

- 3. The tail-ribs are duplicate. This is an essential difference.
- 4. The axis is, generally speaking, narrower, and its width is nearly the same throughout: in *Asaphus*, the axis of the thorax always greatly exceeds in width that of the tail.

These distinctions will draw a broad line between the two genera, and will separate the British species belonging to them as in the list that follows. There will be no intermediate or doubtful forms, with the exception of *Ogygia? hybrida*,—of which the tail only has been hitherto discovered.

<p><b>ASAPHUS</b>—(<i>Basilius</i>)</p> <p>(?) (<i>Ptychopyge</i>) (<i>Isotelus</i>)</p> <p>(<i>Brachyaspis</i>) (<i>Cryptonymus</i>)</p> <p><b>OGYGIA</b>—</p> <p>    "    var. <i>convexa</i></p> <p>    "    var. <i>angustissima</i>.</p> <p>    <i>scutatatrix</i>, Salter.</p> <p>    <i>peltata</i>, Salter.</p> <p>    <i>Selwynii</i>, Salter.</p> <p>(?)     <i>hybrida</i>, Salter.</p>	<p><i>tyrannus</i>, Murch.</p> <p><i>peltastes</i>, Salter.</p> <p><i>Fowisii</i>, Murch.</p> <p><i>Marstoni</i>, Salter.</p> <p><i>laticostatus</i>, McCoy.</p> <p><i>radiatus</i>, Salter</p> <p><i>Corndonensis</i>, Murch.</p> <p><i>gigas</i>, Dekay.</p> <p><i>affinis</i>, McCoy.</p> <p><i>Homfrayi</i>, Salter.</p> <p><i>rectifrons</i>, Portl.</p> <p><i>scutalis</i>, Salter.</p> <p><i>Buchii</i>, Brongu.</p> <p>    <i>convexa</i></p> <p>    <i>angustissima</i>.</p> <p>    <i>scutatatrix</i>, Salter.</p> <p>    <i>peltata</i>, Salter.</p> <p>    <i>Selwynii</i>, Salter.</p> <p>    <i>hybrida</i>, Salter.</p>	<p>Llandeilo Flags, Llandeilo.</p> <p>Llandeilo Flags, Llandeilo.</p> <p>Llandeilo Flags, Anglesea.</p> <p>Caradoc Shale, Horderley, Shropshire.</p> <p>Llandeilo Flags, Builth.</p> <p>Caradoc, Rhiwias, near Bala.</p> <p>Llandeilo Flags, Builth.</p> <p>Caradoc Rocks, Tyrone.</p> <p>Up. Tremadoc Slate, S. of Portmadoc.</p> <p>Up. Tremadoc Slate, near Tremadoc.</p> <p>Lower Silurian, Tyrone.</p> <p>Caradoc, Tyrone.</p> <p>Llandeilo Flags, Builth.</p> <p>Llandeilo Flags, Builth.</p> <p>Llandeilo Flags, Builth.</p> <p>{ Lr. and Up. Tremadoc and Arenig   Group,   Tremadoc, Portmadoc, and St.   David's.</p> <p>Arenig Group, St. David's.</p> <p>Arenig Group, Dolgelly.</p> <p>Llandeilo Flags?—Carmarthenshire.</p>
--	--	---

NOTICES OF MEMOIRS

I.—ON THE PENTACRINITES OF THE WEST INDIES; WITH SOME REMARKS ON PENTACRINITES AND SEA-LILIES IN GENERAL.<sup>1</sup>

By Dr. CHRISTIAN LÜTKEN, Assistant Zoologist in the Museum of Copenhagen.

Translated from the original Danish, by Dr. GUSTAF LINDSTRÖM, of Wisby, Island of Gotland, Sweden.

