no topographic or other reason exists for this change in soil type along the canal line.

From all the information available to the writer these differences are due to irrigation, which has gone on for fifty years or more. Most of the soils affected are very recent and are made up of mineral fragments washed from granitic mountains by torrential rains coming at rare intervals and spread by the floods originating in the desert storms. All the desert soils show much felspathic material, which appears to be comparatively fresh. Apparently the breaking down of these arkosic sands has caused the change in soils which has produced clay loams and clays out of sandy loams.

In the river bottom areas, where the soils are the result of sediments carried by the streams and where moisture has been present much longer than in the true desert soils, the effect is not noticeable. It is in the broad valley areas which slope from the mountains that the soil changes are most evident.

The quality of the water used in irrigation in the Salt River is a factor which should be considered. River water used by the canals in the Salt River project varies from 300 to 500 parts per million total salinity in floods to 1,500 or more parts per million at low flow. In recent years well water, higher in salinity than river water and running as high as 3,000 or more parts per million, has been mixed with the river water or used directly on many areas. In the Buckeye region, dependent in low flow periods on return water, the irrigation supply frequently runs as high as 3,000 parts per million total salinity. It may be that the use of water of this high salinity has had an effect in hastening the soil disintegration.

Two results of this change in the soils are apparent. First, the increase in clay content has made penetration of irrigation water very slow and in many cases it is difficult to get the soil to absorb enough water. This in turn tends to cause an accumulation of salinity in the soil, for where such highly saline waters are used it is necessary to use an excess above consumptive use requirements to leach out accumulating salinity.

The second effect of soil disintegration is the liberation of soluble matter within the soil. This may eventually accumulate in sufficient quantity to damage certain soils.

This short note is written to call attention to the phenomena observed in the hope that some one may be able to investigate the interesting matter.

THOS. H. MEANS

SAN FRANCISCO, CALIF.

UNPUBLISHED POEM BY T. A. CONRAD

IN connection with a discussion of the recent biography by Wheeler[1] of the paleontologist, T. A. Conrad, attention was called to the included unpublished poem[2] by Conrad.

At the time the poem was written, Conrad was paleontologist of the New York State Geological Society. Very probably the reason for his sojourn at Schoharie was because of the residence there of the John Gebhards, father and son, whose excellent collections and work on the Paleozoic section exposed at Schoharie were outstanding.

To a Trilobite

Thou large-eyed mummy of the ancient rocks,
The Niobe of ocean, couldst thou tell
Of thine own times, and of the earthquake shocks
Which tore the ocean-bed where thou didst dwell;
What dream of wild Romance would then compare
With the strange truths thy history might unfold?
How would Geologist confounded, stare
To find their glittering theories were not gold?
Methinks I see thee gazing from the stone
With those great eyes, and smiling as in scorn
Of notions and of systems which have grown
From relics of the times when thou wert born.
Thou ne'er saw glittering fishes in the deep,
Which now in multiform profusion play,
Nor giant shells, nor monsters such as sweep
Along the surge and dash the ocean spray.
Yes, small in size were most created things
And shells and corallines the chief of these;
No land but islets then, nor trees nor springs,
And no tornado thundered o'er the seas.
But the wild earthquake did the work of death,
And heaped the sand and tore the Naiad's cave.
Race after race resigned their fleeting breath—
The rocks alone their curious annals save.
And since the trilobites have passed away
The continent has been formed, the mountains grown,
In ocean's deepened caves new beings play,
And man now sits on Neptune's ancient throne.
The race of man shall perish, but the eyes
Of Trilobites eternal be in stone,
And seem to stare about with wild surprise
At changes greater than they yet have known.

T. A. CONRAD,
Paleontologist

Schoharie, June, 1840.

Although the writing of poems was a well-known phase of Conrad's life, copies of his poems are rare.

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PATHS OF FLIGHT

THE writer has noticed, from the various experiences he has had in dealing with the locusts (*Locusta*

[1] H. E. Wheeler, *Bull. Amer. Paleontology*, 23: 77, 1935.

