1853–6," Vol. X, Zoology, containing "Fishes" by Charles Girard. On page 357 a young specimen is listed as collected by Dr. George C. Shumard near the mouth of the Poteau River in 1853. Elsewhere (p. 59 of special report No. 5) this fish is stated to have come from the Missouri River. Presuming that the first statement is correct, the atlas shows that the Poteau River rises in the western part of Arkansas, flows in a great circle west, north and northeast and empties into the Arkansas near to but west of Fort Smith, Arkansas. The specimen then was taken in what was at that time the Indian Territory, and is now Oklahoma. It then belongs in the Arkansas River drainage but was not collected within the state of that name.

The next reference is brief but definite. D. S. Jordan and C. H. Gilbert collected a specimen (no data given) in September, 1884, from the Red River at Fulton, Arkansas.[1] It is unfortunate that they confine themselves to merely listing the fish among those caught. Little more information is given by S. E. Meek,[2] who lists the fish on the authority of Girard, and of Jordan and Gilbert, but gives its habitat as "Mississippi Valley." There is no evidence whatever that he had ever collected the fish from Arkansan waters.

It is significant that in the 38 years since Meek wrote, the fish has never been recorded from the waters of Arkansas. From this one must judge that it is a rare fish. During a residence at Little Rock from 1895–1901, and in numerous visits there since I have never heard of it, although my interests in certain of its kindred fishes have led to much quest for information about these fishes.

Ganoid Fishes in Arkansas

In conclusion it is interesting to note that this short article makes a definite record for Arkansas of another member of the old group Ganoidei. Of these archaic fishes the following are known from Arkansan waters:

(1) *Scaphirhynchus platorhynchus*, the sand or shovel-nosed sturgeon;
(2) *Polyodon spathula*, the paddlefish or spoon-billed sturgeon;
(3) *Lepisosteus osseus*, the billfish or long-nosed gar;
(4) *Lepisosteus platostomus*, the short-nosed gar;
(5) *Lepisosteus spatula*, the alligator or broad-nosed gar;
(6) *Amia calva*, the grindle, bowfin or lawyer.

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[1] Proc. U. S. Nat. Mus. for 1886, 1887, Vol. 9, p. 14.
[2] A Catalogue of the Fishes of Arkansas. Ann. Rept. Geol. Survey, Ark. for 1891, Little Rock, 1894, Vol. II, Misc. Repts., p. 227.

DETERMINATION OF THE RELATIVE VOLUMES OF TWO COMBINING STREAMS FROM THEIR TEMPERATURES

From the law of heat transfer we know that if two volumes of water, V_1 and V_2, having temperatures of T_1 and T_2, are added together the combined volume will be $V_1 + V_2$ (called V_3), and their temperature T_3 will be given by the equation:

$$\frac{V_1T_1 + V_2T_2}{V_1 + V_2} = T_3$$

If two streams unite and their temperature and the temperature of the stream below the junction is taken, then their relative volumes in cubic units per unit time can be found by this same equation slightly simplified to fit the special situation.

Let A be one stream, B the other and C the stream resulting from the union of A and B. Also let V_1 be the volume in cubic units per unit time of A, V_2 of B and V_3 of C. T_1, T_2, T_3, are the temperatures of A, B and C, respectively.

$$1.\quad \frac{V_1T_1 + V_2T_2}{V_1 + V_2} = T_3$$

$$2.\quad V_1T_1 + V_2T_2 - V_1T_3 - V_2T_3 = 0$$

$$3.\quad V_1(T_1 - T_3) = V_2(T_3 - T_2)$$

$$4.\quad \frac{V_1}{V_2} = \frac{T_3 - T_2}{T_1 - T_3}$$

$$5.\quad \frac{A}{B} = \frac{T_3 - T_2}{T_1 - T_3}$$

The substitution of the temperatures of these streams in equation 4 will give the relative volumes per unit of time of these streams in any case except where the temperatures of both streams are the same, but that case is sufficiently rare so that the calculation of relative volume by temperature will save much time and labor on water surveys, etc.

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DERMATITIS PRODUCED BY ENCELIA CALIFORNICA NUTT

In a recent number of Science, Dr. Munz[1] has called attention to a new case of a plant causing dermatitis. Perhaps there are other offenders of this sort common in our flora that should also be investigated. I wish to call attention to one such plant, the *Encelia californica* Nutt (Compositae), which I am sure causes severe dermatitis on some individuals.

