ; band XI., Nos. 1-4.

Wurzburg—Sitzungsb. der Physik.-Medicin. Gesellsch., Nos. 1 to 11 (1896).

Australia and New Zealand.

Adelaide—Gov. Geologist — Report Arltunga Goldfield and Hart's Range Mica Field (1897)

Brisbane—Depart. of Agriculture—Botany Abridged, 2nd Edit., 1897.

———— Royal Society of Queensland, vol. XII.

Hobart—Royal Society of Tasmania, Papers and Proceedings, 1897.

Melbourne—Victorian Naturalist, vol. XIII., Nos. 9 to 12 ; vol. XIV., Nos. 2 to 4.

———— Royal Society of Victoria—Proceedings, vol. IX., n. s. ; vol. X., pt. 1.

———— Royal Geograph. Society of Australia—Transactions, vol. XIV.

———— Department of Mines and Water—Annual Report, 1896. Report on the Bendigo Gold Fields, Nos. 1-2.

Sydney—Australian Museum—Memoirs III., Atoll of Funafuti. Records, vol. III., No. 2. Report, 1896.

——— Royal Society of New South Wales, vol. XXX., 1896.

——— Agricultural Gazette, vol. VII., parts 10-11 ; vol. VIII., pts. 1-5, 7.

——— Linnean Society—Proceedings, vol. XXI., pts. 3, 4.

——— Department of Mines and Agriculture—Records of the Geolog. Survey of N.S.W., vol. V., pt. 2. Report, 1896.

——— Sydney Observatory—Meteorological Observations (H. L. Russell).

Wellington, N.Z.—New Zealand Institute — Transactions and Proceedings, 1896.

———————— Department Lands and Survey — Reports, 1894-5 ; 1895-6.

Belgium.

Brussels—Annales de la Société Entomologique de Belge, tome 39, 1895.

———— Memoires de la Société Royale des Sciences de Liege, tome XIX.

Canada.

Halifax—Nova Scotian Institute Nat. Sciences, Proceedings, vol. IX., part 1.

Montreal—Canadian Record of Science, vol. VII., No. 4.

Ottawa—Geological Survey of Canada, Annual Report, 1894 ; ditto, 1895.

Toronto—Canadian Institute: Annual Reports, 1887, 1892, 1893, 1894 ; Transactions, vol. I., part 1 ; Proceedings, vol. I., parts 1, 2.

France.

Nantes—Bulletin de la Société Sciences Naturelles de l'Ouest de la France, tome VI., Nos. 2, 3 (1896).
Paris—Feuilles des Jeunes Naturalistes, Nos. 314 to 321.
—— Bulletin des Seances Société Entomologique, Nos. 15 to 20 (1896); Nos. 1 to 12 (1897). Annales, vol. LXIV. (1895).
—— Bulletin des Museums d'Histoire Naturelle-Géologie des Indes Anglaises.

Great Britain and Ireland.

Cambridge—Philosophical Society, Proceedings, vol. IX., part 5.
Dublin—Royal Irish Academy, Proceedings, vol. IV. part 1.
Edinburgh—Royal Physical Society, Proceedings, 1895-6.
———— Royal Society of Edinburgh, vol. XX.
———— Edinburgh Geological Society, Transactions.
London—Royal Microscopical Society, Journal, parts 5, 6 (1896); parts 1 to 4 (1897).
——— Royal Society, Proceedings, vol. LX., Nos. 360 to 368; vol. LXI., Nos. 369 to 376.
——— Linnean Society, Proceedings, Nov., 1895; June, 1896.
——— Entomological Society of London, vol. 1896.
——— Chemical Society, Journal.
——— Imperial Institute, Journal, vol. II., Nos. 22, 23; vol. III., No. 26.
Leeds—Journal of Conchology, vol. VIII. Nos. 8 to 11.
Manchester—Manchester Literary and Philosophical Society, vol. XLI., parts 1 to 3.
———— Manchester Geological Society, vol. XXIV., part 10; vol. XXV., parts 4 to 7.

India.

Calcutta—Indian Museum, Ancient Coins, parts 3, 4.
Madras—Madras Government Museum, Bulletin, vol. II., No. 1.

Italy.

Florence—Società Entomologica Italiana, Bulletin I. to IV., 1897.
Milan—Atti della Società Italiana Scienze Naturali Milano, vol. XXXVI., Nos. 15 to 26; vol. XXXVIII., Nos. 1 to 7.
Palermo—Bolletino della Societià Botanico di Palermo, Anno I., part 1.
Pisa—Atti della Società Toscana di Scienze Naturali, vol. XV.
Turin—Bolletino dei Musei di Zoologia ed Anatomia Comparata dello R. Univer. di Torino, vol. XI., Nos. 260 to 267; vol. XII., Nos. 268 to 292.

