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The liver (Plates XIX. and XX. figs. 1, 1 a) differs from that of C. pilorides (Plates XIX. and XX. figs. 2, 2 a) chiefly in the absence of that subdivision of the lobes into lobelets, as originally described by Say and subsequently by Owen in that species, and as shown in the figures above referred to. The primary division of the liver of C. pilorides into lobes is, however, on precisely the same plan as in C. melanurus, as may be seen by comparing the figures, the principal difference in the general outline being noticeable in the right and left central lobes, which in C. melanurus scarcely exceed the right and left lateral lobes in length, but in C. pilorides are greatly produced backward. In both species the Spigelian lobe (s) is small and similarly shaped, and in both there is a similar separated portion (l.l') of the left lateral lobe (l.l). The gall-bladder is well-developed.

The other abdominal viscera are as in C. pilorides.

The epiglottis is short, and rounded at the tip. The vocal cords are shallow, but very dense in structure, with sharply defined margins, as in C. pilorides, but there are no distinct sacculi laryngis. With this exception Prof. Owen's description of the larynx of C. pilorides also applies to this species. The trachea is formed of twenty-eight cartilaginous rings, dorsally imperfect; the bronchi diverge gradually, and the right bronchus much exceeds the left in calibre. The lungs are divided into lobes precisely as in C. pilorides.

The heart is rounded at the apex, without trace of a notch between the ventricles. As in C. pilorides and Erethizon dorsatum, there is a large innominate artery which gives off the right subclavian and the two common carotid arteries, the left subclavian arising separately from the arch of the aorta. The arrangement of the precaval veins differs, however, remarkably from that of C. pilorides as described by Prof. Owen, for instead of the blood returned from the head and anterior extremities being emptied into the right auricle by a single vein, there are, as in most species of Rodentia and Insectivora, two precaval veins; the left precaval vein receives the left vena azygos and winds round the heart to open into the right auricle, while between the orifices of the right and left precavals the postcaval vein enters.

The male generative organs cannot be described for want of material, but they probably resemble those of C. pilorides described by Prof. Owen (l. c.).

The clitoris is provided with a long prepuce, and is perforated by the urethra; the vagina is remarkably long and spacious, and its walls are marked by numerous rugosities. The uterus (Plate XXI. fig. 4) is bicorneate; the long cornua unite by their internal margins in their posterior thirds, but their cavities continue separate almost to the vagina, into which, however, they open by a single os. The ovaries, as in the Hare, are not enclosed in peritoneal capsules, each capsule is quite open, and the Fallopian tube, after pursuing a tortuous

So differing from Erethizon and Cercolabes, where there is no trace of one. It must, however, be remembered that there is a gall-bladder in the closely allied Hystrix.
course, opens on its external free margin at the furthest distance from the ovary; each ovary lies close behind and external to the kidney, external to which the ovarian ligament passes outwards, downwards, and forwards upon the ribs and intercostal spaces, becoming lost in the peritoneal lining.

The brachial plexus is formed from the fifth, sixth, seventh, and eighth cervical, and from the first dorsal nerve, as shown in the diagram (fig. 4). Superficial branches from the seventh and eighth

Fig. 4. Origins and connexions of the nerves of the brachial plexus.

Fig. 5. Origins and connexions of the nerves of the lumbar plexus.

a.c, Anterior crural; a.th, Anterior thoracic; c.f, Circumflex; e.c, External cutaneous; i.e, Internal cutaneous; m, Median; m.sp, Musculo-spiral; ob, Obturator; rh, Rhomboid; s, Great sciatic; s.d, Subscapular; sp.sc, Suprascapular.

nerves unite to form the internal cutaneous nerve (i.e), which is distributed as usual; and superficial branches derived from the sixth and seventh nerves unite to form the musculo-cutaneous (m.e). The ulnar nerve (ul) is formed by the junction of a large branch from the united branches of the first dorsal and eighth cervical nerves, and sends off a branch, which, with one derived from the seventh cervical, forms the median nerve (m). The musculo-spiral (m.sp), a large nerve, is formed under cover of the origin of the preceding nerves from branches of the seventh and eighth cervical nerves, and a small twig from the first dorsal. The circumflex (c.f) is formed altogether from the sixth cervical, with which a communicating filament is derived from the fifth nerve.