IN this very elaborate memoir, the author first describes a new species, *Pentacrinus Mülleri*, and gives an excellent plate of the animal, natural size. He then gives an account of the other Crinoidea (*Pentacrini*, *Holopus*, etc.,) which have been found, or pretended to have been found living, but the knowledge of them seems to be very scanty and unsatisfactory. Next, Dr. Lütken compares the Pentacrini with the genus *Alecto*, and states, that these genera belong to the same natural family. The nearest allies of the Pentacrini are, nevertheless, the extinct tertiary forms, (the true Pentacrini from the London Clay, and the genera *Isocrinus*, H. v. Meyer, and *Cenocrinus*, E. Forbes). Of these Dr. Lütken considers the last as

<sup>1</sup> Om Vestindiens Pentacriner med nogle Bemærkninger om Pentacriner og Søllilier i Almindelighed of Dr. Phil. Chr. Lütken. Af Naturhist. Foren. Vidensk. Meddeleser 1864.

undoubtedly a true *Pentacrinus*, and the former only as a slightly deviating sub-genus. The magnificent Pentacrinus of Jura, (*P. briarcus* and *P. subangularis*) differ in a higher degree as in the more branching arms, in the small radiaria, and in the solid plates of the perisoma.

As to the true confines of the family of the Pentacrinus, the author thinks them very uncertain, and he also considers the question of the arrangement of all sea-lilies in natural groups, still to be in a highly unsettled state. Some have arranged them in *articulated* and *tesselated*, (CRINOIDEA ARTICULATA and TESSELATA). Those naturalists who acknowledge the CRINOIDEA ARTICULATA as an independent order, number all species, younger than the palæozoic formations, excepting *Holopus* and *Marsupites*, amongst them. They consider all the CRINOIDEA TESSELATA as Palæozoic. But Dr. Lütken thinks this opinion untenable, and it seems to him impossible to draw definite lines between them. "If you take to the definition," he says, "that those Sea-lilies are articulated, which have the radialia of the pelvic cup free, that is, articulated between themselves, not united by seams, . . . . it may be answered that the Jurassic *Apiocrinus* has the radialia united by small intercalated interradiania, and the radialia are thus immoveable, and not free." Moreover, the Palæozoic *Taxocrinus* has the radialia quite as free as the Pentacrinus, and ought therefore to be ranged amongst the CRINOIDEA ARTICULATA. A satisfactory systematical arrangement of the Crinoidea is, nevertheless, highly desirable, as their forms almost daily increase in number. The author is very right in dwelling on the undue eagerness with which some palæontologists, who, with a very slight knowledge of the living crinoids, create so-called new species, often founded on few and insufficient fragments. Although Dr. Lütken does not yet consider it time to establish a true system of the Crinoidea, he gives what he calls "a guiding thread" through this maze of forms. He then in the first place designates as suborders, (a) the *Cystidea*, and (b) the *Blastoidea*, in opposition to (c) the true *Crinoidea*, and amongst the last, he separates as families, (1) the genus *Holopus* with *Cyathidium*, (2) *Cupressocrinus*, and (3) *Anthocrinus*, (*Crotalocrinus*), both distinguished by the peculiar structure of their arms, (although so widely unlike each other,) and by the absence of "pinnulæ"; perhaps also, (4) *Ctenocrinus*, (5) *Eucalyptocrinus*, so different from all true Crinoids in its whole structure. Then there rests the chief mass, (6) of all typical *Sea-lilies*, and as central or typical genera amongst these may be discerned, I.—*Pentacrinus*, (with *Alecto*, *Millerocrinus*, *Taxocrinus*, and *Encrinus*); II.—*Apiocrinus*, (with *Guettardocrinus*); III.—*Platycrinus* and *Actinocrinus*.

The remarks of Dr. Lütken on the sexual organs of the extinct *Crinoidea* are very important. It is undecided whether the living Pentacrinus have a mode of reproduction resembling that of *Alecto*, with the ova and the spermatic fluid enclosed in the pinnulæ of the arms. The specimens of the European Museums have been searched in vain, the pinnulæ are in no way so inflated as in *Alecto*. On the other hand, there is no fact that contradicts the almost generally spread opinion, that the sexual products in all typical *Sea-lilies* have been lodged in

the pinnulæ. In those genera again where these pinnulæ are absent, as in *Anthocrinus* and *Cupressocrinus*, the theory may be so applied that the ova, etc., had their place on the interior surface of the arms, covered by the membranaceous envelope of the arms. Or it may be, that in the last-mentioned genera, the sexual organs were placed in the interior of the pelvic cup, as can be assumed with certainty to have been the case with the *Cystidea* and the *Blastoidea*. In no typical Sea-lily, again, whether recent or fossil, has there ever been seen any opening on the calyx, that could be supposed to be sexual.

