This article was downloaded by: [OARE Consortium]

On: 04 July 2015, At: 04:52

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: 5 Howick Place, London, SW1P 1WG

Annals and Magazine of Natural History: Series 1

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/tnah07>

XXIX.—The Anatomy of Nautilus

M. Valenciennes

Published online: 04 Dec 2009.

To cite this article: M. Valenciennes (1841) XXIX.—The Anatomy of Nautilus, *Annals and Magazine of Natural History: Series 1*, 7:44, 241-245, DOI:

[10.1080/03745484109442696](https://doi.org/10.1080/03745484109442696)

To link to this article: <http://dx.doi.org/10.1080/03745484109442696>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is

expressly forbidden. Terms & Conditions of access and use can be found at
<http://www.tandfonline.com/page/terms-and-conditions>

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 44. JUNE 1841.

XXIX.—*The Anatomy of Nautilus.* By M. VALENCIENNES*.

BARON VON HUMBOLDT gave the Academy an account of the examination of the animal of *Nautilus Pompilius*, the third animal of this species which has been seen by naturalists, which has been made by M. Valenciennes in Paris, and by whom it had been communicated to him in a letter. "M. Meder, a merchant in Java," says M. Valenciennes, "has sent me the animal of the *Nautilus Pompilius*, already described by Owen, which was fished up between Timor and New Guinea. I think that the drawings which I have made of this animal will be somewhat more distinct than those by Mr. Owen. I have discovered an organ which had escaped the celebrated English anatomist, namely, a conical hollow tube clothed with papillæ, which contains in its interior a folded membrane, having the greatest resemblance to that in the nostrils of Fishes; I do not doubt, therefore, that it is an organ of smell. Mr. Owen supposed this organ to be in another place, at the base of the inner tentacula; yet it must have quite another destination, since there are also two other entirely similar organs at the base of the outer tentacula, which Mr. Owen has not seen†. I am inclined to consider them as membranes which belong to the organ of taste. I was not able to find any inward ear, nor could I discover any cephalic

* From Reports of the Royal Academy of Berlin for Jan. 28, 1811.

† They are described as follows in Mr. Owen's Memoir on the Pearly Nautilus: "Although the external configuration of the oral sheath is thus varied, its internal surface is uniform and smooth, except at the lower part near the anterior margin, where there are two clusters of soft conical papillæ, and on each side of these a group of laminae disposed longitudinally." (p. 14.) The oral sheath is formed by the confluence of the bases of the outer tentacula: the single group of laminae at the base of the inner tentacula was conjectured by Mr. Owen to be the analogue of the lamellated olfactory organ in fish, on account of its rich supply of nerves and its position immediately anterior to the mouth. The organs conjectured to be those of smell by M. Valenciennes are two hollow tentacula, situated on the outside of the head, one beneath each eye; there is a remnant of one of these tentacula beneath the remaining eye in the wounded, and, at this part, mutilated specimen, described by Mr. Owen.—Ed.]

Ann. & Mag. N. Hist. Vol. vii.

R

cartilage. The pericardium has a *most* remarkable arrangement. It is folded in such a manner as to form six pockets or sacs about the heart, three on each side, each of which opens at the base of the gills, two at the hinder gills. Through these openings the pericardium has a free connexion with the great respiratory cavity of the animal. Upon these sacs are situated the spongy elevations, similar to those which Cuvier discovered in *Octopus*. Owen has also delineated them, but not plainly enough. Lastly, the examination of the head has shown me that this is surrounded by *eight* arms, as in *Octopus*. The two upper arms are broad and flat, and capable of expansion. They surround the shell on the side of the raised part of the spirally-wound cone (the convexity of the last convolution but one), so that the black part on the mouth of the shell, not far from the spire, supports the basis of the broader arms; when they spread over the shell they deposit upon it the outer layer streaked with yellow, nearly in the same way as the margins of the foot of the *Cypree* form a layer which is coloured different to that which the neck-band of the animal deposits*. I consider the divisions which project on the arms as organs similar to the suckers of the *Octopus*. The outer arms have seventeen divisions (*gaines*), from which proceed as many feelers (*cirrhes*). The two great and broad arms have each only two divisions. The two arms nearest to the mouth possess, the one thirteen, the other twelve suckers (*ventouses*) or divisions. The animal is fastened to the shell by two strong muscles, which are continued into the interior, in order to support the funnel which is formed by the reverted fold, which contains in the interior the tongue-shaped organ, through which the entrance of the water into the respiratory cavity is prevented when the animal moves about quickly in the water. The *Octopus* needs no such provision, as it swims backwards; *Sepia*, which moves in an oblique direction, possesses only a rudiment. According to this, the *Nautilus* has as many arms as an *Octopus*; but they are differently shaped, very short, and furnished with contractile feelers, which come forth from divisions which take the place of the suckers, and which have even been considered as arms. The tube, which descends into the siphon, continues through all the convolutions, even to the very innermost. It is fleshy and surrounded by a calcarco-gelatinous membrane, which is excreted from the tube itself. This tube cannot therefore enter into connexion with the interior of the cavities of the chambers; these cavi-