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The lumbar plexus (fig. 5) is remarkably simple, even more so than in Erethizon dorsatus 1; it is formed from the last three lumbar (the fifth, sixth, and seventh lumbar nerves) and the first sacral; as in E. dorsatus there is no connexion between the nerve from which the crural and obturator nerves are derived and the anterior root of the great sciatic; the anterior crural nerve (a.c) is formed by the junction of the fifth and sixth lumbar nerves, from which also the obturator nerve (ob) is given off; the great sciatic (s) is formed by the last (the seventh) lumbar nerve and the first sacral only. In the distribution of the nerves of this plexus no peculiarities are noticeable.

To sum up, C. melanurus, while differing so remarkably from C. pilorides in the absence of that subdivision of the hepatic lobes which has been described in the latter species 2, and in the presence of two pre-caval veins, resembles it closely in other respects in its visceral anatomy, and probably also in its myology, as the few notes available on the myology of C. pilorides agree with the writer’s observations on that of C. melanurus. In their general anatomy both species show the close relationship which exists between this genus of Octodontidae and the genera of Hystericeidae, indicating the near affinities of these two families of Hysterice Rodents.

EXPLANATION OF PLATES.

PLATE XVIII.

Capromys melanurus, half natural size.

PLATES XIX. & XX.

Fig. 1, 1 a. Liver of C. melanurus, showing convex and concave surfaces.
2, 2 a. Liver of C. pilorides, showing corresponding surfaces. c, Caudate lobe; g, gall-bladder; l, suspensory ligament; l.c, left central lobe; l.l-l.p, left lateral lobe; r.c, right central lobe; r.l, right lateral lobe; s, spigelian lobe.

PLATE XXI.

Fig. 1. Stomach of C. melanurus (natural size), dorsal surface. c.c, Cardiac cul-de-sac; d, duodenum; e, esophagus; p.p, pylorus.
2. Cæcum, half natural size. c.o, colon; i, ilium.
3. Proximal part of cæcum (three fourths natural size) laid open, showing the ileo-cæcal valve (c'), and the position of the two patches (a, a') of agminated glands; i, ileum; c.o, colon.
4. Uterus and upper half of vagina, the latter (v), the os uteri (o, u), and part of the right and left cornua (c, c') are laid open; on either side the mesometrium (m) with vessels, the ovaries (o.v.), the open peritoneal capsules (cp) each traversed by the Fallopian tube (f.p), and the ostium (indicated by a bristle, b) of the latter opening on the outer border of the peritoneal capsule, are shown.

1 Mivart, P. Z. S. 1882, p. 281, fig. 9.
2 It is therefore evident that the subdivided condition of the hepatic lobes into lobelets can no longer be considered characteristic of the genus Capromys.
May 6, 1884.

Prof. Flower, LL.D., F.R.S., President, in the Chair.

The Secretary read the following report on the additions to the Society’s Menagerie during the month of April 1884:

The total number of registered additions to the Society’s Menagerie during the month of April was 220. Of these 43 were acquired by presentation, 61 by purchase, 7 were born in the Gardens, and 30 were received on deposit. The total number of departures during the same period, by death and removals, was 128.

The most noticeable additions during the month were:

1. Two Nepalese Hornbills (Aceros nepalensis), purchased April 4th, being the first examples of this fine species of Hornbill that have been acquired by the Society.

2. A fine Gigantic Salamander of Japan (Megalobatrachus maximus), purchased April 23rd. No specimen of this Batrachian has been in the Society’s collection for some time. The present example is about 2 feet 8 inches in length.

