not a few complete sets of journals. The total value of the whole collection is estimated at approximately £3,000. The council of the society has passed a resolution to the effect that a special room shall be used to house the collection and shall be labeled "Sohtsu G. King Library of Conchology." A complete catalogue of the library is under preparation and will be printed and circulated to related institutions and learned societies. In addition to the collection Mr. King has provided an endowment, the income of which will be used to continue subscriptions to the journals of which the library possesses back volumes.

DISCUSSION

THE PREGLACIAL PHYSIOGRAPHY OF WESTERN OHIO

LITTLE has been known of the surface which lies buried beneath the glacial drift in western Ohio. The writer examined approximately 20,000 well records, and from these about 6,000 of the most significant were selected and plotted on a base map of western Ohio. The well records were obtained from the Ohio State Water Conservation Commission and the Ohio State Geological Survey. In 1934, geologists and engineers, working on a CWA project, collected 148,000 well records from every county in Ohio. Approximately one half of the state was covered when the project was abandoned. Less than one fourth of the records in western Ohio show the depth of the drift to bed-rock. It was found that because of the limited space on the base map, not all the records could be plotted, and hence only the more significant ones were used. Nearly 10,000 oil-well records from the Ohio Oil Company were furnished by the Ohio Geological Survey. The majority of these are from Wood and Hancock counties, the others coming from Allen, Sandusky, Auglaize, Lucas, Putnam and Hardin counties.

The work of plotting the elevations of the bed-rock on the base map has been completed and a contour map drawn of the buried surface. The following facts have been uncovered. A valley, the continuation of the preglacial Lake Erie lowland, extended in a southwesterly direction. The axis of this valley extends through Lucas, Fulton, Defiance and Henry counties. The stream which occupied this valley the writer calls the preglacial Maumee. It flowed eastward through the depression now occupied by Maumee Bay and probably was a tributary of a large stream which occupied the Lake Erie depression. Another river, the preglacial Sandusky, flowed in a northeasterly direction through what is now Sandusky Bay, into the Lake Erie lowland, where it joined the trunk stream which probably flowed eastward, receiving other large tributaries from the south which drained northern Ohio. The axis of the preglacial Sandusky valley extends through the middle of Sandusky Bay, eastern Sandusky County, Seneca and Wyandot counties. A broad, low divide separated the preglacial Maumee and preglacial Sandusky valleys. To the east of the preglacial Sandusky lies the preglacial Huron Valley, the axis of which extends through Erie, Huron and Crawford counties.

A major divide, a prominent physiographic feature in preglacial time, extended in an east-west direction through Holmes, Knox and Richland counties, continuing beneath the glacial drift in a southwesterly direction through Morrow, Marion and Union counties, where it connects with the buried upland in Logan County, where the highest point in Ohio is located. To the south and west of this buried upland in Logan County is a broad, buried valley once occupied by a preglacial river called the Teays. To the southwest of the Teays valley, in Darke, Miami, Preble and Montgomery counties, the divide widens out into a broad upland which separated the pre-glacial Miami from the Teays drainage. The preglacial or interglacial Miami and Little Miami drainage was to the southwest, as at present. The Teays River has been traced from the south as far as Chillicothe, where it disappears beneath the glacial drift. This stream flowed northward into Pickaway County, where it curved in a northwesterly direction, flowing through Madison, Clark and Champaign counties, where it again curved to the north, around the broad upland in Logan County, through Shelby County, extending in a westerly direction through Auglaize County, continuing through the depression now occupied by Lake St. Mary. From here it extended in a northwesterly direction through Mercer County into Indiana, where it can be traced eastward as a buried depression.

The Teays could not have flowed northward to the Lake Erie depression through Franklin and Delaware counties, as it would have been necessary for the waters to flow over a preglacial divide which stands more than 200 feet higher than the Teays valley, where it disappears beneath the glacial drift at Chillicothe. Nor is it probable that the Teays drained southwestward into the preglacial Miami, since that valley appears to be too narrow in Clark County for so large a stream as the Teays to have flowed through it. Furthermore, it would have been necessary for the Teays to have flowed over a high divide which stood from 980 to 1,000 feet above tide, between the preglacial Miami and Teays valleys.