* [From this description it is evident that M. Valenciennes accedes to Mr. Owen's view of the relative position of the animal of the *Nautilus Pompiilus* to its shell, which had been opposed by Mr. Gray and M. De Blainville.—Ed.]

ties, which must be empty, cannot therefore be at all connected with each other. Of the function of this siphon, in which, as Rumphius and Owen have observed, vessels are distributed *, I, at present, have formed no opinion.

"The animals examined by Owen and myself cannot, in my opinion, belong to the same species. Owen says that the beak of his animal is calcareous at the summit and serrated; mine has a corneous beak as far as the summit, and is perfectly smooth at the margin. Owen's *Nautilus* was fished up near Erromanga, one of the Hebrides; mine in the New Guinea Sea, therefore at a distance of 1000 or 1200 miles from the former.

"I can now conceive how a *Nautilus* moves: it effects this by its long and thick arms, which are combined to a kind of foot; thus they are able to push themselves along under the surface of the ocean, as our *Limnæa* and *Planorbis* do in marshes; yet with this difference, that these are then in an inverted position, so that the brain lies under the œsophagus when they move upon the water; instead of which the *Nautilus* remains in its natural position upon the water, the brain above the œsophagus. If it can creep along at the bottom of the sea, as Rumphius asserts, this must certainly take place in an inverted position. The *Nautilus* is therefore formed entirely after the structure of the Cephalopoda, and has nothing in common with the Gasteropoda†; nor has it anything in common with *Spirula*. Of this I possess fragments, which sufficiently prove their resemblance to the *Sepia* or *Loligo* by the form of their mantle, and by having only two branchiæ. *Belemnites* are nothing but straight, not convoluted, spirulæ. The aspect of the *Nautilus* shows moreover that it can possess no operculum, and that the *Aptychus*, as M. Voltz supposes, cannot be looked upon as an operculum. If the *Aptychus* is part of an Ammonite, as is highly probable, then this part must either be sought for near the mouth or in the pharynx."

Remarks of Professor J. Müller.

Essential differences do not occur between Owen and Valenciennes in the number of tentacula, but only in the explanation of these in reference to the organs in the *Sepia*. Owen looks upon his digitations or tentacular tubes as the arms, and adopts indeed only the nineteen digitations on each side,

* [The entire siphon was termed an artery by Rumphius, but he nowhere alludes to the small vessels of the siphon, injected and described by Mr. Owen.—Ed.]

† [The *Nautilus* possesses, in common with the Gasteropods, the single systemic heart, without the two separate branchial hearts which characterize the higher Cephalopoda.—Ed.]

whilst he designates the groups of tentacula placed about the mouth as four *appendices labiales tentaculiferae*. Valenciennes regards the flaps, from which proceed the tentacular tubes, as arms. His two upper arms is Owen's *hood*. As this, according to Owen, sends off two tentacula, he regards it as two digitations of a similar kind as the remainder, united in the middle. The flaps on each side, on which the seventeen tubes with tentacula are situated, are called by Valenciennes the second or outer arm; the tentacula are considered by him as analogous to the suckers of the *Sepia*. Owen calls the single tentacular tubes arms, of which he reckons nineteen on each side; Rumphius has twenty*. Valenciennes gets the third (upper inward) and fourth (under inward) arm on each side out of the front and hinder *appendices labiales tentaculiferae* of Owen, each of which, according to him, has twelve tentacula; according to Valenciennes one has thirteen, the other twelve; according to Rumphius each has sixteen. Owen compares the under *appendices labiales* to the pedunculated arms of the Calmars, the upper ones as a further development of the outer lip of the same.