3. A series of animals collected by Charles T. Kettlewell, Esq., F.Z.S., during the voyage of the yacht ‘Marchesa’ in the Eastern Archipelago, amongst which were three examples of the Lesser Bird of Paradise (Paradisaea minor) from Jobie Island, and one of the White Cockatoo of the Philippines (Cacatua philippinarum), obtained at the Sooloo Islands—a new locality for this species.

4. A fine example of the Mediterranean Seal (Monachus albiventris), an animal now growing scarce and difficult to procure, purchased April 26th.

5. A Banded Gymnogene (Polyboroides typicus), purchased April 30th. This is the first example of this very curious bird of prey that has been acquired for the collection.

Professor Bell exhibited some specimens of Estheria melitensis sent from Malta by Captain Becher, R.A., and stated that, in answer to his inquiries, that gentleman had confirmed the fact of the males appearing to equal in number the females, as had been stated by previous observers of the members of the genus.

Lieut.-Col. H. H. Godwin-Austen exhibited and made remarks on an old Indian drawing representing a Tiger—hunt, and called attention to the colour of one of the Elephants represented in it, which was of a creamy-white.

A communication was read from Mr. G. A. Boulenger, F.Z.S., containing an account of the Reptiles and Batrachians of the Solomon Islands. This memoir was based principally on two important collections made in the Solomon Islands and transmitted to the British Museum by Mr. H. B. Guppy of H.M.S. 'Lark' in 1883 and 1884, in which were found several new and interesting forms.
The species of Reptiles recognized as hitherto known to occur in the Solomon Islands were stated to be 19, and those of Batrachians 9 in number.

This paper will be published in the Society's 'Transactions.'

The following papers were read:


[Received April 7, 1884.]

As is well known, the incisors of the simplicident Rodents have no milk predecessors. With regard to the molars, the rule seems to be the following. When there are only three (as in the Common Rat), or fewer than three (as in Hydromys), these are all true molars, and have no predecessors. These animals then are truly monophyodont. When the number exceeds three, it is by the addition of teeth to the front of the series, which are premolars and are preceded by milk-teeth. In the large majority there is only one such tooth on each side.

When milk-teeth are present, a remarkable variation is observed in their characters and the period at which they are matured and shed. Thus in the Guinea-pig and its allies the one milk-molar (a small, though tolerably well-formed tooth) is absorbed or shed a short time before birth; while in the Porcupines and Beavers the corresponding tooth is retained until the animal has nearly reached the adult condition 1.

On Nov. 30, 1875, two Capybaras were born in the Society's Gardens: one died on the same day, the other lived until the 8th of December. The skull of this one was preserved, and is now in the Museum of the Royal College of Surgeons. It shows the state of dentition at this early age particularly well.

In the adult Capybara the dental formula is $i.1$, $c.0$, $p.1$, $m.3 = 20$; the distinction between premolars and molars being inferred from the analogy of other Rodents, in fact of other placental Mammals. In the little animal eight days old, the cranium of which measures 102 millim. in length, the number of the teeth is just the same as in the adult; the incisors and four molariform teeth being all present and in an equal state of development. A small portion of the surface of each, including the posterior molar, has been already abraded by wear. The molar teeth show the same form and pattern as in the adult, being each divided by deep lateral grooves into distinct lobes corresponding to those of the full-grown tooth. They are, however, all very much smaller, the length of the whole series

in the upper jaw being 30 millim. instead of 72 as in the adult. They evidently represent the narrow apical portion of the permanent teeth, which as growth proceeds wears off, and they are not in any case milk-teeth. As the first of the series, or premolar, is as fully developed as the one which follows it (or first true molar) it must either have no predecessor, or one which has disappeared at an early stage of intra-uterine life.


[Received March 28, 1884.]