JAVA.

Batavia—Natrkuncig Tidschrift deel LVI.; Boekwerken, 1896.
Amsterdam—Geological Description of Java and Madoura, tomes I., II., with maps.

JAPAN.

Tokio—Asiatic Society, Transactions, vol. XXIV.
——— Seismological Society, Transactions, 1896.
——— College of Science, University of Japan, vol. IX., part 2; vol. X., parts 1, 2.
——— Geograph. Soc. of Japan, vol. XVIII., No. 3.

MEXICO.

Mexico—Sociedad Cientifica, tomo IX., Nos. 9, 10; tomo X., Nos. 1 to 4.
———— Instituto Geologico, Bolletino, Nos. 4 to 6.

NORWAY AND SWEDEN.

Bergens—Bergens Museum Aarbag, 1896, part 1 (Isopoda), part 2 (Crustacea); 1897, parts 3 to 6.
Christiana—Den Norske Nordhavs Expedit., 1876-78, No. XXIII. (Tunicata), No. XXIV. (Protophyta).
———— Fauna Norvegiæ, No. I. (Phyllocarida of Phyllopoda).
———— Norvegischen Meteor. Instit. Jahrbuch, 1893-4-5.
———— Norronaskellen Crania Antiqua, 1897.
———— Philologiske Afghandlingen.
Stockholm—Geologiska Föreningens, 1896.
———— Entomologisk Tidschrift, vol. 1896, heft 1 to 4.
Stavanger—Stavanger Museum Aarb., 1895.
Trondhjem—Kongelige Norske Videnskabers, 1894-5.
Upsala—University of Upsala, Bulletin of Geological Institution, vol. II., parts 2 to 4.

RUSSIA.

Moscow—Société Impériale des Naturalistes, bulletin Nos. 2 to 3, 1896.
St. Petersburg—Société Impériale Mineral., band 32.
———— Comité Geologique, bulletin tome XIV., Nos. 2 to 4; tome XV., Nos. 2-5
———— Academie Impériale des Sciences. Bulletin, tome VI., Nos. 1 to 3.

SWITZERLAND.

Geneva—Société de Physique et d'Histoire Naturelle, Compte Rendue des Seances, vol., XIII., 1896.
Lausanne—Société Vaudoise des Sciences Naturelles, bulletin XXXII., Nos. 121-122; XXXIII., No. 123.
Neuchatel—Société Neuchatelaise de Géographie, bulletin, tome, VIII., 1894-5.

SOUTH AMERICA.

Buenos Aires—Academia Nacional de Ciencias, boletin, tome, XIV., Nos. 3, 4.
Montevideo—Musee Nacional, annales V., VI., VII.
Rio de Janein—Observatoria, Annuario 1896.
———— Musee Nacional, Archivos, vol. VIII.

SOUTH AFRICA.

Cape Town—Philosophical Society, vol., VII., pt. 2.

UNITED STATES AMERICA.

Baltimore—John Hopkins' University Studies, series XIII., Nos. 9 to 12; XIV., Nos. 1 to 5; circulars, vol. XVI., Nos. 129-130.
———— American Chemical Journals, vol. XVII., Nos. 8 to 10; XVIII., Nos. 1 to 5.
———— Journal of Philclogy, vol. XVI., Nos. 2 to 4.
Boston—Society National History Proceedings, vol. XXVII.
———— American Academy of Arts and Sciences, Proceedings, vol. XXIII.
Cambridge—Harvard Museum Comparative Zoology, Bulletin, vol. XXVIII., Nos. 2, 3; XXX., Nos. 1 to 6.
Cincinnati—Society of National History, Journal, vol. XVIII., Nos. 3, 4; XIX., No. 1.
Chicago—Field Columbian Museum, vol. I., Nos. 1 to 5.
Grenville, Ohio—Scientific Laboratories, Denison University, vol. IX., pt. 1.
New York—Academy of Sciences, annals, vol. IX., Nos. 1, 3.
———— Microscopical Society, vol. XII., No. 4; XIII., Nos. 1 to 3.
Philadelphia—Academy Natural Sciences, Proceedings, parts 1, 2, 1896.
Rochester, N.Y.—Academy of Sciences, Proceedings, vol. III., pt. 1.
San Francisco—Californian Academy of Sciences, Proceedings, vol. V., pt. 2; Memoirs, vol. III., No. 5.
Salem—American Association, Advance. Science, Proceedings, 1895.
St. Louis—Missouri Botanic Gardens Report, 1896.
Washington—National Academy of Sciences Memoirs, vol, III.
———— U.S. Geologicol Survey—Annual Report, 15, 16; Bulletins 123, 126, 128, 129, 131, 134.
———— Department of Agriculture, N.A. Fauna, No. 12; Monograph, Common Birds in their relation to Agriculture.

