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CONTENTS OF VOLUME I.

NUMBER I.

SCIENTIFIC INTELLIGENCE.

NUMBER II.

SCIENTIFIC INTELLIGENCE.

NUMBER III.

SCIENTIFIC INTELLIGENCE.

The next No. of this Journal will be published on the first of March.

CONTENTS.

SCIENTIFIC INTELLIGENCE.

(For remainder of Contents, see third page of cover.)

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[SECOND SERIES.]

ART. I.—*On Three several Hurricanes of the American Seas and their relations to the Northers, so called, of the Gulf of Mexico and the Bay of Honduras, with Charts illustrating the same;* by W. C. REDFIELD.

(Continued from p. 16.)

Gale or Norther of the Gulf of Mexico in October, 1842.

THIS storm appeared at the southwestern borders of the Gulf of Mexico at the close of September and beginning of October; but from what direction it arrived in that region, does not clearly appear. We may suppose its previous course to have been westwardly, like other storms of these latitudes; and on almost any hypothesis its route must have been, in part, on the nearly adjacent portions of the Pacific Ocean and the gulf of Tehuantepec, a region which has long been noted for its tempestuous character.*

From the region first mentioned, this gale appears to have moved in a northeastwardly or more easterly course through the Mexican sea, across the peninsula of Florida, and over the Atlantic Ocean, touching the Bermudas, till, near the 60th degree of west longitude, it becomes lost to our present inquiries.

* Vide HUMBOLDT's New Spain; New York, 1811, Vol. I, pp. 21, 64—66. The Pacific coast of Central America being seldom visited by our navigators, we are unable to obtain reports from that region.

ART. IX.—*Notice of some Genera of Cyclopacea;* by J. D. DANA.

As a preface to the descriptions which follow, a classification of Crustacea is here given; it is made out so as to exhibit to some extent the parallel relations of the several orders and subdivisions.

CRUSTACEA.

<table>
<tr><td>Subclassis I.
PODOPHTHALMIA.</td><td colspan="3">Subclassis II.
EDRIOPHTHALMIA.</td><td>Subclassis III.
MANDYATA.‖</td></tr>
<tr><td>Ordo 1. DECAPODA.
Tribus
1. Brachyura.
2. Anomoura.
3. Macroura.</td><td colspan="3">Ordo 1. CHORISTOPODA.*
Tribus
1. Isopoda.
2. Læmipoda.
3. Amphipoda.</td><td></td></tr>
<tr><td>Ordo 2. SCHIZOPODA.
Tribus
1. Stomapoda.
2. Diploöpoda.</td><td colspan="3">Ordo 2. ENTOMOSTRACA.
Subord. 1. GNATHOSTOMATA.†
Tribus
1. Branchipodacea.
2. Limnadiacea.
3. Daphniacea.
4. Cyclopacea.
5. Cypridacea.
Subord. 2. CORMOSTOMATA.‡
Tribus
1. Caligacea.
2. Lernæacea.
3. Nymphonacea.
Subord. 3. MEROSTOMATA.§
Tribus
1. Limulacea.</td><td>Tribus
1. Cirripeda, or Balanacea.¶</td></tr>
<tr><td></td><td colspan="3">Ordo 3. TRILOBITA.</td><td></td></tr>
</table>

Order ENTOMOSTRACA.

Tribe CYCLOPACEA.

To avoid explanations in the following descriptions, we here enumerate the prominent external characters of this tribe.

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* From χωριστος *separate*, and πους *foot*, alluding to the fact that the pairs of feet belong each to a distinct segment of the body.

† From γναθος *jaw*, and στομα *mouth*, alluding to the mouth being furnished with proper mandibles and maxillæ.

‡ From χορμος *trunk*, and στομα *mouth*, the mouth having the form of a movable trunk.

§ From μηρος *thigh*, and στομα *mouth*, the basal joints of the legs constituting the jaws.

‖ From μανδυη *a cloak*, alluding to the covering in which the body of the animal is enclosed.

¶ The Cypris-like young of several Anatifæ were collected and figured by the writer, and the metamorphosis traced to the adult state. When first found swimming free in the ocean, they were taken for a new genus allied to Cypris, so similar are their forms. The fact that the body and legs of the Cirripeda shed their skin, is further evidence of the propriety of placing this group with Crustacea.

The pedicel of the Anatifæ corresponds to a pair of antennæ in the young; the animal attaches itself by the sucker-like disk terminating these organs before the metamorphosis commences, and in a group of Anatifæ all the different stages may be observed, from the pair of distinct antennæ to the fixed simple pedicel.

Body jointed, the carapax not prolonged beyond the joint to which it belongs; *abdomen* not inflexed.

Eyes simple.

Antennæ two pairs; the second often pediform or subcheliform.

Mandibles 4–5-spino-dentate, sometimes having a subnatatory palpus.

Maxillæ, one pair; sometimes with a subnatatory palpus.

Maxillipeds, one pair; sometimes simple maxillæ; at others, prehensile, but never at all natatory.