Among the valuable collections made during 1876 by Captain H. C. St. John, H.M.S. ‘Sylvia,’ in the Japanese seas were a few Holothurians; these were not reported on along with the rest of the Echinodermata, which some years ago formed the subject of interesting communications from Prof. Martin Duncan, F.R.S., and Mr. Sladen.

Now that I am engaged in working through the collections of Echinoderms in the British Museum, the Trustees of which owe the specimens now under consideration to the generosity of Dr. Gwyn Jeffreys, F.R.S., I think it proper to direct the attention of the Society to two very remarkable specimens among these Holothurians which cannot be placed in any genus at present instituted. The lessons to be learned from these specimens, and the knowledge that has been acquired of forms unknown to Professor Semper, thanks chiefly to the labours of Ludwig and v. Marenzeller, lead, I think, to a reconsideration of the classificatory system and phylogenetic table which in 1868 was put out by Semper, to whom the student of Holothurians will always be under the deepest obligations. It is with diffidence that I propose to rearrange a family that has been studied by this distinguished naturalist.

*Description of the Specimens.*—Body elongated, tapering at its hinder end. Oral tentacles in two cycles; in the outer fourteen, of fair size, and more or less subequal; in the inner ten, very small, arranged regularly by pairs, radial in position. Suckers confined to the ambulacra, arranged in quite regular rows; in the bivalve ambulacra they are set in pairs, but are a little more irregular and more crowded in the trivial ambulacra. Owing to the attenuation of the body in the hinder region, the rows of suckers approach one another. The interradii are altogether free of suckers. There are no signs of any calcareous pharyngeal plates.


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There are no calcareous plates or spicules developed in the walls of the body or of the tube-feet, the only calcareous deposits being the terminal plates of the tube-feet, and the delicate and elegant bars which are found in the tentacles.

The integument is very thin anteriorly, but increases considerably in thickness in the hinder part of the body, where it is quite stout. When its walls were cut through, the anterior portion of the body-cavity was found to be filled with a large number of stout, rather short genital tubes, which branched only once or twice, but were so numerous as to obscure considerably the underlying parts. The retractors of the pharynx are inserted behind the middle point of the body; two of them are remarkable for approaching and uniting with one another; under the band thus formed, on one side the intestine passes twice. The intestine is very delicate. No Polian vesicle was detected, and it is probably of comparatively small size; the so-called water-lungs extend forwards to the anterior end of the body.

The characters presented by this form are sufficiently remarkable to justify the establishment of a new genus for its reception. It stands nearest to the two genera instituted by Ludwig—Echino-cucumis and Actinocucumis; but it differs from them both in the important character of the regularly paired disposition of the radially placed smaller tentacles. With them, it differs from all other polychirote (or Dendrochirotæ with more than ten tentacles), and agrees with the more simple of the decachirote Dendrochirotæ in having the sucker-feet confined to the ambulacra.

In consequence of the definite disposition of the tentacles in two cycles, I propose to speak of it as Amphicyclus, this form of the name being sufficiently different from Amphicyclia.

The Generic Characters appear to be:—Stichopod arrangement of the suckers associated with the possession of more than ten oral tentacles; the tentacles in two circles: those of the inner are arranged in pairs, are ten in number, radial in position, smaller than those of the outer circle, in which there are fourteen subequal tentacles. There are no calcareous pharyngeal plates, and two of the retractors of the pharynx are united with one another.

As there is only one species known, the discrimination of the specific characters is, of course, unsafe; but these appear to be:—

1. Complete absence of rods or spicules from the walls of the body or tube-feet;
2. Attenuation of the hinder end;
3. Thickness of integument of anterior end;
4. Large number of genital tubes.

As the locality is known (lat. 41° 12' N., long. 140° 45' E.; 43 fms., sand and mud), I propose the specific name of japonicus.

The useful classification proposed by Professor Semper in his magnificent work has been universally adopted by systematists since the year 1868; in it the Dendrochirotous Pneumonophora were

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1 In Cucumaria frondosa, where calcareous deposits are reduced to a minimum, there are well-developed plates in the tentacles; and Thyone okeni (see Brit. Mus. Cat. 'Alert' coll.) has rods in the tentacles only.

