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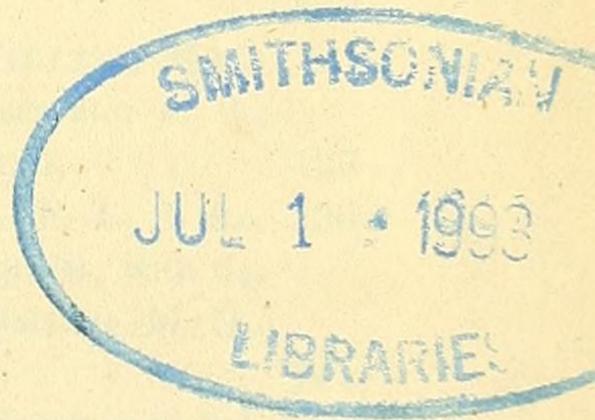
DR JOHNSTON.

“Rerum naturalium sagax Indagator.”

VOLUME FIRST.

W. H. LIZARS, EDINBURGH;
S. HIGHLEY, 32, FLEET STREET, LONDON; AND
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mixed upon the sides with golden yellow, and showing indications of darker transverse bands upon the back ; upon the opercle a spot of blue, continued towards the eye ; fins rosy pink mixed with yellow. Upon the anterior part of the dorsal fin a deep black spot or blotch, occupying the greater part of the membranes of the three first rays ; another upon the upper margin of the base of the caudal fin. These spots were similar in size and situation in Dr Johnston's specimens, and they continue unaltered in the spirits, although the other colours have faded to a pinkish brown.

As the specific title of *Cornubicus* has been applied to the other species, and described as the Goldsinny by various writers subsequent to Pennant, it is proposed to designate the present species as the *Labrus (Crenilabrus) rupestris*, (Jago's Goldsinny,) to which the following synonyms may be appended.

Goldsinny, Ray's Syn. Av. et Pisc. App. Catalogus quorundum rariorum, &c. D. Georgius Jago, p. 163, f. 3.

Die Seekarausche, Lutjanus rupestris, Bloch. Naturg. der Ausländischen fische, ii. p. 117, pl. 250, fig. 1.

VII.—*Observations on some circumstances attending the process of Exuviation in Shrimps and Lobsters.* By JONATHAN COUCH, F. L. S.

Dr MILNE-EDWARDS, in his *Histoire Naturelle des Crustaces*, has given an account of what may be considered the present state of our knowledge, of the circumstances under which the process of exuviation is effected, and the methods by which it is accomplished in the long-tailed stalk-eyed crustaceans ; but as much of what that eminent naturalist advances is derived from other authorities, and I have reason to conclude, contrary to the general opinion, that the circumstances attending this process of nature, are different in even nearly allied species, there still remains space for enquiry.

Réaumur is our only original authority for the minute circumstances attending the process of exuviation, which he observed in the River Crayfish (*Potamobius fluviatilis*, Leach ;) but not having an opportunity of consulting that author's work, I copy his narrative from Dr M. Edwards's quotation : " A few days previous to the commencement of the operation, the creature abstains from all solid nourishment, and the carapace and abdominal segments will be found to offer less than the usual resistance to the pressure of the finger. Shortly afterwards the crayfish appears restless, and rubs its legs against each other ; it then throws itself on its back, agitates its whole body and then distends it, by which the membrane joining

the carapace to the abdomen is burst, and this great dorsal plate is raised. Some degree of rest follows these first struggles ; but after a short time the animal again puts all its organs in motion, the carapace is seen to rise gradually from the legs beneath, and in less than half an hour, the animal has extricated itself from this portion of its slough. By retracting its head, the antennæ, eyes, and legs are withdrawn as from a case ; and the extrication of the last, being the most difficult and complicated operation, is attended with so much pain, that the effort sometimes occasions the loss of one or more of the organs. The hinder parts are withdrawn with less difficulty ; the head is conducted below the carapace, and the tail being thrown off by a forward motion attended with a brisk and distensive action, the creature is seen divested of all its encumbrances, and the case is left unbroken, as if no struggle had ever taken place within it.

