tors and used them in the decomposition of fractions into partial fractions; John Bernoulli (1667–1748) who exhibited the connection between the arc tangent and the logarithm of an imaginary argument, and Leonhard Euler (1707–1783), who introduced in 1740 the use of imaginary exponents. The large number of interesting results which had been obtained by the use of complex numbers before the legality of this use had been proved may partly account for the fact that this proof failed to attract much attention until many years after it was first published. Correct results have frequently inspired faith in the correctness of the methods employed and were often accepted as proof of this correctness.

Although negative numbers were used much earlier than complex numbers, the solution of a quadratic equation having two complex roots seems to have preceded by about eighty-four years the solution of such an equation having two negative roots. The earliest known example of the latter appears in the "Invention nouvelle" by A. Girard which was published in Amsterdam, 1629. The late appearance of such a solution directs attention to the fact that the general use of negative numbers came much later than might be inferred from the modern early use of them in our schools. Among the late strong opponents to the use of these numbers was Robert Simson (1687–1768), who was professor of mathematics in the University of Glasgow for forty years after 1711.

Hence it results that what the modern high-school student is supposed to master easily gave much trouble to a noted professor of mathematics less than two hundred years ago. Possibly the concealing of difficulties in elementary mathematics is too frequently regarded as a simplification of the subject. While a clear explanation of the theory of operating with negative numbers does not seem to be older than the corresponding theory relating to complex numbers it is a clear exaggeration to assert that "the one glimmer of mathematical intelligence in the early history of negatives is the suggestion of Fibonacci that a negative sum of money may be regarded as a loss." This assertion appears in the "Development of Mathematics" by E. T. Bell (page 158, 1940). On the contrary, the ancient Babylonians already used the terms "tab" and "lal" with respect to numbers as we now use + and − to represent distances in opposite directions from a fixed line.[1]

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AN UNRECORDED CAUSE OF "RED WATER"

RED WATER has attracted the attention of seafarers since early times. Various marine organisms have been cited as giving rise to this phenomenon, frequently ascribed to one or another species of dinoflagellate, as, for instance, *Gonyaulax polyhedra* off our own west coast, but never before do trochophore larvae seem to have produced it.

In 1935 I had the good fortune of accompanying Captain Allan Hancock, of Los Angeles and Santa Maria, California, on another of his memorable Pacific Expeditions aboard his motor cruiser, the *Velero III,* now in the service of the U. S. Navy. The third of January saw us headed southward off the coast of central Peru, angling across the Humboldt or Peruvian current. During that afternoon, while a little more than 50 miles to the westward of the Lobos de Tierra Islands (6° 28′ S., 81° 51′ 30″ W.), many patches of "red water" were seen all afternoon. A sample dipped up in a bucket from one of them was preserved in formalin for later study.

The contained organisms, thought at the time of collection to be peridinians, though very much plasmolized as the result of preservation, were unmistakably some species of trochophore larva, either mollusk or annelid. Dr. Martin Johnson, of the Scripps Institution, in commenting on the material says, "There is a possibility that the larvae could be those of a bivalve mollusk—the trochophore stage of gastropods usually occurs while yet enclosed in a case. I was, however, unable to make out any shell gland, a feature characteristic of bivalves in this stage. The trochal cilia also seemed to be more characteristic of annelids." He adds that it was perhaps not possible to settle the question from the specimens at hand. It is to be regretted that these larvae were not sufficiently far advanced in development to permit definite determination.

As trochophores apparently have not heretofore been observed as causing "red water," the fact that they were present in such enormous numbers as to give rise to this phenomenon seems worthy of note. No temperature reading was made at the time of the taking of the sample, but while on the same course the surface temperature at 10:05 A.M. registered 19.50° C. (6° S., 81° 41′ W.) and at 5:30 P.M., 20.32° C. (7° 50′ S., 81° 53′ 30″ W.).

Besides Dr. Johnson, I am also indebted to Dr. Herbert Graham, Mills College, and Dr. Olga Hartman, Allan Hancock Foundation, University of Southern California, for critically examining the sample; and to Captain Allan Hancock for permission to publish these notes upon it.

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THE TEACHING OF TROPICAL MEDICINE

THE request of the armed forces that medical schools give more emphasis to tropical disease presents new

[1] *Cf.* O. Neugebauer, "Vorgriechische Mathematik," page 18, 1940.