2 Haeckel, Jenaische Zeitschr. vol. xv.
grouped under the three subfamilies of Stichopoda, Gastropoda, and Sporadipoda, according as the ambulacral suckers were set in definite rows, and the interradii were altogether or almost completely devoid of suckers (e.g. *Cucumaria*), were confined to the trivium ("ventral surface") (e.g. *Psolus*), or were scattered more or less regularly over the whole body, as in *Thyone*.

Among the Sporadipoda, *Thyone* and *Stereoderma* alone had ten tentacles only; and, till the time of Ludwig's institution of *Pseudocucumis* and *Actinocucumis*, all Stichopods were thought to have ten tentacles or to be "decachirote."

The recent researches of Von Marenzeller have resulted in an emendation of the generic characters of *Colochirus* ¹, and have in principle removed it from the Stichopoda to the Sporadipoda, so that in place of saying with Semper "Die Füsschen der Bauchseite stehen in 3 deutlich von einander getrennten Reihen," we now say, with Marenzeller, "Die Ambulacralfüsschen der Bauchseite stehen entweder in drei deutlichen Reihen oder nahezu regellos." While Von Marenzeller has demonstrated the inconstancy of the Stichopod arrangement in one of the Stichopoda, it has been my fortune to show ² that the Sporadipod disposition of the ambulacral feet in *Stereoderma* is, in *S. murrayi*, carried further than it is in *S. unisemita*, the only species of the genus that was known in 1868.

We are then led to the conclusion that the disposition of the ambulacral suckers offers a less certain basis for arrangement than was supposed some years since. It might, indeed, well have been thought that as the Holothurian got further and further away from the parent stock which remained under the domination of the pentameric disposition of parts, it would, as it began to develop more than five pairs of tentacles, have its sucker-feet developed in the interradial as well as the radial parts of the body. Such a theoretical consideration would find support in the fact that some forms as they grow older lose a stichopodous and acquire a sporadi-podous arrangement of the sucker-feet; while a not unimportant consideration for the systematist is the variability of this character.

With regard to the former, however, opposing evidence is offered by the case of *Amphicyclus*, where, with in all 24 tentacles, we have the stichopod arrangement completely retained; and by the genus *Actinocucumis*, made known to us by H. Ludwig, where there is a stichopod arrangement, and from 18 to 20 tentacles.

As to the latter consideration, I should like to speak with diffidence till I have a better acquaintance than I have now with the species of the genus *Cucumaria*. As a matter of fact, however, systematists do, at this moment, unite under that head (α) stichopods with ten equal tentacles, (β) stichopods with ten tentacles of which two are smaller than the rest, and (γ) forms with eight large and two smaller tentacles, and some sucker-feet scattered in the interambulacra. Semper has hinted at the advantage of separating the last from the rest and forming for them a new generic group; but he

² P. Z. S. 1883, p. 61.
The liver (Plates XIX. and XX. figs. 1, 1 a) differs from that of C. pilorides (Plates XIX. and XX. figs. 2, 2 a) chiefly in the absence of that subdivision of the lobes into lobelets, as originally described by Say and subsequently by Owen in that species, and as shown in the figures above referred to. The primary division of the liver of C. pilorides into lobes is, however, on precisely the same plan as in G. melanurus, as may be seen by comparing the figures, the principal difference in the general outline being noticeable in the right and left central lobes, which in C. melanurus scarcely exceed the right and left lateral lobes in length, but in G. pilorides are greatly produced backward. In both species the Spigelian lobe (s) is small and similarly shaped, and in both there is a similar separated portion (I.I') of the left lateral lobe (I. I). The gall-bladder is well-developed.

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It must, however, he remembered that there is a gall-bladder in the closely allied Hystrix.

