ments which cut them were firmly held by the moving ice for considerable lengths of time.

(2) Intermittent slip along well-developed thrust planes. These thrust faults have been photographed by many observers on many glaciers. Intermittent slip along some of them has been shown by automatic instrumental records and is homologous with slips on thrust faults in other rocks.

(3) Solid shearing of aggregates of granules. This small-scale faulting is found to be more prevalent and general than the larger slips on well-developed thrust planes and is a characteristic feature of glaciers.

(4) Solid flow by idiomolecular exchange between ice crystals. This type of movement involves the growth of ice granules together with movement and adjustments (sliding and rotation) between the granules, and is considered to be the underlying basic process in glacier motion. The granules are small in a névé region; they are larger near the glacier terminus, and particularly large in the longer glaciers. In some places near the terminus of the Allen glacier in the Copper River district of Alaska and probably fifteen to twenty miles from the upper snowfields, they average from three to four inches in diameter and locally have been observed up to six inches. It is believed that the névé granules gradually grow as the ice moves down the glacier, the larger crystals at the expense of the smaller, by transfer of molecules. In the process the granules change their positions with respect to one another under changing conditions of pressure and melting, as explained in various text-books in the last thirty years. "The summation of slight adjustments between innumerable granules is general movement of the mass in lines of least resistance. . . . This . . . appears to be the fundamental mechanism by which the motion is accomplished." Rather strange it is that Dr. von Engeln should characterize the concept, which puts first in importance this movement between the granules, as "fundamentally and completely erroneous," when he takes over the idea of intergranular movement as the basis of his own view of glacier motion. His particular addition is the postulate of a liquid film of salt solution which, by lubrication, aids this movement between granules.

Dr. von Engeln has designated this composite picture of glacier motion outlined under headings (1) to (4) as the "shear concept." Shearing plays its part in the complex phenomenon of ice moving down a valley, and its recognition is important for the light which it throws upon the nature of the ice, but it is only one phase of a complicated process. To name the whole concept after but a single factor where other important factors are strongly involved seems open to protest.

Dr. von Engeln states "that a glacier consists of an outer and terminal crust of rigid ice, carried along and shoved forward by a core of interior ice flowing viscously under the pressure of the exterior shell and existing at essentially the pressure-temperature melting point of ice, a temperature which declines with depth (because of the increase of pressure) to the bottom of the glacier. The viscous flow of the interior ice results from the presence of a liquid film of salt solution surrounding and separating the glacier grains. This film acts as a lubricating medium to facilitate the movement of the grains one past the other."

In so far as there may be a small amount of salt between granules of purer ice, melting at such places obviously would be aided and movement of the granules, as discussed above under heading (4), would be facilitated. Thus the salt would seem to act as an additional auxiliary agent increasing the effectiveness of the other processes already mentioned. Careful chemical analyses should reveal how much salt actually is present in the upper part of a glacier starting from a lofty snow summit far inland, how much lowering of the melting point may be expected, and consequently how important an auxiliary factor salt may be.

At the other extreme, J. V. Harrison delights in twitting his friends about a "glacier" in Persia which is all salt, or salt mixed with gypsum. The salt has come up from below as a salt plug and "spills over the alluvium of the plain, where it forms a long tongue-like sheet stretching southwards for fully three miles."[1]

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A TROPICAL FISH CROSS

VARIOUS attempts at experimental crossing of two tropical fishes, the swordtail (*Xiphophorus helleri*) and guppy (*Lebistes reticulatus*) have proved unsuccessful, and there is quite a general belief that these two species are too unrelated or have too dissimilar chromosome formulae for successful mating. To be sure, some aquarists claim to have crossed them successfully, and there are alleged hybrids which are more or less generally discredited as such.

As the matter is of considerable theoretical interest, we wish to record a more successful attempt; and will first summarize what seem to us the important and reasonably certain results obtained; second, discuss the possibilities of error, and, finally, touch briefly on the experiment's significance.

