ART. XIV.—*Notable Case of a Species of Grapsoid Crustacean apparently in actual process of Evolution* ;* by A. E. VERRILL.

[Brief Contributions to Zoology from the Museum of Yale University—lxviii.]

WHILE collecting crustacea, etc., in Bermuda during the spring of 1901, I was particularly interested in a grapsoid crab of the genus *Sesarma*, which has acquired terrestrial habits in a remarkable degree, as compared with the most nearly allied form (*S. Ricordi*), which lives on the adjacent shores, at about high-tide level.

The large genus *Sesarma* is distributed all around the world in the warmer latitudes. There are about twenty American species. All the species have a broad network of hairs on the external under surface of the branchial areas, for the purpose of purifying and aerating the water used in the branchial cavity to keep the gills moist. The length of time that they can remain away from a supply of water largely depends, therefore, on the size of the branchial cavities and the extent of the external aerating areas. Many species never live away from the sea shore. Some, like the *S. reticulatus* of the Atlantic coast, from Connecticut to Florida, live in holes in wet salt marshes, associated with "fiddler-crabs," their holes descending to permanent water level. Others, like *S. cinerea* of the Carolina coasts, live just above high-tide level, hiding under stones, driftwood, lumber, etc. Several species in the tropics live among the tangled roots of mangroves, in the swamps, mostly just above high-water level, but within easy reach of water. Some species, like *S. Roberti*, of the Antilles, have acquired more arboreal habits and climb into the upper branches of trees, often going far away from water, especially in those islands having abundant rains.†

The common species in Bermuda (*S. Ricordi*) lives ordinarily at and just above high-tide level, within easy reach of water. It is often seen running actively about among the stones and dead seaweeds, usually associated with *Pachygrapsus transversus*. It may almost always be found under masses of *Sargassum* cast up on the shores, as well as under stones.

* Abstract of a paper read before the American Society of Naturalists, Dec. 27, 1907. For illustration see Trans. Conn. Acad., vol. xiii, plate x, fig. 3.

† My son, Mr. A. H. Verrill, who collected this species in Dominica Island, states that while riding along the roads he often took it from the overhanging branches of trees; others were taken from the branches of fruit trees. This species has a very large branchial chamber.

Its range extends from Florida through the West Indies to Trinidad.

The new form seems to be a subspecies or a variety of *S. Ricordi*, which may be actually in process of development into a genuine species, by natural selection and physiological isolation.

It was found living under stones in dry upland fields and nearly barren waste lands with thin soil, where the scanty vegetation consisted of wiry grasses and dwarfed shrubs and weeds. It was associated with a few species of ants, beetles, cockroaches, spiders, land-shells, etc. When the stones were turned over it usually ran away very actively and sought shelter under other stones, but did not seek the water, as most species do. Its general appearance was very unlike *S. Ricordi*. It usually had a sordid dirty color, due largely to adherent particles of soil. It may be described as follows:

Sesarma Ricordi, var. *terrestris*, subspecies or var. nov.

The carapace appears more rough and uneven than in the ordinary form, for it is more strongly areolated and the branchial areas are more swollen, so that the vertical thickness is greater and the reticulated areas of the sides are broader, giving a larger surface for aëration of the water, and indicating larger gill cavities and gills. The dorsal surface of the carapace is covered with more numerous and larger granules, bearing numerous short dark hairs, very evident under a lens of low power, and capable of holding adherent dirt; the plicæ on the postero-lateral sides are stronger and more granulous; the lateral marginal edges are more sinuous anteriorly, owing to the more swollen branchial chambers. The anterior frontal margin is less sinuous, the median indentation often being obsolete or faint.

The ambulatory legs are distinctly larger and longer than in the common form. When the legs are folded the tooth on the distal angle of the merus joint of the legs of the third and fourth pairs reaches considerably (2–3^{mm}) beyond the outer orbital angle, while in *Ricordi* it just reaches it, or only slightly exceeds it (·5^{mm} or less). The proportion of the merus joints of these legs to the breadth of the carapace is 1:1·36. In *Ricordi*, 1:1·5. Ratio of same to length of carapace, 1:1·2. In *Ricordi*, 1:1·4.

The colors, when living, appear dull or sordid yellowish brown, or mud-color, due partly to adherent dirt, often specked or mottled with red or reddish brown. Fresh specimens cleaned in alcohol were variegated with pale bluish gray, dark brownish gray, and blackish, with some red and yellowish

white; an irregular pale band, specked with dark gray, extends from eye to eye. Legs above variegated with similar colors, but paler, the dark brown color mostly in irregular transverse bands. Chelæ whitish or pale yellow; legs bluish white beneath. The colors are evidently imitative of the surroundings and probably protective.

Measurements of Bermuda Specimens.

Number	Sex	Carapace length	Carapace breadth	Front breadth	Chelæ length	Chelæ breadth
3148 <i>a</i>	♂	18.0	20.0	11.0	15	8.5
3148 <i>b</i>	♂	16.6	17.0	9.0	12	7.0
3148 <i>c</i>	♀	17.5	18.5	9.7	10	5.5
<i>d</i>	♀	17.0	19.0	11.0	10	5.5
<i>e</i>	♂	13.5	15.5	8.0	10	7.0

Although there are several distinctive characters, as shown above, it agrees so well in most other respects with *S. Ricordi*, that it does not seem to have become of actual specific rank. We found no intermediate specimens, but it is possible that a more extended search might reveal such. None were found with eggs. It is probable that its breeding season is in mid-summer.

It is not improbable that it has the habit of eating different food from its parent species, and also a somewhat different breeding season, so that the two forms may no longer interbreed. This could not be determined at the season of the year when we were in Bermuda.

It is also possible that it has acquired a somewhat different larval life, for in some other genera of grapsoid crabs (e. g. *Pinnixia*) the species differ widely in their metamorphoses.

No doubt it goes into the sea at the breeding season, and the young probably pass through zoëa and megalops stages, as in allied species, but these stages may be abbreviated.

The young crabs, moulting from the megalops at the shore, have evidently inherited the instinct to seek the higher and drier localities, where they probably have fewer enemies. The modifications that have taken place are in accordance with the change in habitat. The increased hairiness of the carapace and legs serves to retain the dirt that aids materially in their concealment when exposed. Probably they feed mostly at night. The larger gill capacity and longer legs have evident advantages.

That it is not a casual or transitory variation is evident from the fact that there are, in the Museum of Yale University, several good characteristic adult specimens sent to us before

1866 (perhaps collected as early as 1855), by J. Matthew Jones, Esq., who resided in Bermuda for many years, during the colder seasons, and whose first book on Bermuda was published in 1859.

It is certain that all the more terrestrial and arboreal species of this genus must have been derived originally from aquatic species, much in the same way that this form has been developed. Several of those now regarded as distinct species on the American mainland and in the West Indies may even have descended from *S. Ricordi* or some very similar species. Thus *S. cinerea* of our southern coasts is very closely related to *S. Ricordi*, with which it has often been confounded and from which it cannot always be distinguished, unless by experts.