2 Mivart, P. Z. S. 1882, p. 279.

MR. G. E. DOBSON ON CAL'ROMYS MELANURUS.

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250 MR. G. E. DOBSON ON CAPROMYS MELANURUS. [Apr. 1,

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bar (the fifth, sixth, and seventh lumbar nerves) and the first sacral; as in E. dorsatus there is no connexion between the nerve from which the crural and obturator nerves are derived and the anterior root of the great sciatic; the anterior crural nerve (a.c) is formed by the junction of the fifth and sixth lumbar nerves, from which also the obturator nerve (ob) is given off; the great sciatic (s) is formed by the last (the seventh) lumbar nerve and the first sacral only. In the distribution of the nerves of this plexus no peculiarities are noticeable.

To sum up, C. melanurus, while differing so remarkably from C. pilorides in the absence of that subdivision of the hepatic lobes which has been described in the latter species, and in the presence of two pre-caval veins, resembles it closely in other respects in its visceral anatomy, and probably also in its myology, as the few notes available on the myology of C. pilorides agree with the writer’s observations on that of C. melanurus. In their general anatomy both species show the close relationship which exists between this genus of Octodontidce and the genera of Hystricida, indicating the near affinities of these two families of Hystricine Rodents.

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Fig. 1. Stomach of C. melanurus (natural size), dorsal surface, c.c, Cardiac cul-de-sac; d, duodenum; oz, oesophagus; py, pylorus.

2. Caecum, half natural size, co, colon; i, ilium.

3. Proximal part of caecum (three fourths natural size) laid open, showing the ileo-ciecal valve (c), and the position of the two patches (a, a') of agminated glands; i, ileum; co, colon.

4. Uterus and upper half of vagina, the latter (v), the os uteri (0. u), and part of the right and left cornua (c, c') are laid open; on either side the mesometrium (m) with vessels, the ovaries (pv.), the open peritoneal capsules (cp) each traversed by the Rilopian tube (fp), and the ostium (indicated by a bristle, b) of the latter opening on the outer border of the peritoneal capsule, are shown.

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1884.] ON REPTILES ETC. FROM THE SOLOMON ISLANDS. 251

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Prof. Flower, LL.D., F.R.S., President, in the Chair.

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This paper will be published in the Society's 'Transactions.'

The following papers were read;

1. Note on the Dentition of a young Capybara (Hydrochoerus
capybara). By Professor W. H. Flower, L.L.D., F.R.S.,
P.Z.S., &c.

[Received April 7, 1884.]

As is well known, the incisors of the simplicident Rodents have
no milk predecessors. With regard to the molars, the rule seems to be the following. When there are only three (as in the Common Rat), or fewer than three (as in Hydromys), these are all true molars, and have no predecessors. These animals then are truly monophyodont. When the number exceeds three, it is by the addition of teeth to the front of the series, which are premolars and are preceded by milk-teeth. In the large majority there is only one such tooth on each side.

When milk-teeth are present, a remarkable variation is observed in their characters and the period at which they are matured and shed. Thus in the Guinea-pig and its allies the one milk-molar (a small, though tolerably well-formed tooth) is absorbed or shed a short time before birth; while in the Porcupines and Beavers the corresponding tooth is retained until the animal has nearly reached the adult condition.

On Nov. 30, 1875, two Capybaras were born in the Society's Gardens: one died on the same day, the other lived until the 8th of December. The skull of this one was preserved, and is now in the Museum of the Royal College of Surgeons. It shows the state of dentition at this early age particularly well.

In the adult Capybara the dental formula is $'\cdot$ \(\ast\), c. \(\circ\), p. \(~\), m. \(\mid\) = 20; the distinction between premolars and molars being inferred from the analogy of other Rodents, in fact of other placental Mammals.