Valenciennes' view has much in its favour, inasmuch as the genus of Cephalopods, *Cirrotheuthis* of Eschricht, has arms, which are not furnished with suckers, but with delicate filiform tentacula. Valenciennes mentions two tentacula on each of the upper arms, together therefore four; Owen has only two tentacula altogether upon his *hood*. Valenciennes has also indicated the tentacula before and behind the eye. Their presence is an objection to his view; their structure, however, differs from that of the other tentacula.

The foliaceous organs, which Owen takes for the organ of smell, are in Valenciennes' descriptions doubled; for he has an organ which Owen wants, in the vicinity of the eye, a tube with a folded membrane in the interior, which he considers as the organ of smell, because it is formed as in Fishes. Very probable. That the cephalic cartilage, which Owen has described, is said to be wanting, seems to me somewhat suspicious.

What has been communicated about the pericardium is interesting, and differs from Owen's description in the number of the apertures†. And, lastly, what has been communicated concerning the siphon is important, as is the confirma-

* [Rumphius includes the two that are combined to form the hood, in his series of twenty, which thus corresponds with Mr. Owen's enumeration.—Ed.]

† [Mr. Owen's words, in reference to the apertures here alluded to, are: "and on each side, at the roots of the branchiae, there is a small mammillary eminence with a transverse slit, which conducts from the branchial cavity to the pericardium." *Loc. cit.* p. 27.—Ed.]

tion of the muscular annecton of the animal to the shell. The animal observed by Valenciennes may very possibly be a different species, as the non-serrated margin of the snout and its perfectly corneous state would lead us to believe.

XXX.—On Red and Green Snow. By the late Prof. MEYEN*.

M. CH. MARTIUS, who twice accompanied the French expedition to Spitzbergen, has given us some interesting observations on coloured kinds of snow, which throw quite a new light on this subject. On the occasion of speaking of the structure and development of the cells of plants in his treatise, 'Du microscope, et de son application à l'étude des êtres organisés, et en particulier à celle de l'utricule végétale et des globules du sang,' Paris, 1839, 4to, p. 19, he brings forward the several simple orders of Algæ the individuals of which consist of solitary vesicles, and there *Protococcus viridis* and *nivalis* are mentioned as the simplest plants; and the description of a green field of snow is given, which was seen on the coast of Spitzbergen on the 25th of July, 1838, by MM. Martius and Bravais. The surface of the snow was white, but a few centimetres below it was as deeply coloured as if it had been sprinkled with a decoction of spinage. In another instance M. Martius found this green substance scattered like dust over the surface of a snow-field, the greater part of which was covered with an immense mass of *Protococcus nivalis*; below the surface and on the edges of the field the snow was also coloured green.

The microscopical examination was made in Paris, and it was found that the snow-water was filled with an amorphous green matter, among which were spherical *Protococcus* cells; some were red and much larger than the green ones, and others were rose-coloured, and as far as size goes stood between both. Later researches showed that the snow was composed of globules, which varied much in size and colour; some appeared to be simple, green or pale rose-coloured, and 0·01 to 0·05 millimetres in diameter; others, which were however scarcer, were blood-red and 0·02 mill. in diameter. Other globules appeared to be compound, for they appeared like a case in which other globules were enclosed; their diameter was 0·05 to 0·055 mill.: in one globule there were 5 red small ones, and M. Martius never saw green ones enclosed in this way.

From many observations M. Martius came to the conclusion, that the red globules of the green snow are identical with those of the red snow, and that the green snow (*Protococcus*

* From Wiegmann's Archiv, Heft i. 1840, p. 166, communicated by H. Croft, Esq.