to the ordinary disturbances. It is reasonable to suppose that the dotted line might represent the normal procedure of the graph, but there is no experimental evidence available to justify the supposition.

One peculiarity of the maximum effect is its lag of about seven minutes behind the period of totality. A second peculiarity is the unexplained reversal which occurred shortly after the maximum. The total angular variation over the period of measurement was of the order of ten minutes. A curve was also obtained the following day, over the same time limits, and showed a very quiet state of the magnetic field.

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ARCA PATRICIA SOWERBY, A MIOCENE FOSSIL FROM THE DOMINICAN REPUBLIC[1]

IN 1850 G. B. Sowerby[2] described *Arca patricia* and other Miocene fossils collected in the valley of Rio Yaque del Norte, Dominican Republic, by Colonel Heneken, a British army officer. This species, like many others described in the same report, was not figured. Almost every writer who has had anything to do with the Miocene mollusks of the Dominican Republic has made a guess as to *Arca patricia,* but none took the trouble to inquire about the type material. Sowerby compared this species with *Arca grandis* Broderip and Sowerby, a giant *Arca* living on the Pacific coast of Central America and northern South America. Therefore, it was natural to suppose that *Arca patricia* resembled *Arca grandis.* Following this lead Gabb supposed that *Arca patricia* is the giant Miocene *Arca* from the Dominican Republic that is remarkably similar to *Arca grandis.* Guppy, who examined the type material, merely commented that *Arca patricia* is "undoubtedly near *A. grandis.*" Maury followed Gabb and also recently used the name *Scapharca (Scapharca) patricia* for the large Miocene *Arca* from Trinidad. Pilsbry[3] thought *Arca patricia* might be *Arca chiriquiensis* Gabb, a species first collected from middle Miocene beds cropping out on Chiriqui Lagoon on the Atlantic coast of Panama close to the Costa Rican boundary. *Arca chiriquiensis* has an extensive distribution, as it has been found in Miocene beds in the Dominican Republic, the Republic of Haiti and Colombia. At all these localities it lived in water of low salinity.

The type material of *Arca patricia* is in the foreign collection of the Geological Society of London. In 1911 this collection was transferred to the British Museum (Natural History). Mr. L. R. Cox, of the Geological Department of the British Museum, recently very kindly sent me a cast of the holotype that is so skilfully made that it looks like an actual shell. Mr. Cox informed me that the type material consists of about twelve specimens, but one specimen (Geol. Soc. London No. 12828) was selected by Blake and Sherborn as the holotype when they compiled the catalogue of type specimens in the collection of the Geological Society of London.[4] The cast shows that *Arca patricia* is very different from both *Arca grandis* and *Arca chiriquiensis;* and, as Mr. Cox suspected, it is the species to which Dall in 1898 gave the name *Scapharca (Argina) tolepia.* Dall's description of this species as an *Argina* misled Dr. Maury, so she gave another name to the same species—*Scapharca arthurpennelli.* The holotype of *Scapharca (Argina) tolepia* Dall (both valves in attached position, U. S. Nat. Mus. No. 113,801) was collected on Rio Amina, a northward-flowing tributary of Rio Yaque del Norte. The type locality of *Scapharca arthurpennelli* Maury is on Rio Mao, a northward-flowing tributary of Rio Yaque del Norte lying west of Rio Amina. The holotype of *Arca patricia* is a little larger than the holotype of *Scapharca (Argina) tolepia;* its posterior end is a little more extended, and its umbo is not so broad. Both specimens can, however, be duplicated in a series of about 150 topotypes of *Scapharca arthurpennelli.* Pilsbry and Johnson described three new subspecies of *Arca tolepia.* Some of these subspecies may not be valid in view of the variable features of this species, which is one of the most abundant fossils in the Cercado formation (lower Miocene) of the Dominican Republic. Gabb thought the specimens in his collection were young shells of the giant *Arca.*

In the lists of fossils published in the report entitled, "A geological reconnaissance of the Dominican Republic," Mansfield and I followed Maury in the use of the names *Arca patricia* and *Arca arthurpennelli,* as we wished to get stratigraphic results from almost 1,000 species of Tertiary mollusks in the shortest possible time. But it was inexcusable to overlook the identity of *Arca tolepia* and *Arca arthurpennelli.*

This picturesque muddle, which is the result of disregarding type material, is summarized as follows:

[1] Published with the permission of the director, U. S. Geological Survey.

[2] For references see synonymy.

[3] Pilsbry, H. A., Acad. Nat. Sci. Philadelphia Proc., Vol. 73, pp. 405–406, 1922.

[4] Blake, J. F., List of the types and figured specimens recognized by C. D. Sherborn, F.G.S., in the collection of the Geological Society of London; verified and arranged with additions, p. 65, 1902.

Barbatia (Scapharca) patricia (Sowerby).