In the little animal eight days old, the cranium of which measures 102 millim. in length, the number of the teeth is just the same as
in the adult; the incisors and four molariform teeth being all present and in an ecpaal state of development. A small portion of the surface of each, including the posterior molar, has been already abraded by wear. The molar teeth show the same form and pattern as in the adult, being each divided by deep lateral grooves into distinct lobes corresponding to those of the full-grown tooth. They are, however, all very much smaller, the length of the whole series


in the upper jaw being 30 millim. instead of 72 as in the adult. They evidently represent the narrow apical portion of the permanent teeth, which as growth proceeds wears off, and they are not in any case milk-teeth. As the first of the series, or premolar, is as fully developed as the one which follows it (or first true molar) it must either have no predecessor, or one which has disappeared at an early stage of intra-uterine life.

2. Studies in the Holothuroidea. — III. On Amphicyclus, a
new Genus of Dendrochirotous Holothurians, and its bearing on the classification of the family. By Professor F. Jeffrey Bell, M.A., Sec.R.M.S.

[Received March 28, 1884]

Among the valuable collections made during 1876 by Captain H. C. St. John, H.M.S. 'Sylvia,' in the Japanese seas were a few Holothurians; these were not reported on along with the rest of the Echinodermata, which some years ago formed the subject of interesting communications from Prof. Martin Duncan, F.R.S., and Mr. Sladen I.

Now that I am engaged in working through the collections of Echinoderms in the British Museum, the Trustees of which owe the specimens now under consideration to the generosity of Dr. Gwyn Jeffreys, F.R.S., I think it proper to direct the attention of the Society to two very remarkable specimens among these Holothurians which cannot be placed in any genus at present instituted. The lessons to be learned from these specimens, and the knowledge that has been acquired of forms unknown to Professor Semper, thanks chiefly to the labours of Ludwig and v. Marenzeller, lead, I think, to a reconsideration of the classificatory system and phylogenetic table which in 1868 was put out by Semper, to whom the student of Holothurians will always be under the deepest obligations. It is with diffidence that I propose to rearrange a family that has been studied by this distinguished naturalist.

Description of the Specimens. — Body elongated, tapering at its
hinder end. Oral tentacles in two cycles; in the outer fourteen, of fair size, and more or less subequal; in the inner ten, very small, arranged regularly by pairs, radial in position. Suckers confined to the ambulacra, arranged in quite regular rows; in the bivial ambulacra they are set in pairs, but are a little more irregular and more crowded in the trivial ambulacra. Owing to the attenuation of the body in the hinder region, the rows of suckers approach one another. The interradii are altogether free of suckers. There are no signs of any calcareous pharyngeal plates.


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There are no calcareous plates or spicules developed in the walls of the body or of the tube-feet, the only calcareous deposits being the terminal plates of the tube-feet, and the delicate and elegant bars which are found in the tentacles.

The integument is very thin anteriorly, but increases considerably in thickness in the hinder part of the body, where it is quite stout. When its walls were cut through, the anterior portion of the body-cavity was found to be filled with a large number of stout, rather short genital tubes, which branched only once or twice, but were so
numerous as to obscure considerably the underlying parts. The retractors of the pharynx are inserted behind the middle point of the body; two of them are remarkable for approaching and uniting with one another; under the band thus formed, on one side the intestine passes twice. The intestine is very delicate. No Polian vesicle was detected, and it is probably of comparatively small size; the so-called water-lungs extend forwards to the anterior end of the body.

The characters presented by this form are sufficiently remarkable to justify the establishment of a new genus for its reception. It stands nearest to the two genera instituted by Ludwig — Echino-cucumis and Actinocucumis; but it differs from them both in the important character of the regularly paired disposition of the radially placed smaller tentacles. With them, it differs from all other polychirote (or Deudrochirotse with more than ten tentacles), and agrees with the more simple of the decachirote Dendrochirotae in having the sucker-feet confined to the ambulacra.

In consequence of the definite disposition of the tentacles in two cycles, I propose to speak of it as Amphicyclus, this form of the name being sufficiently different from Amphicyclia 2.

