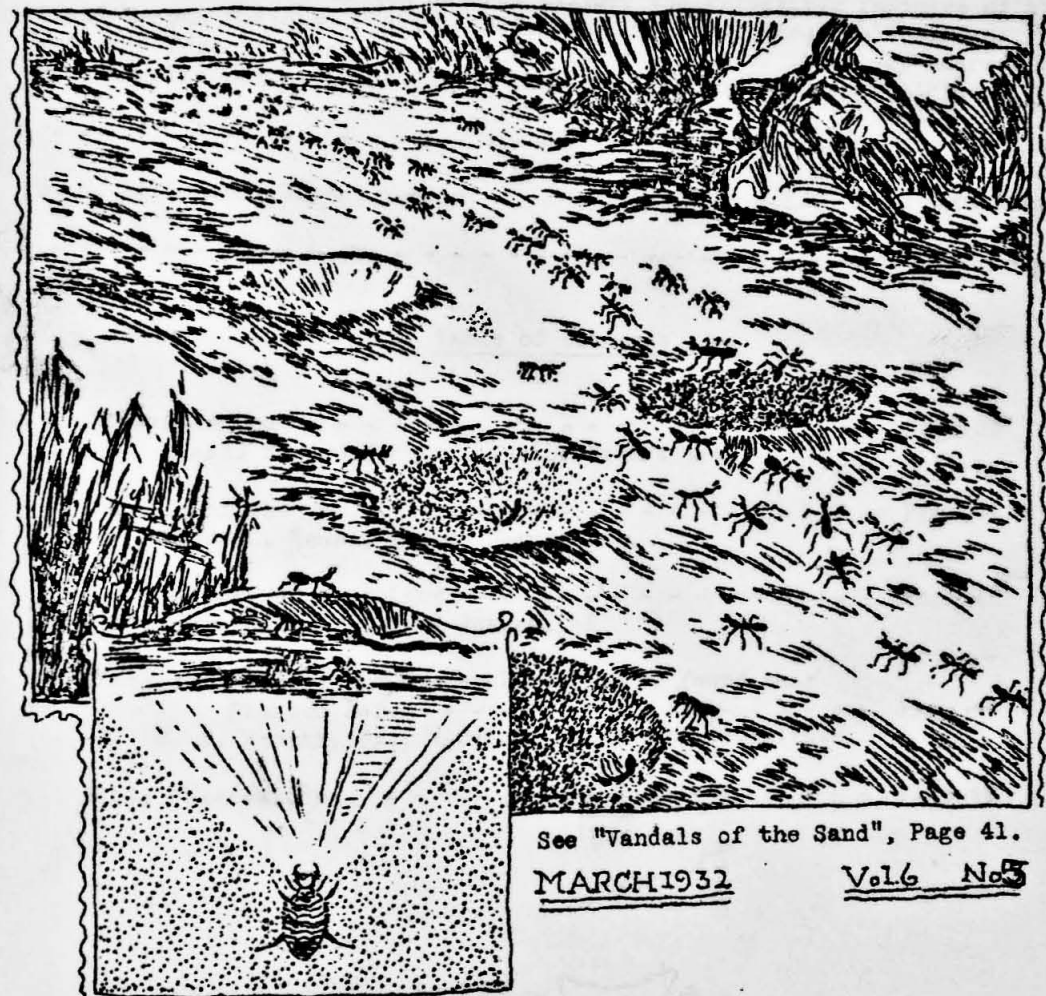


GRAND CANYON Nature Notes



See "Vandals of the Sand", Page 41.

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Grand Canyon Nature Notes

No. 5
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This Bulletin is issued monthly for the purpose of giving information to those interested in the natural history and scientific features of the Grand Canyon National Park. Additional copies of these bulletins may be obtained free of charge by those who can make use of them, by addressing the Superintendent, Grand Canyon National Park, Grand Canyon, Arizona.

M. R. Tillotson, Superintendent

Edwin D. McKee, Park Naturalist

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"SPRING IS NEAR"

By Donald Edward McHenry, Junior Naturalist

SPRING IS NEAR - at least as close as 3000 feet below the south rim. With winter's total of about 95 inches of snow on the south rim and about 190 inches on the north rim, it is little wonder that the winter-weary inhabitants of the Grand Canyon are a bit incredulous about the coming of Spring. Yet the writer stepped off the south rim on March tenth in about a foot of snow and continued to wade and slip thru winter during the first drop of about 1000 feet into the canyon. Gradually the snow began to hide out in patches beneath the shade of rocks and bushes while the trail itself became an uninviting path of slithering red mud.