Arca patricia Sowerby, 1850, Geol. Soc. London Quart. Jour., Vol. 6, p. 52. Guppy, 1876, Geol. Soc. London Quart Jour., Vol. 32, p. 531. Not *Arca patricia* Guppy, 1903, Trinidad Botanical Dept. Bull., p. 541. (Reprint, Bull. Am. Paleontology, Vol. 8, pp. 279–280.) Not *Scapharca patricia* Maury, 1917, Bull. Am. Paleontology, Vol. 5, p. 337, pl. 53, fig. 1. Not *Arca (Scapharca) patricia* Woodring and Mansfield, 1921, in Vaughan and others, Dominican Republic Geol. Survey Mem., Vol. 1, pp. 102, 154, 164. Not *Scapharca (Scapharca) patricia* Maury, 1925, Bull. Am. Paleontology, Vol. 10, pp. 209–210, pl. 13, fig. 5.

Arca (Anadara) grandis Gabb, 1873 (part, not Broderip and Sowerby), Am. Philos. Soc. Trans., new ser., Vol. 15, p. 253.

Scapharca (Argina) tolepia Dall, 1898, Wagner Free Inst. Sci. Philadelphia Trans., Vol. 3, pt. 4, pp. 649–650, pl. 33, figs. 7, 8. (The citation of Bowden, Jamaica as the locality of the figured specimen is an error.)

Scapharca arthurpennelli Maury, 1917, Bull. Am. Paleontology, Vol. 5, p. 342, pl. 55, figs. 9, 10.

Arca (Scapharca) arthurpennelli (Maury), Woodring and Mansfield, 1921, in Vaughan and others, Dominican Republic Geol. Survey Mem., Vol. 1, pp. 97, 122.

Arca (Argina) tolepia (Dall), Pilsbry, 1922, Acad. Nat. Sci. Philadelphia Proc., Vol. 73, p. 406.

Arca patricia has the external features of an *Argina*, but has the cardinal area and hinge of the so-called *Scapharcas*. Both *Arca chiriquiensis* Gabb and the Miocene species from the Dominican Republic, Trinidad, Tobago and Colombia resembling *Arca grandis* Broderip and Sowerby belong to the group of *Arcas* called *Senilia* by Gray (type, *Arca senilis* Linné, a species living on the west coast of tropical Africa from Senegal to Angola). No *Senilias* and no so-called *Scapharcas* similar to *Arca patricia* are living in the Caribbean Sea at the present time. These species illustrate the remarkable deployment of *Arcas* in the Miocene Caribbean Sea and their present relatively impoverished representation there.

Pilsbry considers that the giant Miocene *Arca* from the Dominican Republic is *Arca grandis*. Specimens from the Dominican Republic and also from Colombia and Trinidad have crudely beaded ribs, whereas *Arca grandis* has clean-cut ribs, except in very large and heavy specimens, and usually only a few anterior ribs are beaded. Fossil and living specimens are variable in shape and have essentially the same cardinal area and hinge. The Caribbean Miocene fossils seem to represent a different species or at least a recognizable subspecies, but it seems inadvisable to propose a name in a note that could easily escape attention.

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ABSTRACTS OF PAPERS PRESENTED AT THE MADISON MEETING, NOVEMBER 9, 10 AND 11

Proper motions of stars obtained with the blink microscope: FRANK E. ROSS (Introduced by Edwin B. Frost). In the past, proper motions have been obtained by comparing positions of the stars measured with the meridian circle at distant epochs. In this way the motions of all the brighter stars have been obtained. The accuracy, however, is not great, on account of the uncertainty of the zero point at different epochs. Direct measures of photographs secured at epochs well separated in time, in general greater than ten years, yield better values. The blink comparator has been devised for the rapid comparison of photographs of the same field of stars secured at different epochs. With this instrument stars of large proper motion are instantly detected. There is urgent need of surveying the entire sky in this manner, for the detection of all the stars of large proper motion, in order that a true picture of the space which is contiguous to our sun may be built up. Professor E. E. Barnard secured the photographs of the necessary quality covering approximately one half of the sky. These fields are now being duplicated and compared by the writer. The minimal magnitude is approximately 15, and the lower limit of proper motion about 0.1 per year.

Radial velocities of 368 helium stars: EDWIN B. FROST, STORRS B. BARRETT and OTTO STRUVE. This paper gives the results of the measurement of 2,431 spectrograms of 368 helium stars (Harvard class B). The work has been in progress since 1901 and includes nearly all stars of the class, brighter than visual magnitude 5.5 and north of 15° south declination. Forty-two per cent. of these stars, or one out of 2.4, have been found to spectroscopic binaries, necessitating many plates for finding the velocity of the center of gravity of the pairs.

A solution for the whole group yields a velocity of 17.2 km per second for the solar motion, directed toward $\alpha = 284°$, $\delta = +12°$, with a value of the K-term of $+5.6$. The average residual velocity was 10.0 km per second. A distinct increase in the residual velocity is shown in passing from the brightest to the fainter stars. Inclusion of data from other sources, for the southern stars of which we have no plates, changes the position of the solar apex very slightly, but increases the solar motion to 26 km per second.

The constancy of the light of stars: JOEL STEBBINS. "It has been demonstrated by the work of the Smithsonian Astrophysical Observatory and its stations, under the direction of Dr. C. G. Abbot, that the sun may be called a variable star," said Dr. Stebbins. "That is, the amount of radiation in the form of light and heat which the sun emits is not always the same, but changes to the extent of several per cent. on each side of the average. The results of the Smithsonian observers are being used to study the connection between weather