LIST OF FELLOWS, MEMBERS, &c.

NOVEMBER, 1897.

Those marked (F) were present at the first meeting when the Society was founded. Those marked (L) are Life Fellows. Those marked with an asterisk have contributed papers published in the Society's Transactions.

Any changes in the addresses should be notified to the Secretary.

Date of Election.	HONORARY FELLOWS
1857.	BARKELEY, SIR HENRY, K.C.M.G., K.C.B., F.R.S., Royal Colonial Institute, London.
1893.	*COSSMANN, M., Rue de Maubeuge, 95, Paris.
1897.	*DAVID, T. W. E., B.A., Professor of Geology, Sydney University, New South Wales.
1897.	*DENNANT, JOHN, F.G.S., Inspector Technical Schools, Camberwell, Victoria.
1876.	ELLERY, R. L. J., F.R.S., F.R.A.S., late Government Astronomer Victoria, The Observatory, Melbourne, Victoria.
1890.	*ETHERIDGE, ROBERT, Director Australian Museum, Sydney.
1853.	GARRAN, A., L.L.D., Sydney, New South Wales.
1893.	GREGORIO, MARQUIS DE, Palermo, Sicily.
1855.	HULL, H. M., Hobart, Tasmania.
1855.	LITTLE, E.
1876.	RUSSELL, H. C., B.A., F.R.S., F.R.A.S., Government Astronomer New South Wales, Sydney, New South Wales.
1894.	*WILSON, J. T., M.D., Professor of Anatomy, Sydney University.

	CORRESPONDING MEMBERS.
1881.	BAILEY, F.M., F.L.S., Colonial Botanist, Brisbane, Queensland.
1881.	*CLOUD, T. C., F.C.S., Manager Wallaroo Smelting Works, South Australia.
1880.	*FOELSCHE, PAUL, Inspector of Police, Palmerston, Northern Territory, Australia.
1881.	GOLDSTEIN, J. R. Y., Melbourne, Victoria.
1880.	*KEMPE, REV. J., Australia.
1893.	*MCKILLOP, REV. DAVID, S.J., late Daly River Mission, Northern Territory.
1892.	*MAIDEN, J. H., F.L.S., F.C.S., Director Botanic Gardens, Sydney, New South Wales.
1888.	*MASKELL, W. M., Wellington, New Zealand.
1886.	NICOLAY, REV. C. G., Freemantle, Western Australia.
1880.	*RICHARDS, MRS. A., Mount Barker, South Australia.
1892.	*SCHULTZ, REV. LOUIS.
1883.	*STIRLING, JAMES, Government Geologist, Victoria.
1893.	*STRETTON, W. G., Palmerston, Northern Territory

FELLOWS.

