When silver nitrate was applied to the surface of *G. dibranchiata,* it stained the area on which it was applied dark brown. Several laboratory experiments gave promising results. Field tests showed that worms marked by silver nitrate and released were still marked when recovered after 30 days.

Worms of 4 to about 30 cm in length were marked with silver nitrate in the form of a commercial "caustic pencil," composed of silver nitrate 40 percent and potassium nitrate 60 percent. When a worm was touched with the caustic pencil, a whitish mark appeared at the place of contact. This was due to the formation of silver chloride. At the same time it was observed that the segments on which the whitish mark was visible temporarily contracted. After some time, the whitish mark turned dark brown.

By means of various combinations of dots produced by silver nitrate on the dorsal and the ventral surfaces, worms can be marked according to different groups. I employed this method to mark *G. dibranchiata* according to different size-classes.

From a few laboratory experiments with *Nereis virens* Sars, *Nephthys caeca* (Fabricius), and a few dead shells of *Mya arenaria* Linnaeus, it appears that the method can be extended successfully to the marking of many soft- and hard-bodied animals.

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13 April 1954.

Sorption of Carbon Dioxide by Nut Meats

During some packaging experiments with shelled walnuts and pecans in transparent, flexible plastic bags, packages in which the air had been displaced with carbon dioxide prior to sealing often developed sufficient vacuum to cause the package to collapse, drawing the film tightly around the contents in a manner similar to that of a package sealed under vacuum. The use of nitrogen instead of carbon dioxide did not produce this effect.

Data on the sorption of carbon dioxide by dried-milk powder were reported by J. A. Pearce [*Can. J. Research* **23**(F), 327 (1945)]. He found that whole-milk powder, at 35°F and approximately 74 cm of mercury, absorbed more than 0.4 ml of carbon dioxide per gram of milk powder. Under like conditions, only about 0.012 ml of nitrogen was absorbed. Pearce also showed that there is some sorption of carbon dioxide by skim-milk powder, although the rate and amount are less than those of whole milk. He concluded that carbon dioxide is sorbed not only by the butterfat but also by the other constituents of milk powder.

In tests at Beltsville, walnut meats (containing 68 percent oil) in a closed system absorbed 0.3 to 0.4 ml of carbon dioxide per gram during the first hour. Thereafter the rate was extremely low. Oil extracted from the nuts by pressure sorbed about 0.6 ml/g in ½ hr (with very gentle agitation of the oil), whereas the fat-free meats (walnuts that had been ground and solvent-extracted) sorbed only 0.17 ml/g in 24 hr. Oil that had been saturated with carbon dioxide and then held under vacuum for 15 min absorbed only about half as much of the gas as it did originally. This seems to indicate that vacuum alone does not completely degas the oil. However, when this oil was heated to 145°C and then cooled to room temperature, the carbon dioxide uptake was found to be approximately the same as that of the original sample.

It appears that the vacuum developed in packages of nut meats packed in an atmosphere of carbon dioxide is due chiefly to sorption of the gas by the oil in the nuts and to some slight amount of absorption by other nut constituents.

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14 May 1954.

Sagacity of a Crab

Seventy-seven years ago someone who was more sagacious than I presented observations under the title, "Sagacity of a lobster" [Anon., *Nature* **15**, 415 (1877)]. That observer's wariness was exhibited by the fact that he remained anonymous and by the fact that he used the word *sagacity* rather than *intelligence,* in which I shall imitate him here, since *intelligence* and even more precise terms such as *preference* have aroused considerable criticism when applied to lower animals. *Sagacity* has the advantage of less common usage and in one sense, especially formerly, it was used to indicate keenness of sensory perception without necessarily implying understanding. However, where one begins and the other ends is hard to say, and loosely the two words are considered to be synonyms.

Swimming crabs are given to swimming in dangerous situations, come enemies or not, as at the surface well sky-lighted for predators in the waters below. In shallow waters of the Gulf Coast, the blue crab, *Callinectes sapidus,* may be observed at the surface 5 mi from shore, valiantly fighting off attackers in a losing battle [G. Gunter, *Publ. Inst. Marine Sci.* **1** (2), 7 (1950)].

This habit of the blue crab led to an episode that I observed some 3 yr ago and upon which I have cogitated considerably since, with no answers. Since the actions of the crab in question seemed to approach what is commonly known as "intelligent," and since I am mindful of the various Horatios of behavior who would guard us well from mental connections with the lower animals, I have not heretofore had the temerity to record the observation. However, since the circumstance will be difficult or impossible to duplicate experimentally and may not be seen often again in nature, I now muster the courage.

One morning a half-grown blue crab was swimming at the surface with the incoming tide, alongside the dock and some 14 ft beneath my feet. The water was turbid. Suddenly a fish attacked from an angle below.

