

## CIRCULAR OF INQUIRIES

RELATIVE TO THE

NATURAL HISTORY OF THE AMERICAN CRAWFISH  
AND OTHER FRESH WATER CRUSTACEA.

SMITHSONIAN INSTITUTION,

WASHINGTON, D. C., *March 1, 1878.*

The Smithsonian Institution desires to call attention to the importance of securing for the National Museum full series of the Crawfish and other fresh-water Crustacea of North America.

Recognizing the fact that the agency of man has already exterminated forms which once inhabited the streams and fresh-water basins of the eastern side of the continent, it perceives the necessity for speedy preparation to secure the species belonging to the various faunal areas before they are forever lost to science.

Many facts have recently been added to the recorded history of the Crawfishes which enable a more exact position to be taken with regard to their origin and affinities. Many more observations, however, will be needed to fill out their history; and every fact bearing upon the subject will be of interest and value.

The student can no longer be satisfied with a bare designation of the species, but he must admit that each stage of growth has its meaning, and that so has every step in physical advance or divergence.

It should be remarked that the habits of a form may vary according to environment and attending circumstances. Thus in the crawfish, a species will build chimneys of mud in some localities,

while it will not do so in others. At one season of the year it will wander over a wide range of surface, and at another it will remain confined within narrow limits.

Distinct species live in the mountain streams and in the springs at their sources. Some frequent the marshes of the lowlands, (both the fresh and salt marshes) either near the streams, or adjacent to the bays, sounds, or ocean. Some occur beneath stones in rivers, creeks, or branches; in the muddy basins; beneath stones in the rapids; among grass and weeds in more quiet places, and in coves; under shelving grassy banks; in holes at the bottom of ponds, lakes, dams, and mill-races. Others bore holes in the meadows, or even in the hill-tops near water; and in bringing up the mud and clay from their tube-like holes, pile it as a chimney at the entrance. These species at particular times place a plug of clay in the orifice of the chimney and seal themselves in for a certain length of time.

Still others reside in the drains and mud of the rice fields and plantations of the south, and sometimes burrow through the embankments allowing the water to flood the region.

In order to secure a more full and accurate knowledge of these creatures, the Smithsonian Institution respectfully requests replies, as far as possible, to the following queries. A reference to the number will suffice in cases when it is inconvenient to write at greater length.

There are three great groups of Crawfish which may be distinguished by the difference in the shape of the front end of the head.

1. The first has the tip of the head with acute spine, and farther back with another sharp, long spine each side.

2. The second has the tip of the head acutely triangular, and usually with a minute tooth or notch each side just back of it.

3. The third has the tip of the head almost conical, with the sides a little rounded, or with the extreme tip armed with a short tooth.

Other crustacea will be found parasitic upon fishes and other aquatic creatures, some in their mouths, stomachs, or intestines, or attached to their gills, or gill covers. Other kinds inhabit the shores of bays, creeks, coves, &c., beneath rubbish, or grass, or in the sand, or on the plants submerged in the waters, or even beneath stones and other matter in ponds, sometimes at great depths.

Some attack fishes, wound them, suck their blood, or devour them ; while others feed upon their eggs.

Various kinds of fishes swallow crustacea, and they may be found in their stomachs.

Catfishes often cram themselves with them, and with their eggs. Their eggs form a dainty morsel for aquatic insects and other creatures.

All these creatures of whatever form or kind will be acceptable, in all their stages, from the egg to the adult. They can be sent in alcohol, or alive, as may be most convenient.

When placed in fluid, their colors and markings should be noted and sent at the same time as the specimens.

On the last page of the present circular will be found the figure of a crawfish with a separate representation of the tail, taken from the "First Book of Zoology," by Professor E. S. Morse, (D. Appleton & Co., New York.)

Answers to the queries may refer merely to the number of the questions.

Full credit will be given to all who interest themselves to send specimens and observations.

JOSEPH HENRY,  
*Secretary Smithsonian Institution.*

## QUESTIONS.

1. What kinds of Crawfish live in your vicinity ?
2. Have you one kind in your springs, and a different kind in the streams which run from them ?
3. Do they live in holes made by themselves at the bottom of the springs ?
4. If so, do other creatures live with them in these holes ?
5. Are they active there, or elsewhere in winter ?
6. Do the different parts of your streams yield different kinds ?
7. If so, please report any differences in their habits ?
8. Does one species master the other and chase it away, or exterminate it ?
9. Does the kind in the springs destroy the floors or other parts of your spring houses ?
10. Will you secure a few of the largest specimens you may find ?
11. Are these large ones more shy and secretive than the medium sized ones ?
12. The males may be known by the forked, hooked, or twisted ends of the first pair of legs on the fore part of the belly proper. Are the males or the females of any one kind more abundant ?
13. At what dates do you find eggs on the belly of the female ?
14. Does the male, or another female, help to place the eggs on the legs of the belly ?
15. What is the size of the smallest female you have ever seen with eggs ; and what of the largest ?
16. Are the eggs sometimes smaller, or fewer, than at other times ?
17. If a specimen loses her eggs does she lay a new set ?