1887. Adcock, D. J., Adelaide, South Australia.
1874. Angas, J. H., Adelaide, South Australia.
1897. Ashby, Edwin, Adelaide, South Australia.
1887. Bagot, John, Adelaide, South Australia.
1893. *Bednall, W. T., Adelaide, South Australia.
1887. *Blackburn, Rev. Thomas, B.A., Woodville, South Australia.
1884. Boettger, Otto, Adelaide, South Australia.
1886. *Bragg, W. H., M.A., Professor of Mathematics, University of Adelaide, South Australia.
1882. Brown, L. G. Adelaide, South Australia.
1883. *Brown, H. Y. L., F.G.S., Government Geologist South Australia, Adelaide.
1897. Browne, J. H., North Adelaide, South Australia.
1893. Brummitt, Robert, M.R.C.S., England, Kooringa, South Australia.
1884. Bussell, J. W., F.R.M.S., North Adelaide, South Australia.
1879. *Cleland, W.L., M.B., Ch.M., J.P., Colonial Surgeon, Resident Medical Officer Parkside Lunatic Asylum, Lecturer on Materia Medica University of Adelaide, Parkside, South Australia.
1876. (L) Cooke, E., Commissioner of Audit South Australia, Adelaide, South Australia.
1895. Cooke, John H., Adelaide, South Australia.
1880. Cox, W. C., Semaphore, South Australia.
1887. *Dixon, Samuel, Adelaide, South Australia.
1876. Dobbie, A. W., Adelaide, South Australia.
1896. Drummond, J. H. G., M.D., Moonta.
1893. Dudley, U., Drake, N.S.W.
1890. *East, J.J , F.G.S., (Corresponding Member, 1884), Kalgoorlie, W.A.
1886. Fleming, David, North Adelaide, South Australia.
1882. Fowler, William, Melton, Yorke's Peninsula, South Australia.
1889. Fraser, J. C., Adelaide, South Australia.
1880. *Goyder, George, Jun., F.C.S., Government Analyst South Australia, Adelaide, South Australia.
1887. Grasby, W. C., F.L.S., Grenfell-street, Adelaide, South Australia.
1896. Greenway, Thomas J., East Adelaide.
1896. Hawker, E. W., LL.B., B.A., F.G.S., Gladstone Chambers, Adelaide.
1891. *Holtze, Maurice, F.L.S., Director Botanic Gardens, Adelaide (Corresponding Member, 1882), Adelaide, South Australia.
1883. *Howchin, Walter, F.G.S., Goodwood East, South Australia.
1893. James, Thomas, M.R.C.S., England, Moonta, South Australia.
1896. Jones, J. W., Conservator of Water, Adelaide.
1853. (F) Kay, Robert, General Director and Secretary South Australian Public Library, Museum, &c., Adelaide, South Australia.
1894. Kershaw, James A., Entomologist National Museum, Melbourne.
1897. Lea, A. M., Col. Entomologist, Perth, W.A.
1884. Lendon, A. A., M.D., M.R.C.S., Honorary Physician Children s Hospital, North Adelaide, Adelaide, South Australia.
1856. Lloyd, J. S., Adelaide, South Australia.
1888. *Lower, O. B., F. Ent. S., Broken Hill, N.S.W.
1885. *Lucas, R. B., Adelaide, South Australia.
1896. Lukowitz, M. von, M.D., Adelaide.
1897. Marsh, C. W., Menzies, W.A.
1874. Mayo, G. G., C.E., Adelaide, South Australia.

1892. *Meyrick, E. T., B.A., Ramsbury, Hungerford, Wiltshire, England.
1888. Molineux, A., F.L.S., Secretary Central Agricultural Bureau South Australia, Kent Town, South Australia.
1859. (L) Murray, David, Adelaide, South Australia.
1884. Munton, H. S., Brighton, South Australia.
1896. Parker, Thomas, C.E., F.G.S., Rockhampton, Queensland.
1893. Perks, R. H., M.D., F.R.C.S., Adelaide, South Australia.
1883. Phillips, W. H., Adelaide, South Australia.
1886. Poole, W. B., Adelaide, South Australia.
1892. Priestley, P. H., Unley Road, Parkside.
1895. Ramage, Rev. Granville, Norwood, South Australia.
1885. *Rennie. H. E., M.A., D.Sc., F.C.S., Professor of Chemistry University of Adelaide.
1876. Rutt, Walter, C.E., Assistant Engineer-in-Chief, Adelaide, South Australia.
1891. Selway, W. H., Jun., Adelaide, South Australia.
1893. Simson, Augustus, Hobart, Tasmania.
1857. Smeaton, Thomas D., Blakiston, Littlehampton, South Australia.
1871. Smith, Robert Barr, Adelaide, South Australia.
1881. *Stirling, Edward C., C.M.G., M.A., M.D., F.R.S., F.R.C.S., Lecturer on Physiology University of Adelaide, Director South Australian Museum, Adelaide, South Australia.
1893. *Streich, Victor, F.G.S., Windanya, W.A.
1876. *Tate, Ralph, F.G.S., Professor of Natural Science University of Adelaide.
1886. *Tepper, J.G.O., F.L.S., Entomologist South Australian Museum (Corresponding Member, 1878), Adelaide, South Australia.
1894. *Turner, A. Jefferis, M.D., Brisbane.
1889. Vardon, Joseph, J.P., Adelaide, South Australia.
1878. *Verco, Joseph C., M.D., F.R.C.S., Lecturer on Therapeutics University of Adelaide, Adelaide, South Australia.
1883. Wainwright, E. H., B.Sc., St. Peter's College, South Australia.
1878. Ware, W. L., Adelaide, South Australia.
1859. Way, Samuel J., D.C.L., Chief Justice and Lieutenant-Governor South Australia, Adelaide, South Australia.
1882. *Whittell, Horatio, M.D., M.R.C.S., F.R.M.S., President Central Board of Health and City Coroner, Adelaide, South Australia.
1886. *Zietz, A. H. C., F.L.S., Assistant Director South Australian Museum, South Australia.