It was a sheephead, *Archosargus probatocephalus*, about 1 to 1½ ft long. The crab by a deft maneuver was able to avoid the initial clumsy rush of the fish, which then found itself at the surface with no headway and with the crab poised over its tail fin. It turned clumsily first one way and then the other, but the crab turned similarly on the smaller circle and remained poised right over the tail fin. The fish turned circles and figure eights but the crab continued to hold its precarious vantage, with the dangerous head always pointed the wrong way for capture. Whether this veritable little dance of death went on for 5 sec or 25, I cannot say, since I was too intent upon watching and never thought of timing the contestants, but it did continue until the fish abandoned these tactics and swam out of sight in the murky water below. Then within a few seconds the same fish, or another just like it, attacked again from below, this time successfully and quickly vanished with the crab in its jaws. That, undoubtedly, was the end of the sagacious crab.

Several questions arise from this simple observation. The crab appeared to know that headlong horizontal flight away from the fish would place it immediately in a vulnerable position. At least it did not take such action. The crab also seemed to know that the head of the fish was dangerous, rather than the tail over which it swam, a point for which, incidentally, I would not have given a crab credit prior to this observation, and about which I still wonder. But if the crab did know, the question is how? It would seem that lessons on this point are usually fatal. We could fall back on instinct, but there are other enemies in these waters who can change ends much faster than any crab can maneuver, and a crab species with instinctual behavior attuned only to relatively clumsy sheepheads would not last long. I draw no conclusions, except that such behavior must have survival value, although it was unsuccessful in this instance, for any prolongation of life in time of great danger must ultimately result, in some instances at least, in a change of events permitting escape.

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17 May 1954.

Citation of Fraudulent Data

The occasion for these remarks is the recent treatment by some British scientists and historians of science of the claims made by Paul Kammerer.

Almost the entire story of the Kammerer affair can be found in the back volumes of *Nature*. Kammerer was a Viennese zoologist who published a number of papers, later summarized in a book (*1*), in which he claimed to have proved that acquired characters were inherited. He based his claims chiefly on two series of experiments. He stated first that the black viviparous Alpine salamander (*Salamandra maculosa*) and the black and spotted oviparous lowland salamander (*forma taeniata*) could each be made to acquire the characters of the other. The second series of experiments was made with the midwife toad (*Alytes obstetricans*), the male of which lacks the pigmented thick thumb pads that some other toads possess. Kammerer claimed that, as a result of his experiments, the male of this species could be made to inherit thumb pads.

These claims were challenged by William Bateson as early as 1919, and a very acrimonious debate ensued (*2*). Kammerer replied (*3*) to Bateson's attacks, and he was defended vigorously by E. W. MacBride (*4*). The controversy developed into a most interesting chase. Bateson wished to examine Kammerer's preserved specimens but could not; no matter where he went, Kammerer managed to be elsewhere. Bateson never caught Kammerer, but the chase ended in 1926. In that year, G. K. Noble of the American Museum of Natural History and Hans Przibram, director of the institute where Kammerer worked, examined the famous specimens. They reported their sensational findings in adjacent papers in *Nature* [**118**, 209 (1926)]. The acquired characters, which Kammerer claimed to have made hereditary, turned out to be India ink.

Kammerer admitted the fraud in a letter to the Presidium of the Communist Academy of Moscow—the letter in which he announced his impending suicide—but he claimed to have been personally innocent of deception and ignorant of the identity of the person who was responsible for the chicanery (*5*).

Western biologists as a whole have tended to excuse Kammerer and blame the fakery on some overzealous assistant. Such "assistance" was actually given the great Russian physiologist, I. P. Pavlov. At the International Congress of Physiology held in Edinburgh in 1923, Pavlov announced that he had proved that the conditioning of reflexes was inherited (*6*). This turned out to be false, and Pavlov retracted the statement (*7*). Further details were given by B. G. Gruenberg (*8*).

Although it is remotely possible that Kammerer, like Pavlov, was fooled by an assistant, the probabilities are against such an interpretation. For 7 years Kammerer skillfully evaded his critics' demands to allow them to examine his specimens. It was not until 1926 that his specimens were finally investigated and, when examined, were found to be frauds. Apparently Kammerer preferred suicide to repeating his work.

For the last quarter of a century, Kammerer has not been taken seriously in the West. In Russia, however, attempts were made immediately to salvage his reputation (*9*). Serious attempts to spread the rehabilitation of Kammerer from Russia to western Europe, however, appear not to have been made until 1948, when the inheritance of acquired characters became an official Soviet doctrine.

The Lenin Academy of Agriculture met in 1948 from 31 July through 7 Aug. (This was the session in which Lysenko triumphed and five geneticists found it