

beyond the compass of our seven or eight octave grand pianofortes? This interval is simply the excess of the twelfth power of 3 over the nineteenth power of 2. As powers of 3 are Twelfths, in music—octaves with Fifths, and not merely Fifths—and as octaves are powers of 2, this comma represents B sharp as topping C in its nineteenth octave. Happily any nineteenth octave is beyond our powers of hearing, even if we adopt a No. 1 with only one vibration in a second of time. We may therefore dismiss so disagreeable a sound to the so-called "Music of the Spheres," in compliment to Pythagoras, who is supposed to have been acquainted with music of that kind.

We are too generally prone to rely upon the labours of our predecessors, and hence this peculiar comma has been received without examination, as the overlapping of twelve Fifths over seven octaves, as stated by "A. R. C." After having traced what it really is, wishing to find the author of the miscalculation, I took up a newly-acquired copy of Koch's, "Musikalisches Lexicon," which, although written in the last century, is still reputed as a work of authority, and has been re-edited by Arrey von Demmer (8vo, Heidelberg, 1865). I found a more curious mistake: instead of twelve Fifths, it is there stated to be twelve Fourths or Fifths; and Koch's way of proving it is by multiplying the ratios, not as fractions, but as whole numbers. For example, a Fifth and a Fourth we know to make one octave, but Koch multiplies 3 times 3 = 9 in one column, and 4 times 2 = 8 in the other (p. 24). As the twelve threes are in one column, he arrives by multiplication at the twelfth power of 3, and as the fours and twos are in the other column, he arrives at the nineteenth power of 2. It is desirable that this should be known as a caution against too-ready acquiescence in Koch's calculations.

WM. CHAPPELL

On "Comatula (Antedon) Rosacea," and the Family "Comatulidæ"

MAY I be allowed to point out to Mr. Stebbing that *Comatula* and *Antedon* are not precisely equivalent names, but that the genus *Antedon* represents only one of some five or six different types, to all of which "Lamarck's happily appropriate designation *Comatula*" is equally applicable; and that this is now generally used as a sort of family name, and only when strict scientific accuracy is not very important, as a generic name.

Johannes Müller, who laid the foundation of nearly the whole of our present knowledge of the zoology and morphology of the family, was the first to recognise that Lamarck's designation, *Comatula* included more than one type; in his well-known memoir, "Ueber die Gattung *Comatula*, Lamarck, und ihre Arten," he indicated two distinct varieties of *Comatula*, the one represented by the ordinary *Comatula rosacea*, with a central or subcentral mouth, and symmetrically distributed ambulacral furrows; and another, which he first recognised in the ordinary *Comatula solaris*, Lamarck, to which he gave the name *Actinometra*: in this type the mouth is marginal, and the furrows of the ten arms open at equal intervals into a circular furrow running round the edge of the disc, the centre of which is occupied by the anal tube. The first of these types is that to which de Fremyville's name of *Antedon* is now usually applied. Müller, however, seems never to have been acquainted with this name, and adopted Leach's genus *Alecto*, which was constituted three years subsequently to *Antedon*; while *Comatula* did not appear till a year later. Recent observations have, however, shown that *Alecto*, as used by Müller, really includes many forms that are true *Actinometra*, and the name has passed gradually into disuse, in its original application to the Crinoids; this was all the more necessary, as the name has been generally received as designating a genus established by Lamouroux in 1821, for a section of the Polyzoa.

Müller was in the habit of using a sort of trinomial nomenclature in his descriptions of the species of *Comatula*; thus, *Comatula (Alecto) europæa*, and *Comatula (Actinometra) solaris*; it will probably be advisable to continue this practice, and it is therefore somewhat unfortunate that Mr. Norman¹ should have transposed *Antedon* into a masculine name, for de Fremyville, who first proposed it, used it as a feminine one, and described his first and only species as *Antedon gorgonia*, which is probably the same as *Comatula carinata*, Lam. Pourtales has already adopted *Antedon* as a feminine name, and we should probably do well to follow his example, especially if we employ Müller's very convenient system of trinomial nomenclature, for it is far simpler to

write *Comatula (Antedon) rosacea*, than *Comatula rosacea = Antedon rosacea*.