ASSOCIATE.

1895. Cleland, John B., Parkside, South Australia.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia.

FOURTEENTH ANNUAL REPORT OF THE COMMITTEE,

BEING FOR THE YEAR ENDING SEPTEMBER 30, 1897.

Evening Meetings.—Eight evening meetings have been held, at which papers have been given as under:—

1896.

Oct. 20—Mr. O. E. Menzel, "Botanical Excursions in N.S. Wales."

Nov. 17—Various members, Results of Excursion to Port Elliot, Port Victor, &c.

1897.

Apl. 13—Mr. J. Aitken, "The Fauna of Boston Island, Port Lincoln."

May 18—Mr. J. W. Mellor, "Notes of a Collecting Trip to the Flinders Ranges."

June 15—Miss J. L. Hussey, "A Few Notes on South Australian Algæ."

July 20—Mr. E. Ashby, "Marine Life on the Brighton Rocks."

Aug. 17—Mr. W. Howchin, F.G.S., "The Glacial Age in South Australia."

Sept. 31—Annual meeting, Chairman's Address by Mr. M. Symonds Clark.

The aggregate attendance at these meetings has been greater than for several years past. It will be seen that the subjects dealt with have embraced several departments in Natural History, the greatest interest, judging by the attendance, being shown in Mr. Howchin's address on the "Glacial Age in South Australia." Most of the papers have been given by, scientifically speaking, the younger members of the Section, which must be regarded as a hopeful sign. The exhibits have again been numerous and interesting, and have given practical evidence of the enthusiasm of collectors, especially in the departments of botany, ornithology,

and conchology. At the September meeting the orchid *Acianthus caudatus*, found by Miss Hussey near Port Elliot, was exhibited for the first time in the Section's history.

Excursions.—During the year eleven excursions have been held, of which the following is a list:—

1896.

Oct. 10—Norton's Summit.
" 24—National Park.
Nov. 7–9—Three days' excursion to Port Elliot, Port Victor, &c.

1897.

Feby. 20—Trawling and dredging off Glenelg.
April 10—Dredging in Port River.
May 15—The Grange (Pine Forest).
June 12—Henley Beach to Glenelg.
July 17—Black Hill.
Aug. 21—Semaphore to Grange.
Sept. 1—Golden Grove and Gorge of the Little Para River.
" 18—Blackwood.

The most noteworthy excursion was the three days' visit to Port Elliot, &c., in November last, when about twenty members enjoyed a pleasant and profitable holiday. Several plants new to most of the party were then gathered by them for the first time. In the winter months the coast was visited, chiefly for securing shells, while in the summer there were two trips on the sea, one off Glenelg, for trawling and dredging; the other in the Port River, for dredging only. One excursion was held chiefly for the study of ornithology. The whole-day trip on September 1st to Golden Grove and the Gorge of the Little Para River (which places had not been visited together for 13 years) was successful both from a social and scientific point of view, and additional pleasure was given to the occasion through the kind hospitality of Mrs. Robertson, of Golden Grove. The remaining excursions were made to the hills, including that favourite resort —National Park.

Protection of our Native Fauna and Flora.—A separate report is, as usual, presented by this Committee, which, it will be seen, has been engaged in formulating a new Bill to afford better protection to our native birds and other animals.

Royal Society's Library.—The members of the Section were reminded during the year that they had the privilege of access to the valuable collection of books in the Royal Society's Library.

Rules.—Owing to the necessity of a reprint of the Section's Rules, the Committee have gone through them seriatim, and have suggested a few alterations which they think will be an improvement.

Financial.—The subscriptions have again considerably exceeded the payments, the former having amounted to £15, while the disbursements have only been slightly over £10.

Membership.—Fresh names continue to be added to our roll of membership, whilst, as always happens, some have been removed from various reasons. The number now on the roll is 88.

M. Symonds Clark, Chairman.
W. H. Selway, Jun., Hon. Secretary.

Adelaide, 20th September, 1897.

NINTH ANNUAL REPORT OF THE NATIVE FAUNA AND FLORA PROTECTION COMMITTEE OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA, TO BE PRESENTED AT THE ANNUAL MEETING OF THE SECTION ON 21st SEPTEMBER, 1897.