And yet this very ooze was the harbinger of spring. The vegetation, which thus far had been wrapped in the gray slumber of winter, began to peek out at the world thru tiny green buds. Here the tender green of the new young leaves of the narrow leaved Mountain mahogany and its cousin the broad leaved Mountain mahogany shown brilliantly against the weather-beaten green of the somber Juniper and the glossy Hollygrape. Here and there snuggled close to the ground were groups of youthful leaves diving promise of lovely Evening primroses in the not too distant future. A little farther down the trail, just at the foot of the red-wall cliffs, a few clumps of Rabbit brush showed dabs of green where spring was beckoning the new leaves from the gaunt and winter-worn twigs. Here the Prickley pear bristled with tufts of new spring growth. Dropping a few hundred feet farther into the canyon, the scrawny Service berry was speckled with juvenile leaves, while close by the Wax current presented quite a green mass.

This brought the writer to the vicinity of the Indian Gardens. A shower of the queer little catkins of the Cottonwoods fell all about as he walked thru the thickets of new Pussy willows which all but completely hedged in Garden Creek. Wherever good fortune allowed one to reach the water as it raced about that strangest of the ferns, the Scouring rush, a hand full of Water cross could be snatched and chewed to refresh the traveler as he hiked along the trail. Here and there on the way towards the drop into the inner gorge, the Apache plume had spread its leaves to welcome springtime.

Weaving back and forth beneath the sinister cliffs which guarded the mouth of Pipe Creek, one met spring on every hand. An observant person would catch the flitting of that dark-winged butterfly - the Morning cloak (Vanessa antiopa) - as she darted thru the green foliage of Arrow wood. Some of the early leaves of the Cranesbill spread their palm-like foliage to the sun from the rocky slopes along the trail.

And then at last, the mighty Colorado with its terrifying whirl as it rushes recklessly thru its deep black gorge, made one almost forget that across the river at Phantom Ranch, spring had settled down with assurance. There the fruit trees were in full blossom and the fig buds about to burst. The warm air is alive with the hum of insects at work. Hither and thither thru the delicate green leaves a spring visitor would lend a dash of brilliant color.

Indeed spring is very near when one can stand on the canyon rim and see the gray of the winter vegetation along the upper water courses shade into the delicate green of spring below. Perhaps it will come climbing up the canyon walls very soon. When it does, it will lend even more color to our already resplendent canyon, and warm the hearts of those who will welcome the passage of winter.

The plants recorded on the trip are listed below in the order in which they were noted:-

Common Name

Scientific Name

Mountain mahogany
(narrow leaved)

Cercocarpus montanus

Mountain mahogany
(broad leaved)

Cercocarpus intricatus

Juniper

Juniperus utahensis

Hollygrape

Berberis fremontii (sp.?)

Rabbit brush

Gutierrezia sp.

Prickley pear

Opuntia sp.

Service berry

Amelanchier utahensis

Wax current

Ribes cereum (sp.?)