Besides these two types *Antedon* and *Actinometra*, there is, as Müller pointed out, another division of the *Comatula* represented by the recent *Comaster* of Agassiz and the fossil *Solanocrinus* of the Wurtemberg Jurakalk; these are distinguished from the ordinary *Comatula* by the fact that five small basals appear externally between the first radials. The five small ossicles lying between the second radials of *Antedon Diibenii*, Böhlische, are possibly also external basals. It is unfortunate that Böhlische was unable to make a further examination of this species, and so determine this very interesting point.

Müller considered *Solanocrinus*, or at any rate *S. costatus* and *S. scrobiculatus* as generically identical with *Comaster*, and pointed out that the differences in the form of the "knopf," or centrodorsal basin, which is elongated and more or less fusiform in *Solanocrinus*, and hemispherical in *Comaster*, could not be regarded as of generic value, for similar differences occur among different species of the recent *Comatula*; e.g., between *C. Eschrichtii*, Müll. and *C. phalangium*, Müll. I have recently found that such differences may occur within the limits of the same species. Thus, of the two specimens of *Comatula (Antedon) macrocnema* in the Paris museum, one has a hemispherical centrodorsal basin, just like that of *Comatula (Antedon) Eschrichtii*, while in the other it is a short pentagonal or nearly circular column, on which the cirrhi are disposed in four alternating rows, precisely as in *Solanocrinus*. Götte, who has recently made some most beautiful observations upon the embryology of *Comatula*, opposes the view first suggested by Sir Wyville Thomson, and since adopted and strengthened by Dr. Carpenter, that the centrodorsal basin represents a coalesced series of the nodal or cirrus-bearing stem-joints in the stalked Crinoids, but its condition in *Solanocrinus* and *Antedon macrocnema* seems to show unmistakably that Sir Wyville Thomson's determination of its homologies is the correct one, especially when it is remembered that, as Goldfuss says, young specimens of *Solanocrinus* are not uncommon, in which the articular surfaces of the segments composing the elongated "knopf" are visible, although in the adult animal they become so closely united as to be inseparable.¹

Unfortunately we do not know the position of the mouth in *Comaster*, the only specimen yet known having been dissected by Goldfuss, who says little or nothing about the ventral surface; but in *Phanogenia*, a new genus of the free Crinoids established by Lovén, it is central, as in *Antedon*.

These four types, *Antedon*, *Actinometra*, *Comaster*, and *Phanogenia*, all currently regarded as belonging to Lamarck's genus, *Comatula*, differ very considerably from one another in many points, perhaps the most characteristic of which is the condition of the basals in the adult animal.

In *Antedon*, as shown by Dr. Carpenter, the primitive basals of the Pentacrinoïd larva undergo a very remarkable metamorphosis into the small and relatively insignificant "rosette;" this is almost entirely inclosed within the circlet of first radials, with which it becomes more or less fused in the adult animal, and by which it is so concealed as very readily to escape notice; so that all the older investigators either denied the existence of basals at all, or like Goldfuss, mistook the first radials for basals. I have recently found that in *Actinometra solaris* (Müller's typical species), and in several other species of the genus, the basals are relatively very large, and take the shape, not of a "rosette," but of a five-pointed star, the rays of which lie on the dorsal aspect of the five sutures of the first radials with one another, while its centre is simply an open and very delicate calcareous network, more or less connected with that proceeding from the inner surface of the radial circlet. These basals are readily exposed by the removal of the flattened centrodorsal basin, the ventral aspect of which exhibits five stellate interrarial depressions, into which the basals fit, but they never extend outwards so far as to be visible externally.

This last condition, of external basals, occurs, however, in *Comaster*, and in the Jurassic *Solanocrinus*. The centrodorsal basin of *Comaster* is hemispherical, and round its ventral margin lie five small triangular basals, not in contact with one another, but so widely separated that the first radials lying between them

¹ Further, in the singularly minute *Comatula alticeps* found by Philippi between the valves of a fossil *Isocardia cor* from the Sicilian Tertiaries, the centrodorsal, which he calls the "kelchstück," is elongated, egg-shaped, and visibly composite, bearing at least two, and very probably several more, alternating rows of cirrhi just like that of *Antedon macrocnema*. I have little doubt but that this species was a true *Antedon*, and an ancestor of our recent *Antedon rosacea* which is now so common in the Mediterranean.