The Birds Protection Act.—The chief business of your Committee has been the preparation of a bill for the further protection of the native fauna, embodying most of the provisions (in an amended form) of the Game Act and the Kangaroo Protection Act, together with some new clauses. Your Committee, believing that the term "Game Act" was misleading, adopted the name of the "Birds' Protection Act." The new clauses comprise provisions, amongst others, for the protection of Cape Barren geese on their island breeding places; for the establishment of public and private reserves for the protection of birds and other animals; for preventing the sale of kangaroo skins of less than 1 lb. in weight; for the issue of licences to trap alive birds, &c., for the purpose of domestication; and for the granting of permits to scientific collectors, providing, however, that such licences and permits shall become void on conviction of the holder of any offence under the Act. The first schedule comprises birds and lizards to be protected during the whole year, the native birds being distinguished by the scientific family or generic names taken from Gould's Handbook to the Birds of Australia. The second schedule includes all other birds and quadrupeds, with certain named exceptions, to be protected during portions of the year. Mr. Wm. White generously offered to submit the draft bill to his solicitor, who suggested several amendments of a verbal nature, which greatly improved the measure. The Minister of Education has kindly promised to take charge of the bill. It is

now in print, and your Committee hope it may be introduced this session.

The Mount Lofty Recreation Reserve.—In response to a communication from the Secretary, a letter was received from Mr. L. J. Milford, Honorary Secretary to the Committee taking charge of this Reserve, stating that his Committee would do all in their power to prevent the destruction of shrubs and birds upon the Reserve.

Kangaroo District, No. 2.—The period proclaimed for the protection of kangaroos in the western portion of the colony having expired, the Secretary wrote to the Commissioner of Crown Lands suggesting an extension of the period for another term, and on the 14th inst. he received an intimation that this request had been complied with. A notice in the *Gazette* of the 9th inst. proclaims an extension for two years from the 8th inst. as regards this district, comprising the Crown Lands in counties Robinson, Dufferin, Way, Kintore, and Hopetoun.

Your Committee having last week observed a report of a seizure in Victoria of a number of ducks, teal, &c., amounting to some 3,000 head, which had been destroyed in the close season, the Secretary wrote to the Commissioner of Crown Lands and Survey, Melbourne, congratulating him on the seizure, and expressing the hope that adequate penalties had been imposed upon the perpretators of such wholesale destruction.

Your Committee, in conclusion, desire to express their thanks to the Commissioner of Crown Lands, the Minister of Education, and the Commissioner of Police for assistance given in carrying out their aims.

SAMUEL DIXON, Chairman.
M. SYMONDS CLARK, Hon. Secretary.

Adelaide, 20th September, 1897.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Receipts and Disbursements for the Year 1896-7.

Dr. Receipts.	£	s.	d.	Cr. Disbursements.	£	s.	d.
To Balance brought forward	3	10	2	By Postages and Sundries	4	9	8
" Grant from Royal Society	10	0	0	" Printing	5	1	0
" Subscriptions	15	0	0	" Attendance	1	0	0
					10	10	8
				" Subscriptions as per contra paid over to Royal Society	15	0	0
				" Balance in hand	2	19	6
	£28	10	2		£28	10	2

Audited and found correct.

THOS. EVANS, F.S.A.I.A.,
THOS. FABIAN, } Auditors.

Adelaide, 20th September, 1897.

W. H. Selway, Jun.,
Hon. Secretary and Treasurer.

ASTRONOMICAL SECTION

OF THE

Royal Society of South Australia.

FIFTH ANNUAL REPORT.

The Committee congratulate their fellow-members on being able to present a Fifth Annual Report for their adoption.

The number on the roll is the same as last year, two having been lost and two gained.

The work of the Society has been carried on by the President and a few active members, which circle the Committee think should be widened, and with that end in view has had prepared a list of subjects, from which every member might select one or more on which he could express his opinion or seek for information, thereby starting a discussion, and so increase the interest of the general meetings.

As in previous years, there have been five general meetings and five business meetings of the Committee.

Papers on the following subjects have been read and discussed :—

"Shooting Stars and their Streams combined with Meteoric Showers." Mr. R. F. Griffiths.

"Planetary Motions." Captain Lee.

"The Temples of Egypt from an Astronomical Point of View." Miss A. M. M. Todd.

"Nebular Hypothesis, and the Action of the Tides." Mr. R. W. Chapman, M.A.

The subjects provided by the Question Box have received careful consideration ; the more important were :—

"The limits of time exposure in Astronomical Photography."

"The alleged atmosphere of the Moon."

"Greenwich Observatory and the production of the Nautical Almanack."

"The latitude and conditions under which the Moon may be seen to rise at the same hour on consecutive days."