Cottonwoods

Populus fremontii

Pussy willows

Salix goodingii

Scouring rush

Equisetum laevigatum

Water cress

Sisymbrium nasturtium-aquaticum

Apache plume

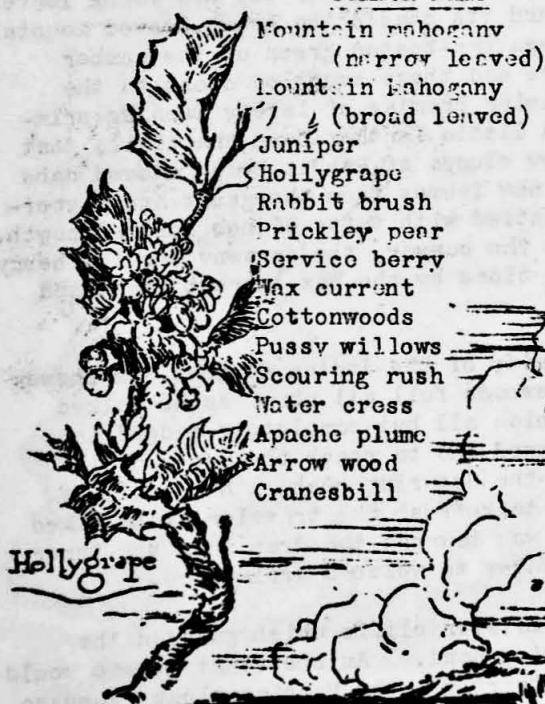
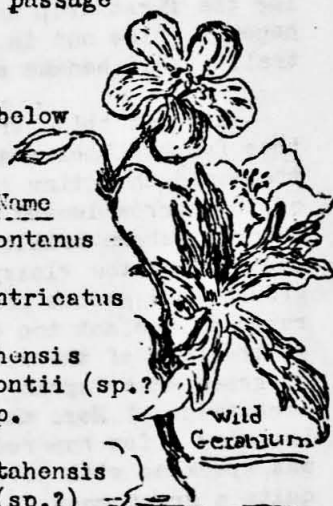
Fallugia paradoxa

Arrow wood

Baccharis sp.

Cranesbill

Geranium sp.



VANDALS OF THE SAND

By Clyde C. Searl, Ranger Naturalist.

OFTEN AT NIGHT around camp fires or hovering about electric lights or lanterns is seen a clumsy insect similar in general appearance to a dragon fly, but differing from that insect in that it flaps all four wings in flight. Time and again, the writer has invited condemnation and doubt by telling people that this insect which is fairly common in the Grand Canyon region, is an ant lion. It is difficult to believe that such a large creature can be the mature form of the common little ant lion or doodle bug with which people are familiar in the larval stage.

Winged
Lions



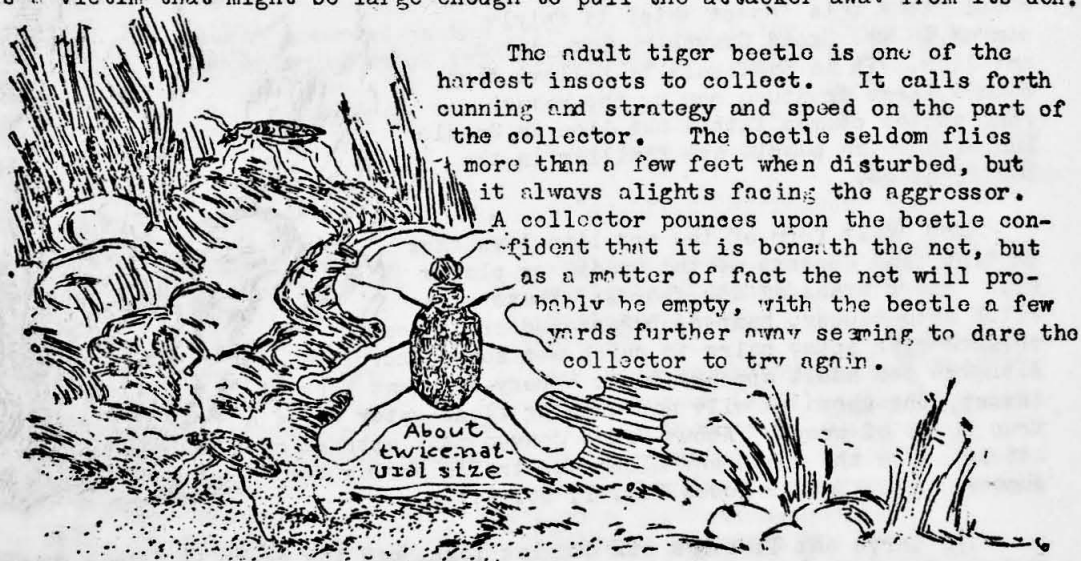
The adult form of the ant lion lays eggs in tiny sand deserts of the woods, or plains along river banks or sea shores. These eggs hatch into clumsy, humped, bug-shaped creatures covered with spiny hairs to which wet sand adheres. Although the adult appears to be a very innocent form of insect, the larva -- wily and cunning flesh-eater -- is a true beast of prey. About Grand Canyon they attract much attention in the woods and along the trails during the summer. (See Nature Notes Vol. 1, No. 4.)