¹ "On the Genera and Species of British Echinodermata," Ann. Mag., N. 11., xvi. 1865.

articulate directly with the centro-dorsal basin, while their infero-lateral angles are truncated so as to make room for the intervening basals.

The basals of *Phanogenia* appear to be in a condition intermediate between that of *Antedon* and *Actinometra*. Lovén describes them as internal and concealed, forming a small rosette with a central pentagonal opening, and marked on its ventral face by five sinuses, which receive processes from the sutures of the first radials.

We have thus a very interesting series of transitions from *Antedon* to *Pentacrinus*; firstly through *Phanogenia* and *Actinometra* to *Comaster*; thence to *Solanocrinus costatus*, in which the basals resemble those of *Comaster*, but the centro-dorsal basin is elongated and visibly composite; and finally to *S. jøgeri*, Goldfuss, in which the basals are so wide that they are completely in contact with one another all round, precisely as in *Pentacrinus*; this genus then only differs as far as the stem and basals are concerned, from *S. jøgeri*, by the fact that its nodal cirrus-bearing stem-segments are not fused together, but separated from one another by more or fewer of the internodal ones which do not bear cirrhi.

Solanocrinus thus constitutes, as already pointed out by Goldfuss, a very interesting intermediate form between the stalked *Pentacrini* and the ordinary free-living *Comatule*, which are only stalked in their young stages.

Besides the above-mentioned four generic types, or rather five, if Pictet be right in erecting *S. jøgeri* into a separate genus, Lamarck's name *Comatula* also includes the beautiful little five-armed *Ophiocrinus* from the Philippines; unfortunately we do not yet know either the condition of its basals or the anatomy of its soft parts, and can therefore form no opinion as to its relations to the other members of the family.

As these five or six types are all equally entitled to the name *Comatula*, it becomes necessary in any systematic work on the family to give them distinct generic or sub-generic names, especially as in one or two cases the same specific name has been given to two or more types. Thus the *Comatula multiradiata*, Goldfuss, is a *Comaster*, while the *C. multiradiata* of Lamarck is an *Actinometra*; and again the *C. armata* of Pourtales is an *Antedon*, while *C. armata*, Semper, is an *Actinometra*.

For ordinary dredging work, however, on the British coasts, where *Antedon* is the only representative of the family, it is not so necessary to discard a common and better known name in favour of one which, although scientifically correct, and considerably older, has only recently come into general use, especially when, as Mr. Stebbing remarks, its meaning and pronunciation are alike difficult to determine; and though the designation *Comatula rosacea* may, scientifically regarded, be a somewhat loose one, it is now so well known that the use of it is not likely to lead to any serious mistakes in synonymy among working naturalists.

P. HERBERT CARPENTER

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WITH reference to the names *Antedon* and *Comatula*, will you allow me to say that the former has been applied to a genus of lamellicorn beetles since the year 1832? *Comatula* has been in use from nearly the beginning of the present century, and it is not only found in the works of Fleming, Forbes, Sars, Owen, G. H. Lewes ("Seaside Studies"), Carus, and others, but it must be a familiar word to many who have seen the splendid tank of those crinoids in the Naples aquarium. And now that we are bidden to change it "on the grounds of priority," may we inquire if the "grounds" of long custom (in this case more than sixty years) are to be invariably set aside? Dr. J. E. Gray, who had a sort of mania for change, tried in 1848 to restore de Freminville's name of *Antedon*. He went a step further, and, after Pennant, adopted Linck's specific name (so far as Linck had any idea of specific names, for they were unknown in his day) of "decameros," so that the advocates of absolute priority will have to take "*Antedon decameros*" as the designation of *Comatula rosacea*.

In Gemminger and von Harold's "*Catalogus Coleopterorum*," *Antedon* is derived from ἀντλ and δδωρ, and consequently spelt *Antodon*; I do not see its application in either case.