The Astronomical Notes (first issued in July, 1892, and now in their sixth year of publication) have appeared regularly during the past 12 months, reflecting great credit on Capt. Lee and Mr. Griffiths, who are at the pains of preparing them.

Adopted at the Annual Meeting of the Society, held at the Observatory, Adelaide, on the evening of Thursday, the 2nd September, 1897.

C. Todd, President.
W. E. Cheesman, Hon. Secretary.

ASTRONOMICAL SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

Balance Sheet for Year Ending 30th September, 1897.

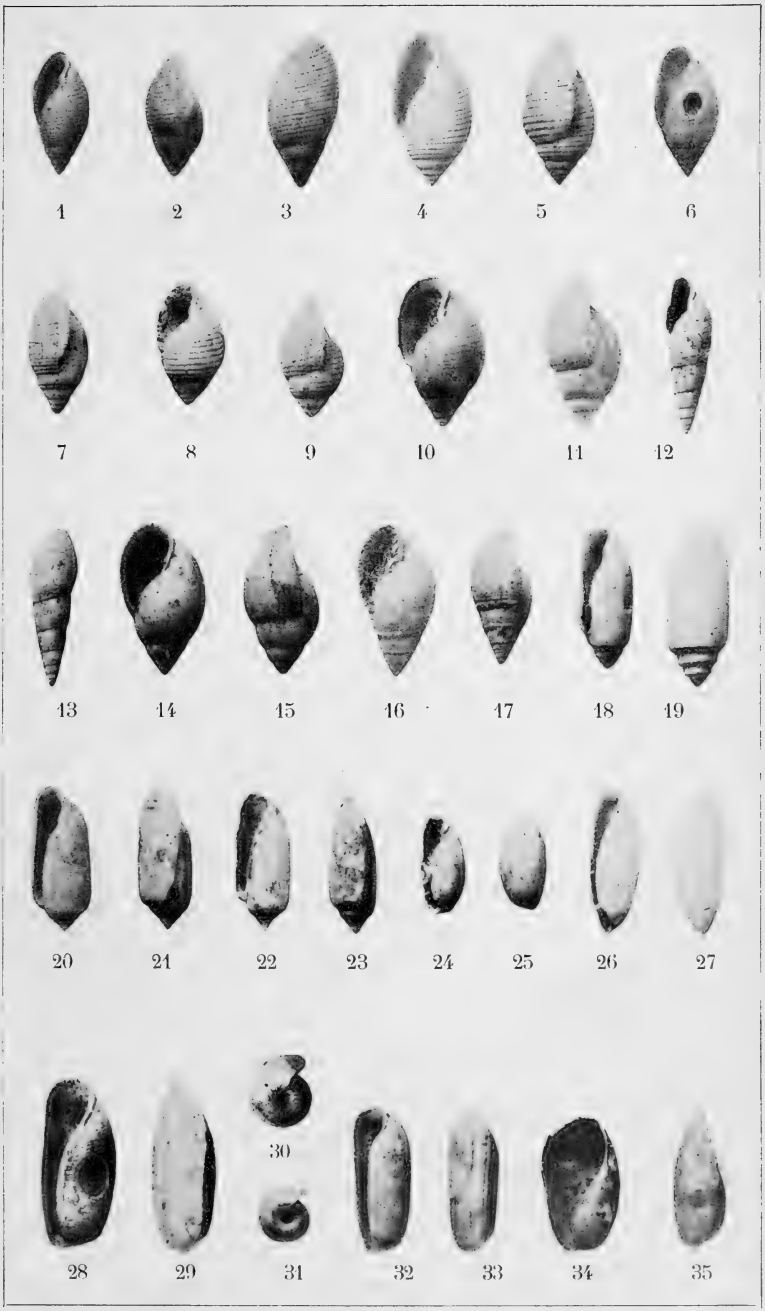
	£	s.	d.		£	s.	d.
To Balance September, 1896	15	5	11	By Subscriptions Royal Society	8	10	0
" Subscriptions	6	5	0	" Postage	2	10	0
" Grant from Royal Society	15	0	0	" Stationery, etc.	1	3	6
" Interest	0	11	1	" Printing Monthly Notes	2	8	0
				" Balance	22	10	6
	£37	2	0		£37	2	0

Audited and found correct,
RICH. V. GRIFFITHS.
31st August, 1897.