Lastly, our author most peremptorily protests against the opinions of some palæontologists, who consider the long tube seen on the apex, or near the apex of the upper side of the calyx, as a proboscidean mouth, or feeding tube. So, for instance, when M. de Koninck says that there is a circular opening on the apex of his *Cyathocrinus*, and that its borders are lengthened to a short tube, or proboscis, which he calls the mouth, and that the anal vent is lateral, Dr. Lütken is of an opinion quite contrary. In the existing Sea-lilies, no zoologist ever found a proboscidean mouth, only a circular vent, but the intestine *always* ends in a short or long proboscidean tube. Even if this tube is situated *near* the centre of the calyx, or *at* it, it does not thence necessarily follow that it is the mouth. In some of the recent specimens, as *Actinometra*, the mouth is excentric, situated near the margins, and the arms central. "It is the form, and not the place, that must decide if it is the anal-tube, or the mouth." Still, the author grants, that there may be a possible exception in the case of *Marsupiocrinus*, as stated in Siluria, and by Mr. Yandell.

The memoir deserves to be studied by all palæontologists working at these beautiful fossils, its true merits cannot be fully discussed in a short abstract.

## II.—VERDHANDLUNGEN DES BERGMÄNNISCHEN VEREINS ZU FREIBURG.<sup>1</sup>

PROFESSOR Scheerer, councillor of mines, completed his remarks "on the Occurrence of Silver at Kongsberg."<sup>2</sup>

The district in which the Kongsberg mines have been worked for nearly 250 years consists of crystalline schists (placed by Kjerulf and Dahll in the oldest known azoic formation); they are mainly micaceous, hornblendic, chloritic, and quartzose schists, besides numerous subordinate varieties, and they appear in beds alternating with one another repeatedly and without any definite order.

The strike of the rock in this district is mainly North and South, and the dip is very steep, and even perpendicular in places. Some of the beds are remarkable for being impregnated with pyrites (iron pyrites, magnetic pyrites, copper pyrites) and still retain their old names of Fall (or Fahl) bands. They are crossed by numerous small veins, seldom more than a few inches wide, which run from East to West, and are filled up mainly with Calc spar, Heavy spar,

<sup>1</sup> Proceedings of the Mining Society of Freiburg, at a meeting held 3rd April, 1866. Extracted from the "Berg-und hüttenmännische Zeitung," 16th July, 1866.

<sup>2</sup> Based on the paper entitled "Betänkning af den ved Kongelig Resolution af 10 Juli, 1865, naadigst nedsatte Commission angaaende Kongsberg Sölvvärk."

Fluor spar, and Quartz; in places, however, these veins contain native Silver in more or less quantity. From the mode of occurrence it was thought possible to lay down the law, *that Silver occurs only where the veins cross Fall bands*; and sometimes this view was distorted into—more or less Silver occurs *everywhere* where veins cross Fall bands. The careful experience of the present day seems to show that the following are the real circumstances of the case:—

The impregnation with pyrites, on which the original idea of a Fall band was founded, is not confined exclusively to one particular bed, nor is it equal throughout one bed. All that can be said is that a certain set of beds, for a considerable length and depth, is irregularly impregnated with pyrites. This set of beds impregnated with pyrites, which we will call a *Fall band zone*, would be the proper extended notion of a Fall band, with the addition that within a Fall band zone, beds of various kinds of schist may alternate with one another. The occurrence of Silver where a vein crosses a Fall band zone, does not depend on the enclosing rock containing pyrites, nor upon its being a certain variety of schist. The above law has to be extended into the fact, that where a *vein crosses a Fall band zone* Silver occurs apparently in a quite irregular manner.