I should be glad to see the "rules of zoological nomenclature" (Mr. Hughes means, I presume, those of the British Association) better observed if it led to the exclusion of such barbarisms as Butzkopf, Gatyghol, Sing-sing, Nabiroup, and others, which many of the readers of NATURE will probably be astonished to find in our modern scientific nomenclature. May

we inquire if such a description as that of the celebrated "*Hister australis*," viz., "nigro-cyanus, nitidus, subtus ater," which would apply to hundreds of species of Histeridae, is entitled to claim the protection of the law of priority? I think we may sometimes fall back with advantage on the law of common sense, or that, at any rate, it may be allowed to supplement the law of priority.

FRANCIS P. ASCOE

December 23, 1876

Sea Fisheries

My chief reason for again intruding on you is for the purpose of supplying some omissions in Prof. Newton's quotations from Prof. Baird's first Report. In this Prof. Baird speaks of the destructive agency of the blue-fish. He states that about a million and a quarter of these fishes are caught annually on the New England coast, but that any one who has watched the blue-fish there must feel convinced that not one in a hundred of these fishes is caught; he allows twenty fish of other kinds as being devoured or mangled by each blue-fish daily, and then goes into a calculation of the thousands of millions of fish which must be destroyed by the blue-fish. I am writing this from memory, but I believe I am correct. Prof. Baird then says (I give this *verbatim*), p. 23:—"Indeed I am quite inclined to assign to the blue-fish the very first position among the injurious influences that have affected the supply of fish on the coast. Yet, with all this destruction by the blue-fish, it is probable that there would not have been so great a decrease of fish as at present but for the concurrent action of man."

This, the other cause of decrease, on which Prof. Baird lays great stress, is the numerous traps and pounds along the coast; but in Clause XII. of the same summary from which Prof. Newton quoted, I find the following:—

"As there is reason to believe that scup, and to a less degree other shore-fish, as well as blue-fish, have several times disappeared at intervals to a greater or less extent, within the historic period of New England, we cannot be certain that the use of traps and pounds within the last ten years has actually produced the scarcity complained of. The fact, however, that these engines do destroy the spawning fish in so great numbers renders it very probable that they exercise a decided influence."

Prof. Newton does not speak with his usual scientific precision when he refers only to the cod, and doubtfully to the mackerel, having decreased owing to the scarcity of the alewives—"cod, haddock, and hake" being mentioned in the same paragraph. Nor does it seem to me quite worthy of my friend, in discussing the probabilities of overfishing in the sea, to try to prove his case by bringing forward an instance of overfishing in the rivers leading to a smaller supply of food at a certain season for purely sea fish on the coast, and therefore a decrease in those sea fish.

Dogfish are "predatory and mischievous:" they plunder the nets, and they tear the nets in pieces.

Athenæum Club, December 29 E. W. H. HOLDSWORTH

[Pressure upon our space has necessitated a curtailment of this letter. This correspondence must now cease.—Ed.]

The "Sidereal Messenger"

IN NATURE (vol. xv. p. 49), in a notice of Mr. Knobel's "Catalogue of the Literature of Sidereal Astronomy," attention is called to the rarity of the *Sidereal Messenger*. We have, in the library of this Observatory, only one copy of that periodical. I hope, however, soon to be in possession of a few copies of vol. i. If so I shall take pleasure in sending one of them to the Royal Astronomical Society. All of Prof. Mitchell's measures of double stars (about 300) are now in the hands of the printer and will be published before the close of the year. ORMOND STONE
Cin. Obs., September 12

South Polar Depression of the Barometer

MR. CLEMENT LEY, writing in NATURE (vol. xv. p. 157), thinks that the great depression of the barometer throughout the region round the South Pole as compared with that round the North Pole, is "mainly due to superior evaporation in the water hemisphere generally." This seems an inadequate cause, for evaporation must be small in the very low temperatures which appear to be constant at all seasons in high southern latitudes. I am convinced that the cause of the barometric depression round the South Pole is the centrifugal force of the west winds which revolve round the Pole, forming, in Maury's words, "an everlasting cyclone on a great scale." A similar cyclone is formed