I have no doubt that the process here described in the Cray-fish corresponds to what takes place in the common prawn (*Palæmon serratus*, Leach,) although I have never been able to observe it in operation ;—the following is a description of the case from which the animal has recently extricated itself : The whole is thin, elastic and transparent ; the carapace with its serrated process whole, the antennæ perfect to their minute extremities : the palpi and jaws drawn within the cavity of the thorax, and partially separated from the sternal plate ; the latter with the legs still forming a loose attachment to each other, and without fracture, but drawn somewhat posteriorly into the thoracic cavity. The case and pedestal of one eye were within the thorax, but the other could not be found ;—the legs perfect, and attached to the sternal plate. The caudal plates were united at their joints, but in no part was there any intervening membrane, this portion of the body not appearing to be thrown off with the more solid covering : a circumstance which will account for the fact, that the eyes do not long remain attached to the adjacent parts after the slough is left by its inhabitant.

The habits of the Lobster (*Astacus Europeus*, Leach,) at this periodical crisis, and the circumstances attending it, present a very considerable difference from those of the species already mentioned. So far from abstaining from food, it is not uncommon for it to be taken in crab pots, which it has been enticed to enter by the allure-ment of the usual bait ; and instances have been related to me, where, when the fisherman commenced to handle his capture, the animal has slipped away, leaving an empty husk as the only reward of his labour. It was by a circumstance somewhat similar that the opportunity is afforded me of giving a minute description of a very perfect case,

left by the creature when it made its escape:—for escape it did, through an aperture too narrow to have allowed it to pass if its new covering had possessed a very moderate degree of firmness—to the no small annoyance of the fisherman, who had calculated on the possession of a prize somewhat above the ordinary magnitude. I cannot find that any extraordinary actions or contortions have been observed in the lobster, when engaged in delivering itself from its trammels, or that the time is prolonged, as is the case with the crayfish: circumstances which are easily accounted for by an examination of the crust; and it is certain that when delivered it possesses great activity in effecting its escape, and that neither the prawn nor the lobster devour, as has been supposed, any portion of the old shell.

In the specimen referred to, the case of the antennæ and palpi, was perfect to their minutest extremities; the stalk also, and transparent covering of the eyes, were uninjured, but the former was attached on its inferior portion only, the superior half hanging loose, so that it would soon have fallen away in the agitation of the sea. The segments and joints of the posterior portion of the body, with the caudal plates, were all joined together, but without any intervening membrane; and the inferior parts from beneath the snout, including the jaws and footjaws, chelædlegs, with the sternal plate, oesophagus and internal coat of the stomach, formed one connected portion, with no farther separation than arises from the absence of every portion of membrane. The whole of these inferior portions was drawn very considerably within the carapace; and it was the latter section of the surface only that showed a mark of the manner in which the animal had delivered itself from its case; and this it did in a way not to be mistaken. Through the middle of this space, ran a line as straight as if it had been cut with a knife, and evidently formed by a natural process of separation: for it even proceeded through the centre of the snout, to the terminal pointed process, at the root of which it turned off on the right side; so that the least effort of the animal was sufficient to afford it a passage.

The observation here made on a very perfect specimen that came into my possession by great accident, has been further confirmed by a careful examination, both of the living lobster, in which an obscure line is perceptible, where the natural separation takes place; and also of a specimen of small size, in which the sloughing or natural process of division had only begun. In the latter case a deep channel had been formed on the external part, nearly half through the carapace; while the internal portion still remained firm; but

I have little doubt that if the creature had lived but a few days longer, the separation would have been complete, and the animal would have escaped from its prison.

The growth of the young of the long-tailed Crustaceans, is well known to be exceedingly rapid ; and there seems reason to believe that the process of exuviation is repeated at least two or three times in the course of the first year of their age. In the course of a summer, among many prawns one or two may always be found in a state that indicates the having lately passed through this process ; but about October or November they all seem to undergo it at once, the breeding season finishes, and no further change in the shell takes place until the approach of the spring. It is not improbable that the general opinion is correct, which limits the exuviation of the adult animals to once in the year ; but from the marks of old injuries, and the incrustation of parasitic animals, I have come to the conclusion that in advanced age the lobster does not throw off its case with any regularity, and perhaps not at all.