The larva ant lion has six digging legs, and its mouth is like a mouse trap. It excavates a conical shaped hole in the sand, the average size of which is about an inch deep and approximately an inch and a half across. Partly concealed beneath the sand at the apex of the cone it awaits, eyes on the lookout and jaws ready to snap the prey. If any little insect creeper or spider comes along in search of food and falls into the pit, sliding to the bottom, it is snatched by the ant lion. From this habit of catching ants the common name has been given the insect.

Another sand dweller possessing a lair is the tiger beetle. One species, *Cicindela carthagenia* var. *humeralis*, Lec., is very common along the sandy banks of Bright Angel Creek. At any time of the day it may be seen lying in wait for some hapless prey. Another species, *Cicindela montana* Lec., has been collected in the Kaibab Forest, on the north side of Grand Canyon.

The tiger beetle lives up to its name both in habit and in appearance. The adult is an insect possessing a shiny armour of copper, golden green, sand color or pea green, and is striped and spotted like a tiger or a leopard. Its jaws are horny and long, hooked and toothed, and close together like a pair of scissors. The larva of the tiger beetle digs pits in sandy banks or damp earth where it waits, alert and mouth ready to snap the first small insect to come along. When the prey is caught it is dragged to the bottom of the lair where it is eaten at leisure.

About half way down on the body segment of the tiger beetle larva are two forward curving hooks which the larva uses to hold itself in place when it attacks a victim that might be large enough to pull the attacker away from its den.



The ANCIENT MAZATZALLAND

By Edwin D. McKee, Park Naturalist.

ALL OF THE HORIZONTAL LAYERS of rock which appear in the upper two thirds of the Grand Canyon walls were formed during the third great chapter of geologic history known as the Paleozoic era. During that time northern Arizona was a large basin and was flooded upon numerous occasions by the encroachment of inland seas. At other times rivers and streams flowed across it and spread out great deposits of sand and silt, leaving these as records of their existence. During most of the long intervals between the periodic floodings, however, this region stood sufficiently high above sea level to allow the processes of erosion to perform their usual work.

March, 1932.

In southern Arizona a similar basin of deposition persisted throughout most, if not all, of the Paleozoic era. Thick formations of limestone containing numerous marine fossils testify to the presence of former ocean bodies, while intermediate beds of sandstone and shale indicate that numerous other types of conditions also prevailed in that part of the state.