[2] Written to Mrs. Amelia Caroline Harper Van Patten, June, 1840, at Schoharie, N. Y. The poem is now in possession of John Paul Young, of Ithaca, N. Y., a grandson of Mrs. Van Patten. Thanks are due to Mr. Young for permission to publish the poem.

migratoria migratorioides phase *gregaria* Rch. and Frm.) in the campaigns, from May 9, 1932, to July 7, 1933, and the present, that the swarms and individuals have a definite course on motion.

As a general rule the path of flight of the whole swarm is in a counter-clockwise direction. In other words, if the swarm is heading north at one place a little distance farther north the swarm will have deflected and will be heading in a northwesterly course; and if the swarm has been noticed heading on southerly course it may be expected that the swarm will be heading on a southeasterly course a little distance farther south. This counter-clockwise course is maintained at normal atmospheric conditions and as long as no temporary impediment is encountered on its flight. With head or tail winds the insects seem to be blown off their course in all directions. Also where natural barriers occur, like mountain ranges that are quite high, the chances are that the swarms will have to deflect and find a path of least resistance until it shall have again gained an open course.

The writer also has noticed that the individual of a swarm flies in a general counter-clockwise circular course. That is, each individual, within the swarm on the wing, flies counter-clockwise and the whole swarm takes a counter-clockwise course.

Because of these facts the writer has been able to prognosticate locust movements to a fair degree.

These are observations that the writer has noted of this winged pest in the Philippines. It would be interesting to know if persons who have had anything to do with locusts have ever noticed or noted the paths of flight of this insect singly and in swarm.

The writer suspects that in the northern hemisphere the paths of flight of locust swarms and individuals within the swarm are counter-clockwise, while those of the southern hemisphere are clock-wise.

ALEXANDER GORDON

LA CARLOTA SUGAR CENTRAL
OCCIDENTAL NEGROS, P. I.

UPPER DEVONIAN SPONGES

THE Carnegie Museum has recently acquired a very large series of Upper Devonian sponges of the family Dictyospongidae. The collection, which contains over 5,000 specimens, including 85 types, was made in New York and in Pennsylvania by the late Edwin Bradford Hall, of Wellsville, N. Y. The types were described by Professor James Hall and Dr. John M. Clarke in Memoir II (1898) of the New York State Museum. However, a large part of the collection had never been cleaned or prepared for identification and this work was carried on during the past year. Due to the excellence of some of the cleaned material, it may prove advisable to revise several genera and species that have not been clearly understood. These sponges will no doubt prove to be good index fossils in determining the stratigraphy of the Upper Devonian in New York and in Pennsylvania.

The writer would very much like to hear of any other collections of Upper Devonian sponges of this family, especially of any collected since 1900, or of any new localities for them which have been discovered by contemporary collectors.

E. R. ELLER

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A CORRECTION

IN my review of Professor Pearse's book, "The Migrations of Animals from Sea to Land,"[1] I questioned the statement that "most species of salmon die after spawning." Such doubt, however, appears to be unjustified, for the adults of the five Pacific species of *Oncorhynchus* do not return to the ocean after their upstream reproductive migration. Only to the Atlantic salmon (*Salmo salar*), the two land-locked forms (*sebago* and *ouananiche*) and the steelhead salmon (*gairdnerii*) of the Columbia River, etc., would the objection apply.

ROBERT CUSHMAN MURPHY

SCIENTIFIC BOOKS

CRANIAL MUSCLES OF VERTEBRATES

The Cranial Muscles of Vertebrates. By F. H. EDGEWORTH. Cambridge: at the University Press. New York: The Macmillan Company. 1935. $30.00.

THERE is doubtless much to be said for the short article favored by editors of current journals, the short article which deals with some illustration of scientific thought torn from its context, or, more deplorably still, penned by an author whose thought has no context. But the day of the monograph will certainly return when donors of funds for research learn that no research is complete without adequate presentation. "Good form," wrote Gracian, "supplies everything, . . . sweetening the truth, . . . and a little manner is the thief of the heart."

This monograph by a veteran in comparative myology is gracious in form and sufficiently spacious in presentation to convey that feeling of confidence in the reader, lacking which no author can hope to make his contribution truly effective. Without prodigality

[1] SCIENCE, June 5, 1936, pp. 553–554.