Early in 1933 by crossing with guppy, broods of

[1] James Vernon Harrison, *Quart. Jour. Geol. Soc.*, lxxxvi, 476–85, 1930.

young were obtained (by Mallett), in tanks kept at a high temperature with an abundance of forced air, from three virgin female swordtails, members of a brood that consisted entirely of females and was raised in his tanks. Later these "hybrid" fish were permitted to interbreed, and a total of 10 broods and 100 "hybrid" individuals obtained to date would be a very conservative estimate, though the original swordtail mothers died without again giving birth. The young were not in any way obvious hybrids but swordtails, mostly female swordtails and less than 10 per cent. male swordtails. An exception was the first-born fish of the first-born original-cross brood, which turned out to be a female guppy, quite typically such to outward appearances. At the age of six months this fish developed a crooked spine, and at between 9 and 10 months gave birth to brood of some half dozen young by a "hybrid" male swordtail, all of which turned out to be swordtails, not guppies.

The parentage of the original crosses seems irrefutable. The swordtail females used were about 18 months old, to be sure, when bred, but there had been no male swordtail or live-bearers other than guppies in the Mallett tanks for a year prior to the birth of their young. That the above-mentioned female guppy was a *bona-fide* member of one of the same broods can hardly be doubted. Its birth was observed (Mallett) and its growth watched from day to day. In the beginning noticeably larger and different from its brood-mates, they grew more rapidly and exceeded it in size. That this guppy gave birth to a brood of swordtails is only reasonably certain. From lack of space it was temporarily confined while pregnant in a tank with young "hybrid" swordtails, and when its own brood appeared, contrary to expectation they could not with certainty be differentiated from the smallest of these, hence the young were allowed to grow up together and all turned out swordtails.

The results obtained call to mind those described by Hubbs and Hubbs[1] for one of the live-bearers, for which they suggest gynogenesis as explanation, later questioned by Howell.[2] If gynogenesis does exist in these fishes it might reasonably be looked for in the present "cross." Nor would the female guppy be entirely out of line with such an explanation if we suppose some chance somatic determinant as well as germinal stimulus to have been received from the male parent without his chromosomes being accepted in the normal way.

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NEW DISTRIBUTIONAL RECORD FOR THE MEDUSA CRASPEDACUSTA

ON the evening of July 25, 1934, a trip was made to a small artificial pond located near the city limits of Dallas, Texas. Much to my surprise, the water of the pond was teeming with the medusae of *Craspedacusta ryderi* (Potts). A single scoop with a pint jar yielded sixteen that varied from 6 to 12 mm in diameter.

On the following day another trip was made to the pond with the necessary equipment for a general survey. The pond, which is two years old, covers approximately one acre and is three and one half feet deep. The water supply is obtained from a Dallas city main and runs in constantly, although during this excessively hot, dry weather there is very little overflow, since evaporation is almost equivalent to the inflow. The pond is well stocked though not crowded with water-lilies, which were purchased from Texas and New Jersey nurseries. The lily-pads and stems are covered with dense growths of algae. Examinations of plankton samples revealed an abundance of ostracods, copepods, rotifers and infusoria, thus insuring sufficient food for the medusae. The pond is also inhabited by goldfish and green sunfish.

Wading among the lily-pads stirred up the "ooze" on the bottom, and in areas where the medusae had not heretofore been visible such riling of the water caused them to appear by the thousands. A close field examination of lily-pads and stems with a hand lens and microscopic examination in the laboratory of scrapings from the vegetation and sides of the pond have failed to reveal the hydroid generation. On the third of November the medusae were still abundant. The cycle will be carefully followed, and it is hoped that eventually the hydroid generation will be found.

According to Bennitt's (1932) summary[1] of the American records of *Craspedacusta,* the present report brings the total number of states from which they have been recorded up to eleven, and Texas is the third state west of the Mississippi from which it has been reported.

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SOCIETIES AND MEETINGS

SUMMER MEETING OF THE AMERICAN MATHEMATICAL SOCIETY

THE fortieth summer meeting of the American Mathematical Society was held at Williams College, Williamstown, Massachusetts, from September 4 to 7. This was the second meeting of the society at Williamstown, the first having been held in 1905. The Mathematical Association of America, which met in

[1] SCIENCE, n. s., 76: p. 628, 1932.
[2] SCIENCE, n. s., 77: p. 389, 1933.

[1] *American Naturalist,* 66: 287–288.