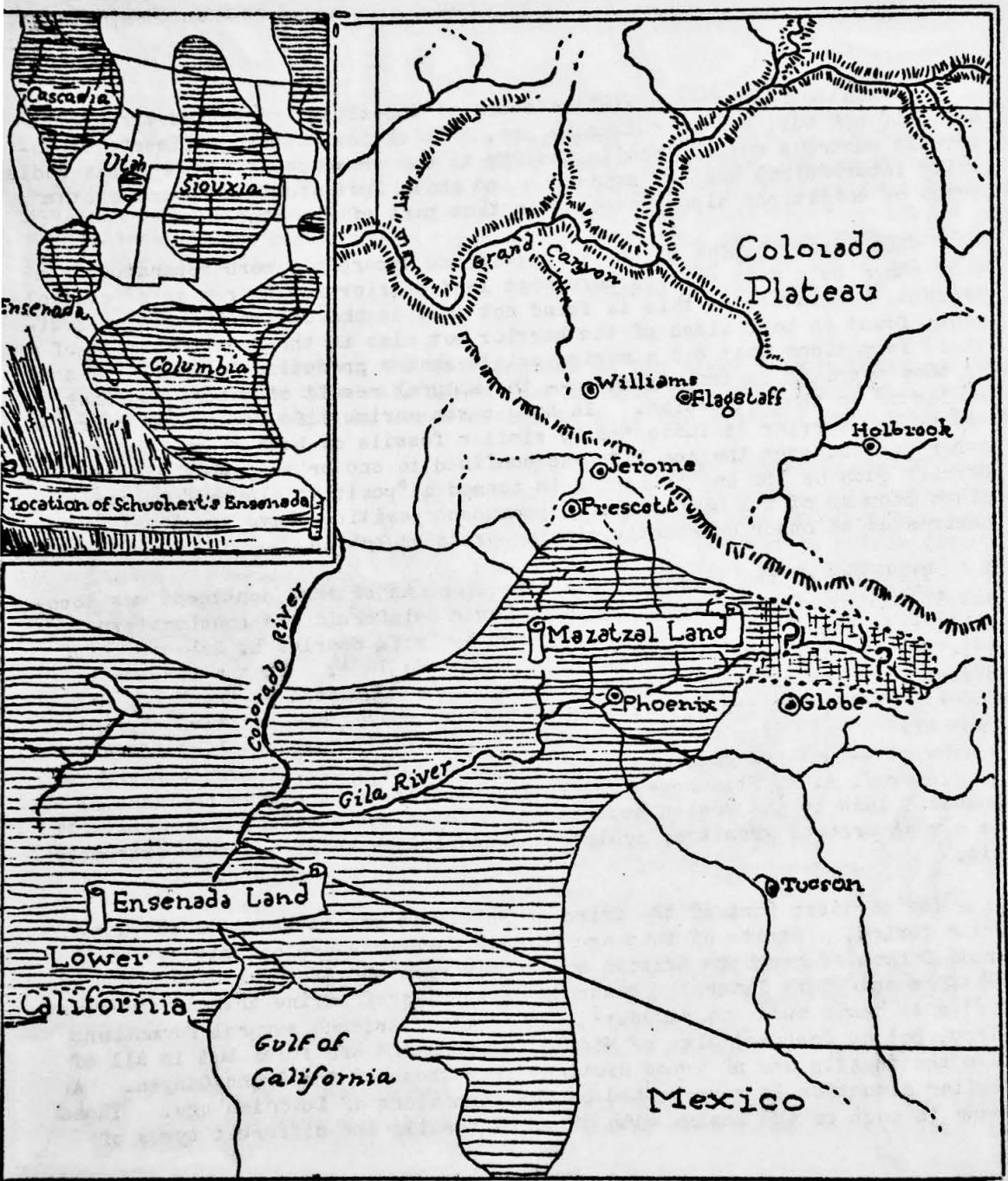
These great basins of the Paleozoic era apparently were separated from each other by a more or less permanent land barrier in the region of central Arizona. Evidence of this is found not only in the distinct types of sediments found on both sides of the barrier but also in the fact that most of those formations that had a marine origin show a gradation from lime to sand as they approach central Arizona -- the natural result of waters becoming shallower in that direction. In some cases marine life apparently migrated around the barrier as indicated by similar fossils on both sides, but during other periods even the sea life was confined to one or the other side. A barrier such as the one indicated is termed a "positive element" by geologists because of its comparatively permanent position above sea level as contrasted to other constantly sinking areas or basins.

That one of the important positive elements of this continent was located in southwestern Arizona, northern Lower California and southeastern California was recognized many years ago by Prof. Charles E. Schuchert* of Yale University. He called that area Ensenada land. That a barrier to deposition also existed in central Arizona was suggested by Dr. F. L. Ransome* in 1916, but the realization that it represented a positive element -- probably an extension of the permanent land mass of Ensenada land to the southwest -- was not made clear until very recent years. Credit for this is due Prof. A. A. Stoyanow*, University of Arizona, who gave the name of Mazatzal land to the region because it includes the Mazatzal Mountains. It is a vast area of granites, schists and quartzites -- all of them extremely old.

The earliest part of the third or Paleozoic era is known as the Cambrian period. Strata of this age (Middle Cambrian) are conspicuous in the Grand Canyon of northern Arizona where they form the green-colored Tonto Platform and where literally hundreds of fossils of marine animals are found buried in their muds and sands.** In southern Arizona several formations (Troy, Bolsa, Cochise) also of Middle Cambrian age are found but in all of them the fossils are of types distinct from those of the Grand Canyon. A similar situation is represented by the formations of Devonian age. These occur in each of the basins with distinct fossils and different types of

* See note at end of article.

** See Grand Canyon Nature Notes, Vol. 5, No. 7,
"Geography of the Middle Cambrian Period".



PROBABLE AREA OCCUPIED BY MAZATZAL LAND DURING PARTS OF THE PALEOZOIC ERA.

sediments. On the other hand, Upper Cambrian and Ordovician formations are confined to the southern basin, while those of Permian age are very extensive to the north but scarcely represented -- and with sediments of a very different nature -- to the south. Strangely enough many of the Permian fossils are the same in both basins. Apparently Mazatzal land acted as a blockade between areas of deposition during all these parts of the Paleozoic Era but to faunal migration only during a few of them.