Feet, 6 pairs; the *first* often prehensile, and subcheliform, and either straight or geniculated; *next four* pairs, bifid and natatory; the *sixth* or *posterior*, (corresponding to another pair of natatories,) rudimentary or obsolete, but in some genera, large in the male, with the right one subcheliform.

Abdomen, 2 to 6-jointed; two caudal appendages furnished with 5 setæ, some of which may be obsolete; occasionally short appendages to one or both of the first and second joints.

External ovaries, one or two, proceeding from the *second* joint of the abdomen, or what corresponds thereto.

The genera of this tribe here described may be distributed as follows:

1. *Palpi of the mandibles and maxillæ obsolete or wanting, eyes with simple spherical lenses.*

Family 1. Cyclopidæ. External ovaries two. Eyes two, on a single spot of pigment. Abdomen abruptly narrower than the cephalo-thorax.

Genus 1. Cyclops, *Müller*. The two anterior antennæ subcheliform in the male. (Fresh-water species.)

Family 2. Arpactidæ. External ovary single. Eyes two on a single spot of pigment. A short appendage near middle of anterior antennæ. Abdomen seldom abruptly narrower than the cephalo-thorax. (Marine species.)

Genus 1. Arpactus,* *Milne Edwards*. Anterior antennæ short, and both, in the male, subcheliform; posterior pair terminating in a number of movable setæ. Prehensile feet subcheliform.

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* Milne Edwards has instituted the genus Cyclopsina for a group near Arpactus having the posterior maxillipeds not subcheliform. In the species examined by the writer the subcheliform character is constant, but the movable finger is sometimes reduced to a very short hook.

Genus 2. SETELLA, *Dana.* Anterior antennæ moderately long, slender, and not subcheliform in the male; posterior pair and prehensile feet nearly as in *Arpactus;* short appendages to the first two joints of abdomen; body slender, and two caudal setæ much longer than the body. (Two movable appendages under the beak.)

The name Setella alludes to the *seta*-like form of the animal, and is from *seta*, a bristle.

2. *Palpi of the mandibles and of the maxillæ prominent, and subnatatory.*

Family 3. CALANIDÆ. External ovary single. Eyes two, the spherical lenses on the same or separate spots of pigment. Anterior antennæ very long and slender, without an appendage. Abdomen abruptly narrower than the cephalo-thorax. (Marine species.)

a. Posterior thoracic legs rudimentary or obsolete, without appendages. Anterior antennæ alike in the two sexes, and never with a geniculating joint.

Genus 1. CALANUS, *Leach.* Cephalo-thorax 4-jointed. Anterior antennæ multiarticulate, with the front margin neatly setiferous, and also the posterior apices of the three terminal joints; first pair of feet much larger than the maxillipeds, having outward lateral motion, but scarcely prehensile; maxillipeds very short and straight, setigerous; abdomen short, 2 to 4-jointed. Beak furcate.

Genus 2. SCRIBELLA, *Dana.* Cephalo-thorax 4-jointed. Anterior antennæ, long 7-jointed; setæ long and pointing in different directions. Maxillipeds much larger than the first pair of legs, flexed forward, the three terminal joints as long as the basal, and setigerous, the setæ setulose. Abdomen very long, (as long as the cephalo-thorax;) two setæ to the short basal joint; (a plume or capillary appendage to base of the 8 natatory legs, extending outward at right angles with the body.)

Genus 3. ACARTIA, *Dana.* Anterior antennæ few-jointed; setæ long and pointed in different directions; maxillipeds much larger than the first pair of legs, not flexed, having the terminal joints very short, and setigerous nearly as in the genus *Pontella;* the first pair of legs small and short, not prehensile; the posterior thoracic legs, a single small joint bearing two divergent setæ, one quite long, and usually standing out from the body.

The name Acartia is from *ακαρτος unshorn*, alluding to the long divaricate hairs of the antennæ.

b. Posterior thoracic legs very long and nearly equal; antennæ of the two sexes alike, without a geniculating joint.

Genus 4. EUCHIRUS, *Dana.* Anterior antennæ many-jointed, with several long setæ at intervals; first pair of feet much larger than the maxillipeds, very long and doubly geniculate, the apex flexed downward and furnished below with a pencil of naked setæ; motion of these organs forward in the line of the body, and not outward. Posterior thoracic legs in male very long, and the right one subcheliform. Beak pointed, in lateral view emarginate.

c. Posterior thoracic legs in the male large, the two unequal, and the right subcheliform; the right one of the anterior antennæ in the same sex having a geniculating joint about one third its length from the apex.

Genus 5. PONTELLA.* Anterior antennæ multiarticulate, the setæ as in *Calanus.* Maxillipeds much larger than the first pair of legs, not flexed, and having the terminal joints short and setigerous, the setæ extending forward to the mouth and setulose, as in *Acartia;* the first pair of legs small and short, not prehensile. The right posterior thoracic leg in the male large cheliform, the left smaller and often simple. Beak furcate. Caudal setæ more or less spread. (There is a large glassy appendage under the head, with a rounded or reniform summit.)