The Generic Characters appear to be: — Stichopod arrangement of the suckers associated with the possession of more than ten oral tentacles; the tentacles in two circles: those of the inner are arranged in pairs, are ten in number, radial in position, smaller than those of the outer circle, in which there are fourteen subequal tentacles.
There are no calcareous pharyngeal plates, and two of the retractors of the pharynx are united with one another.

As there is only one species known, the discrimination of the specific characters is, of course, unsafe; but these appear to be:—

1. Complete absence of rods or spicules from the walls of the body or tube-feet; 2. Attenuation of the hinder end; 3. Thinness of integument of anterior end; 4. Large number of genital tubes.

As the locality is known (lat. 41° 12' N., long. 140° 45' E.; 43 frns., sand and mud), I propose the specific name ojjaponicus.

The useful classification proposed by Professor Semper in his magnificent work has been universally adopted by systematists since the year 1868; in it the Dendrochirotous Pneumonophora were grouped under the three subfamilies of Stichopoda, Gastropoda, and

1 In Ciicumaria frondosa, where calcareous deposits are reduced to a minimum, there are well-developed plates in the tentacles; and Thy one okeni (see Brit. Mus. Cat. 'Alert' coll.) has rods in the tentacles only.

2 Haeckel, Jenaische Zeitschr. vol. xv.
Sporadipoda, according as the ambulacral suckers were set in definite rows, and the interradii were altogether or almost completely devoid of suckers (e. g. Cucumaria), were confined to the trivium ("ventral surface") (e. g Psolus), or were scattered more or less regularly over the whole body, as in Thyone.

Among the Sporadipoda, Thyone and Stereoderma alone had ten tentacles only; and, till the time of Ludwig's institution of Pseudocucumis and Actinocucumis, all Stichopods were thought to have ten tentacles or to be "decachirote."

The recent researches of Von Marenzeller have resulted in an emendation of the generic characters of Colochirus; and have in principle removed it from the Stichopoda to the Sporadipoda, so that in place of saying with Semper "Die Fiisschen der Bauchseite stehen in '6 deutlich von einander getrennten Reihen," we now say, with Marenzeller, "Die Ambulacralt'usschen der Bauchseite stehen entweder in drei deutlicheu Reihen oder nahezu regellos." While Von Marenzeller has demonstrated the inconstancy of the Stichopod arrangement in one of the Stichopoda, it has been my fortune to show 2 that the Sporadipod disposition of the ambulacral feet in Stereoderma is, in S. murrayi, carried further than it is in S. unisemita, the only species of the genus that was known in 1868.

We are then led to the conclusion that the disposition of the ambulacral suckers offers a less certain basis for arrangement than was supposed some years since. It might, indeed, well have been thought that as the Holothurian got further and further away from the parent stock which remained under the domination of the
pentamerous disposition of parts, it would, as it began to develop more than five pairs of tentacles, have its sucker-feet developed in the interradial as well as the radial parts of the body. Such a theoretical consideration would find support in the fact that some forms as they grow older lose a stichopodous and acquire a sporadipodous arrangement of the sucker-feet; while a not unimportant consideration for the systematist is the variability of this character.

With regard to the former, however, opposing evidence is offered by the case of Amphicyclus, where, with in all 24 tentacles, we have the stichopod arrangement completely retained; and by the genus Actinocucumis, made known to us by H. Ludwig, where there is a stichopod arrangement, and from 18 to 20 tentacles.

As to the latter consideration, I should like to speak with diffidence till I have a better acquaintance than I have now with the species of the genus Cucumaria. As a matter of fact, however, systematists do, at this moment, unite under that head (a) stichopods with ten equal tentacles, (/3) stichopods with ten tentacles of which two are smaller than the rest, and (y) forms with eight large and two smaller tentacles, and some sucker-feet scattered in the iuterambulacra. Semper has hinted at the advantage of separating the last from the rest and forming for them a new generic group; but he

8 P.Z.S. 1883, p. 61.