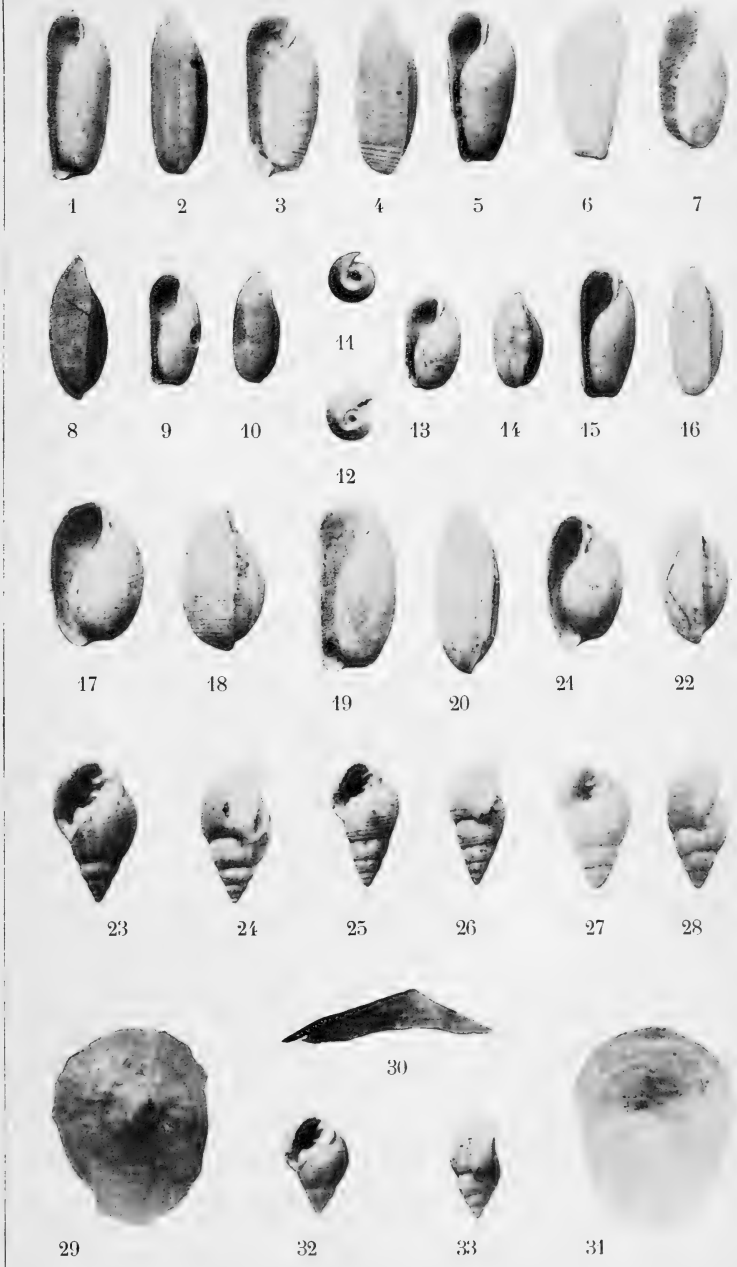
Read and adopted,
C. TODD, President.
W. E. CHEESMAN, Sec. and Treasurer.
2nd September, 1897.

GENERAL INDEX.

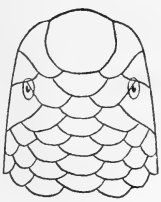
[The species and genera, the names of which are printed in italics, are described as new.]



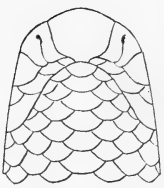
Pissarro, photogr. Sohier à Paris



Pissarro, photogr. Sohier à Paris



2.



3.

1.

4.

Edgar R. Waite, del.

TYPHLOPS PINGUIS, sp. nov.

TRANSACTIONS

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA.

VOL. XXI., Part I.

[With Three Plates.]

EDITED BY PROFESSOR RALPH TATE.

ISSUED JULY, 1897.

Adelaide:

W. C. RIGBY, 74, KING WILLIAM STREET.

Parcels for transmission to the Royal Society of South Australia, from Europe and America, should be addressed "per W. C. Rigby, care Messrs. Thos. Meadows & Co., 35, Milk Street, Cheapside, London."

CONTENTS.

TRANSACTIONS

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA.

VOL. XXI. Part II.

INCLUDING PROCEEDINGS AND REPORTS

EDITED BY PROFESSOR RALPH TATE.

ISSUED DECEMBER, 1897.

Adelaide:

W. C. RIGBY, 74, KING WILLIAM STREET.

Parcels for transmission to the Royal Society of South Australia, from Europe and America, should be addressed "per W. C. Rigby, care Messrs. Thos. Meadows & Co., 35, Milk Street, Cheapside, London."

CONTENTS.