18. How soon after laying do the young ones hatch out ?
19. How many times do they change their shell before leaving the mother ?
20. How many times do they change within the year after leaving the mother ?
21. Do they split the shell lengthwise, or how, in making the change ?
22. Does the change so exhaust their energies as to cause them to remain inert ?
23. If so, for how long a time ?
24. Do they unite sexually at all times of the spring, summer, or autumn ?
25. Do they ever so unite in winter ?
26. Are they affected in any way at the times of changing of the moon ?
27. Do the males fight among themselves for the possession of the female ?
28. Does any species live in the wells of your region ?
29. If so, in what kind of water ?
30. Does the cold or darkness of such places deform them in any way ?
31. How deep in the well do they live, and in what parts of it ?
32. Do you find them in the standing water of limestone quarries ?
33. Do they live in the pools of other kinds of quarries ?
34. Are they found anywhere in strong limestone, iron, sulphur, or alkaline waters ?
35. Does the sand or grit carried down by freshets kill or disable them ?
36. Are they more numerous in some places now than they were formerly ?

37. Has a new form come in and destroyed a former one?
38. What are its enemies in your vicinity?
39. How far does it distribute itself over your region, and does it leave localities to return to them again?
40. Are they nocturnal or diurnal in feeding, or traveling?
41. Does one sex differ from the other in such habits?
42. Do they destroy vegetables or other garden products in your region?
43. Do they cause dams to burst by burrowing through the embankments?
44. Do they sometimes swarm after rains, either during the day or night?
45. What fish feed on them in your vicinity?
46. Do they live singly, in pairs of the sexes, or in communities?
47. Does either sex choose the young for food?
48. Such as burrow in meadows away from water, how deep do they bore the hole? and in what kind of subsoil?
49. Do they always burrow until moisture or water is reached?
50. How long does it take to finish the burrow; stating the kind of ground?
51. Do they use the tail as a shovel to scoop out the soil?
52. How do they carry it to the surface, and how build the chimney?
53. How do they plug it from beneath?
54. How high do they build the chimney?
55. Does the winter rain wash it away and leave the hole open?
56. At what times, in what seasons, does it build chimneys?

57. In what kind of weather do they plug the chimney?
58. How long at a time does one work, and at what hours?
59. Do they select a tree and burrow beneath its roots, or carry the chamber beneath an underground stone for protection?
60. Does a single species sometimes live in the water, and at another time live in holes on the land?
61. Does it sometimes colonize beneath a stone or log in ditch or meadow on the approach of cold weather?
62. Have you more than one kind living upon the branches, or on the tops of, submerged weeds in your streams or ponds?
63. What is the greatest depth of water at which they are found?
64. Do the kinds which live on the weeds affect other kinds of places?
65. Do they generally rest with heads directed up stream?
66. At what seasons and times of day do these unite sexually?
67. How soon after this do they lay their eggs?
68. Does the male unite sexually with the female when she has eggs under her body?
69. Where does she go after being fecundated?
70. Does she feed during incubation?
71. Is she, or he, soft-shelled at the time of sexual union?
72. Please note peculiarities of spot from which your specimens are taken? And state temperature and depth of water?

Name and address of observer,

Date of statement,

REPRESENTATION OF A CRAWFISH (*Cambarus virilis?*) FROM  
THE MISSISSIPPI RIVER.

Fig. 1.

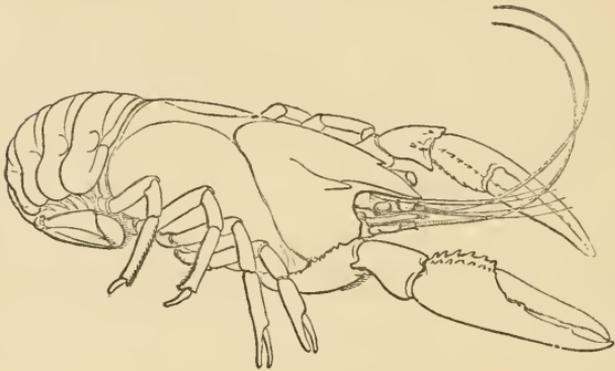
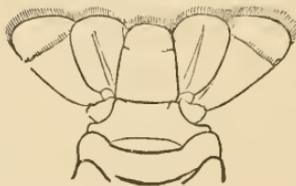


Fig. 2.



Tail of Crawfish.