One of my sons, on returning home for short inter-

[1] Phillip A. Munz, "Dermatitis Produced by Phacelia (Hydrophyllaceae)," Science, 76: 194, August 26, 1932.

vals, became affected several times with dermatitis to such an extent that he could not remain at home. Some near-by plant was suspected as causing the trouble, and several of the most common ones of the native vegetation on the dry hills surrounding the residence were tested. The method used was the crude but effective one of placing leaves against the forearm, held lightly in contact for a few minutes by a cloth band.

In this way it was found that when Encelia leaves were used the skin, which had been in contact with the unbroken leaf, soon turned red, in a few hours began swelling and finally broke out in blisters similar to those produced by poison ivy.

The other members of my family were apparently entirely immune to its influence, but I am thoroughly familiar with two other cases of individuals who are similarly affected by the same Encelia, one of them as severely as my son. Evidently the degree of susceptibility varies with the individual much as does that of ivy poisoning.

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QUOTATIONS

PROFESSOR ARTHUR H. COMPTON'S STUDIES OF COSMIC RAYS

THE Department of Public Relations of the University of Chicago has sent SCIENCE the following press release:

Professor Arthur H. Compton, University of Chicago physicist, has returned to his laboratory on the Midway with a trunkful of new data on the cosmic rays. Since March Dr. Compton has been roving the western hemisphere measuring the intensity of these remarkable emanations as they struck the earth at widely scattered sites.

Two results of his survey, neither of which fits the hypotheses which had been current as to the nature of the rays, were emphasized by Dr. Compton. The first of these is that the intensity of the rays is less near the magnetic equator than near the magnetic poles, which indicates that they are electrical in nature, rather than pure wave-forms.

The second is that the intensity of the rays apparently increases continuously at the higher altitudes, probably reaching a maximum at the top of the atmosphere. This is also held to be an argument against the pure-wave theory.

During the past twelve months Dr. Compton has taken measurements at sixteen major sites, while six further expeditions, under his direction, three of which have now completed their work, have made tests at sites throughout the remainder of the globe.

Dr. Compton's branch of the world-survey included measurements last autumn at Denver and other points in the Rockies; on the Jungfrau in the Swiss Alps, and in Chicago. This spring and summer he and his party have carried their instruments to the Hawaiian Islands, where Mount Haleakala was the major objective; the equatorial Pacific, where tests were made aboard ship; Auckland, New Zealand; Mount Cook, New Zealand, 1,000 miles from Auckland; Mount Kosciuski, Australia; Brisbane, Australia; Panama; Lima, Peru; Arequipa, Peru; Mexico City and neighboring peaks; Churchill, Manitoba, and the Fox Basin, Canada, where the measurements were made at the edge of the ice-pack, 100 miles north of the Arctic Circle.

The three cooperating parties which have completed their work are those of Professor R. D. Bennett, of the Massachusetts Institute of Technology, to Alaska, California and Denver; Professor J. M. Benade, of Punjab University, Lahore, to Ceylon, Sumatra, Java, Singapore, Tibet and India, and Allen Carpe, who was killed climbing Mount McKinley in Alaska. The three which have not yet reported are those of Dr. E. O. Wollan, of the University of Chicago, to Spitzbergen and Switzerland; Dr. A. LaCour, of Copenhagen, at Copenhagen and Greenland, and Professor S. M. Naude, of the University of Cape Town, to Mount Winterhoek in South Africa.

Two further parties will start in the near future, Dr. Compton has announced. Dr. E. P. Ledig, of the Carnegie Station, at Mount Huancayo, Peru, will go to the mountains of south Chile and the Argentine, and Dr. Thomas C. Poulter, of Iowa Wesleyan University, will go with Admiral Byrd's expedition to Antarctica.

During the past 12 months Professor Compton has traveled 50,000 miles, from latitude 46 degrees south to latitude 68 degrees north. He has crossed the equator four times and seen five continents.

Most important of the findings thus far assembled, according to Dr. Compton, is that the intensity of the rays is less near the magnetic equator than near the magnetic poles. This he had not anticipated. In the regions where Professor Robert A. Millikan, of the California Institute of Technology, had also made tests the Compton and Millikan measurements agree substantially. "In certain other areas, however," Dr. Compton said, "particularly in the tropics, our data give a new type of information."

The new data do not substantiate the tentative wave-form theory suggested previously by Millikan and Professor Jeans, of England.

In accounting for the difference between the intensity of the rays at the magnetic equator and the magnetic poles, Professor Compton pointed out that the earth is apparently acting as a huge magnet in relation to the rays.