Genus 6. CANDACIA, *Dana.* Anterior antennæ and posterior thoracic legs, nearly as in *Pontella;* the first pair of legs much larger than the maxillipeds, elongate, and flexed forward, with the extremity inflexed and bearing a pencil of long naked setæ, motion in the line of the body. Front truncate; caudal setæ usually not spread. Color often in part black or nearly so.

3. *Palpi of the mandibles and maxillæ obsolete; two simple eyes?; also two oblate lenses in the front, and two prolate lenses posterior to these within, which may constitute another pair of eyes.*

Family 4. CORYCÆIDÆ. Tentacles short, few-jointed; external ovaries two.

Genus 1. CORYCÆUS,† *Dana.* Body not depressed. Abdomen abruptly narrower than the body, 2 or 3-jointed; second pair of antennæ

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* The name Pontia, applied to this group by Milne Edwards, was previously applied to a genus of insects, and has therefore been changed as above. The genus *Cetochilus* of Roussel de Vauzème does not differ essentially from Pontella.

† See Proceed. of Acad. Nat. Sci. of Philad. for October, 1845, p. 285. The two lenses in these animals are separated by an unobstructed space, and appear beyond doubt to serve for the transmission of light. In contact with the posterior lens behind is an oblong spot of dark pigment. The only other supposition with

subcheliform, larger than the first pair of legs, (nearly as in the genus Ergasilus.)

Genus 2. ANTARIA, *Dana.* Similar to *Corycæus*, but having the second pair of antennæ terminating in a few movable setæ, and smaller than the first pair of legs. (I am not satisfied that these specimens are not the female of the Corycæi.)

Genus 3. SAPPHIRINA, *Thompson.* Body much depressed; antennæ as in *Corycæus;* abdomen 5 or 6-jointed, the basal joint in the female abruptly narrower than the thorax, and having a pair of short appendages; external ovaries two.

Family 5. MIRACIDÆ. Antennæ as in *Setella;* external ovary single.

Genus 1. MIRACIA, *Dana.* Body not depressed, nearly as in the *Arpactidæ*, the abdomen 5 or 6-jointed and not abruptly narrower than the thorax; anterior antennæ nearly as in *Setella*, with a short appendage near the middle; second pair of antennæ terminating in a few movable setæ; beak with two cultriform appendages; first pair of legs subcheliform.

The distinctions in the above genera rest to a considerable extent upon the use of different organs for grasping in the union of the sexes. In *Cyclops* and *Arpactus*, both anterior antennæ of the male are subcheliform for this purpose; in *Pontella* and *Candacia*, the right antenna and right posterior thoracic leg is thus modified in the male; in *Euchirus*, both posterior thoracic legs are very much elongated; in *Calanus*, the first pair of legs are long and have an outward lateral motion for the purpose; in *Corycæus* the second pair of antennæ subserves this end, and in *Antaria* the first pair of legs are large and subcheliform; in *Setella* the same end appears to be secured by the first pair of natatories.

The genera of Calanidæ differ also in the relative development of the maxillipeds and first pair of legs. In *Pontella*, *Acartia*, and *Scribella*, the maxillipeds are largest. In *Pontella* and *Acartia* they are straight, with long setulose setæ directed forward so as to form a kind of scoop-net. In *Scribella* they are flexed like the letter L. In *Calanus*, *Euchirus* and *Candacia*, the first pair of legs are larger than the maxillipeds; in *Calanus* they are long

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regard to their nature which I can suggest, is their possible connection with phosphorescence. But such an arrangement for this end is not probable; and moreover I was never satisfied that the species were phosphorescent.

and spread outward laterally; in *Euchirus* they are thrown forward in the line of the body, and are flexed like the letter ⅃; and in *Candacia* they have nearly a similar position, but have the extremity flexed *towards* the head instead of *away* from it.

The maxillipeds may always be distinguished from the first pair of legs by the setæ, which are *setulose* in the former, and *naked* in the latter.

Art. X.—*On the Law of Electric Conduction in Metals;* by Jonathan H. Lane.

My attention was first directed to the subject of the law of conduction by reading a paper by Prof. Morse, published in this Journal, Vol. xlv, p. 390, first series, accompanied by a communication from Prof. Draper. These communications gave me the impression that the law commonly received was not well ascertained, and it was under this impression that the experiments given in the following paper were made. But since it was written, I have found that I had mistaken the particular aim of Prof. Morse's experiments, which did not profess superior accuracy, but were only intended as experiments on a large scale by way of verification. Experiments have long since been made by different electricians, which afford strong support to the law in question, while others were thought to controvert it; but they have either been explained, or are not in their nature satisfactory. Still, my own method of experiment appears to possess advantages over any that I have seen; and notwithstanding the imperfect manner in which it has been carried out, it has given results more exactly corresponding with the supposed law. I must say, however, that my experiments have by no means been sufficiently extended, for those given are all I have made touching this question.

1. Supposing electricity to be a fluid, and an electric current to be no more than the motion of this fluid through a conductor, which, at the same time, opposes a resistance to its motion, it is a natural inference, that as electric motion is known to result from difference of tension, so conversely, there is always a difference of tension in the different parts of a conductor, while conducting a current—a regular gradation in the quantity of elec-