In preglacial time there were four large drainage basins in western Ohio, as revealed by well records,

the preglacial Maumee, the preglacial Sandusky and Huron, the Teays and the preglacial or interglacial Miami and Little Miami, separated by divides, the major one, including the upland in Logan County, being the controlling feature. The Harrisburg peneplane may be represented by the highest bed-rock elevations in Logan County, and the Worthington erosion surface has a wide extension throughout the area. Lower areas, probably representing the Parker Strath, occur along the buried valleys. Beneath these are the deep, gorge-like valleys which represent the Deep Stage.

In the near future the writer expects to publish the complete results in a paper dealing with numerous details which are treated in a general way here.

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AUTOTOMY IN A PEREGRINE EARTHWORM

NUMEROUS caudal fragments of an unidentified earthworm that had been collected in a living condition from a golf green were submitted, in early June, 1935, to the authors by F. W. Poos, of the Bureau of Entomology and Plant Quarantine, of the United States Department of Agriculture. These fragments averaged 13 mm in length and consisted of from 15 to 23 of the caudal segments. They were reported by a greenskeeper as causing numerous castings on a putting green near Catonsville, Md. This green was investigated by the writers on July 11, a very warm day that succeeded a period when daily temperatures had remained well above 90° F. Numerous earthworm castings, many of them still wet and fresh, were visible on the green. The greenskeeper maintained that these castings were due to fragmentary worms similar to those previously described. Upon removal of a 2-foot square section of sod, however, many active yellowish brown earthworms, 6 inches or more long, were revealed, as well as live fragments of the same. Specimens of these submitted to Dr. Frank Smith at Hillsdale, Mich., elicited the advice that this worm belonged to the genus *Pheretima,* was doubtless a peregrine species and should be sent to Professor R. E. Gates, of Rangoon, Burma, for specific identification. It was at first supposed that the fragmentation observed might represent a habit of reproduction by fission, but a recent excellent work on the earthworms,[1] cited by Dr. Smith, furnished an explanation in what is known as "autonomy," a recognized phenomenon with some earthworms. This consists of the voluntary severance, under certain irritational stimuli, of several segments of the tail, after which the original worm may survive, but the severed fragment, eventually, always dies. Professor Gates subsequently identified the worm as *Pheretima hupeiensis* (Michaelson) 1895, and stated that it had previously been reported twice from Washington, D. C., and once from Philadelphia. Otherwise it is known only from a limited portion of China and Japan. He agreed that the fragments sent him were all autotomized and that this action might have resulted from the previous application of a vermicide to their habitat. This deduction is doubtless correct, as it was learned that mercury, both as chloride and bichloride, had been applied in light dosage several times each year and that lead arsenate, at the rate of 5 pounds to 1,000 square feet of surface, was applied in 1932, and at the rate of 3 pounds each spring thereafter. This amount of poison is easily sufficient to destroy *Lumbricus terrestris* L. and similar species, but evidently served as a mere irritant for this exotic form.

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ANOPHELES (ANOPHELES) NEOMACULIPALPUS, CURRY, EXPERIMENTALLY INFECTED WITH MALARIA PLASMODIA

DURING the latter part of 1935, experiments were begun to determine the infectibility with malaria of certain previously unincriminated species of Anophelines which breed in the Panama Canal Zone and elsewhere in the American tropics. Since that time *A. punctimacula,* Dyar and Knab, a shade-breeding mosquito which is prevalent in Panama throughout the year, has been found naturally infected with malaria plasmodia,[1] and has been proved to be highly susceptible to laboratory infection[2] with both *P. vivax* and *P. falciparum.* These observations and the epidemiological data indicate that *A. punctimacula* is probably an important malaria vector, and that it may be responsible for a considerable part of the malaria infections contracted in unsanitated regions of the Canal Zone.

It is the purpose of this note to announce the experimental infection of another species, namely, *Anopheles (anopheles) neomaculipalpus,* Curry, with *P. vivax.* This mosquito breeds in small collections of sunlit water, being especially common in the hoof-prints and muck of cattle pastures. Further studies will be required to determine the comparative infectibility and the importance of *Anopheles neomaculipalpus.*

From a search of available literature it appears that these two species, *A. punctimacula* and *A. neomaculipalpus,* are the first members of the Arribalzagaia

[1] "The Oligochaeta," by J. Stephenson, Oxford, England, 1930, p. 639.

[1] J. S. Simmons, *Am. Jour. Trop. Med.,* 16: 2, 105, 1936.
[2] J. S. Simmons, SCIENCE, 83: 2150, 269, 1936.