Even this law, based upon experience, must not be accepted without caution, in spite of its being so general. With regard to this, the following questions may be asked:—

*Firstly.*—Is it a well-ascertained fact that the Kongsberg veins contain no Silver outside a Fall band zone?

*Secondly.*—Is it always possible to say, when driving a level, whether one is within a Fall band zone or not? On account of the irregular and often very slight impregnation with pyrites, scarcely or not at all visible, it must be very difficult in many cases to answer this second question, and naturally this renders an answer to the first still more uncertain.

*Thirdly.*—Is it not possible that, besides the Fall band zones visible above ground at day, and worked upon, or supposed to be worked upon, there may exist other Fall band zones underground? Practically this question coincides with the first, and can only be answered by following the veins beyond the borders of a Fall band zone.

By these considerations the miner sees himself deprived of the sure basis of an old rule on which he had relied with confidence for more than two centuries. Let us hope that the loss thus sustained by the theory of veins will be richly compensated for by gain in Silver in ground hitherto considered as barren.

Besides this, in the above-mentioned report there is some further information about the Kongsberg veins, of which the following was specially mentioned:—

In Christian's adit driven as far as the mine, "God's help in time of need," to a length of nearly 2000 fathoms, 251 veins and strings were cut. Of these, 84 (veins) are at least  $\frac{3}{4}$ -inch thick, 167 (strings) possess a smaller thickness, some only as thick as a sheet of paper. Of the 84 veins, 43 were till then unknown, 31 unexplored at this

depth, 10 partly being worked and partly worked out. The adit did not cross any veins which, separately, would entitle one to particular expectations. On account of the very irregular and unequal distribution of the Silver, it must not be inferred that all these veins contain no Silver. Although with regard to their thickness many of the veins may seem of little consequence, still they are important, on account of their continuing most regularly from the surface to the level of the adit, and, indeed, as far down as they have been worked. Where several veins are close together and form a group of veins, the Silver appears to have collected in greatest quantity.—C. L. N. F.

---



---

### REVIEWS.

---

I.—ON THE BURIED FORESTS AND PEAT MOSSES OF SCOTLAND, AND THE CHANGES OF CLIMATE WHICH THEY INDICATE. By JAMES GEIKIE, Esq., of the Geological Survey of Great Britain.

[Communicated by ARCHIBALD GEIKIE, Esq., F.R.S., to the Royal Soc. Edin. Vol. XXIV., Part ii., pp, 363-384.]

THE personal observations of the Author, and those of Prof. Young (Glasgow University), are combined with a mass of recorded and traditional evidence, to arrive at the geological history of these Mosses, the phenomena connected with which are stated to be threefold :—

1st. The buried trees and condition of the country at the period of their growth ;

2nd. The causes which led to the destruction of those trees ;

3rd. The present aspect of the Peat Mosses.

The former abundance of forest trees in these countries (and also in maritime Norway), even in our most northerly islands, where cultivated saplings can but struggle for existence, is thus brought forward.

“Throughout the bleak Orcades and sterile Zetland large trees have at one time found a congenial habitat. Of the main-land it is difficult to say what region has not supported its great forests. The bare flats of Caithness, the storm-swept valleys of the Western Highlands, the desolate moory tracts of Perthshire and the North-eastern counties, the peaty uplands of Peeblesshire and the Borders, and the wilds of Carrick and Galloway, have each treasured up some relic of a bygone age of forests.”

From the submergence of peat containing trees, and old forests, around the British Isles, along the coasts of Brittany and Normandy, and the Channel Islands, the author argues a continental condition of these regions attached to the rest of Europe and each other before the deposition of the marine beds of the Drift Formation, when “the climate was still cold enough to nourish glaciers in the higher valleys of our mountains.” . . . . “a climate more nearly approaching that of the wooded regions of Canada than to that which characterises Germany at the present time.”