One notable exception to the effectiveness of Mazatzal land as a barrier is recognized. At the time when the first extensive coal deposits were being formed in this world -- the period known as the Mississippian -- a great inland sea extended over much of the western part of this continent. On its bottom accumulated a thick deposit of lime which today forms hard limestone cliffs in many parts of the west. In the Yellowstone this limestone is known as the Madison; in the Grand Canyon as the Redwall; and in southern Arizona as the Escabrosa but in all of these places it contains essentially the same fossils. Here then is the evidence of a time when central Arizona probably formed no barrier; when the sea filled a continuous trough from north to south in this country, and when the forms of sea life were able to move and mingle freely in this region. Here was an exception, a time when Mazatzal land did not exist as such.

An explanation of the cause for changes in Mazatzal land and in the basins of deposition to the north and to the south is only theoretical. Some have suggested that contemporaneous low areas existed in the two extremes of the state and that they were simply isolated from each other by the barrier between. Others believe, however, that Mazatzal land was similar to the pivot in a see-saw from which one side went down as the other came up and vice versa. Both are interesting theories and only much more detailed work in the individual formations of this state will throw light upon the true explanation.

1. Schuchert, Charles E.
Bulletin Geological Society of America,
Vol. 20, pp 427 - 606, February, 1910.
2. Ransome, F. L.
U. S. Geological Survey,
Prof. Paper 98-k, p 166.
3. Stovanow, A. A.
American Journal Science,
Vol. xii, pp 314, October 1926.

IDENTIFICATION *of the* COMMON PINK MINERAL FOUND NEAR PHANTOM RANCH

B. F. Moomaw, Jr., Research Fellow,
Department of Geology Virginia Polytechnic Institute, Virginia

THIS IDENTIFICATION of the common pink mineral found in the Canyon walls near Phantom Ranch is based on two properties - the index of refraction and the specific gravity. Either of these determinations would have been sufficient but the second was used as a check.

The index of refraction was determined by the Becke method by which a fragment of the mineral is immersed in oils of known indices of refractions and a petrographic microscope focused on one edge of the mineral. As the tube of the microscope is raised the line of light (known as the Becke line) which shows at the contact of the mineral, and the oil will move towards the substance of the higher index. Immersions using oils with the indices 1.51; 1.52; and 1.53 gave results as follow:

1.51 pronounced movement towards the mineral	
1.52 faint	" " " "
1.53 pronounced	" " " oil.

According to Dana the feldspar ORTHOCLASE has an index of refraction varying from 1.5190 to 1.5260. The determined value (1.52 plus) checks this.

The specific gravity was determined by the displacement method, i.e. the weight in air ~~divided~~ by the loss of weight in distilled water. To do this a fragment is broken from the specimen, suspended from the beam of the balance and weighed. A beaker of distilled water is now put under the beam with the fragment completely submerged and reweighed. The results are as follows:

Weight of fragment in air	2.4125 grams
" " " " water	1.4783 "
Loss of weight in water	0.9324 "

* In the vicinity of Phantom Ranch the great dikes of ancient Archaean "granite" or pegmatite are so abundant that much of that area appears to have the salmon pink color of their predominating mineral which is here described. Although identification based on apparent external features has long been recognized, this careful check by Mr. Moomaw is believed to be of value.

- Editor's note -

From 2.4125 divided by 0.9324 the specific gravity is found to be 2.5824. Referring to Dana again the specific gravity of ORTHOCLASE is found to vary from 2.50 to 2.62. This value is also within the limits.

As color, cleavage, and hardness are very characteristic of ORTHOCLASE, and as examination with a petrographic microscope showed no polysynthetic twinning the specimen is determined to be ORTHOCLASE.

FIELD OBSERVATIONS

A MALE SPURRED TOWHEE was observed by Dr. B. G. Carson near his home on February 15. Another was seen at Grandview Point by E. D. McKee during the snowstorm of March 20. Although occurrence on these dates is probably not to be unexpected, these appear to be the first winter records in this vicinity.

WESTERN BELTED KINGFISHERS of which we have comparatively few previous records from the Canyon, were numerous along Bright Angel Creek all winter.

- E. D. McKee.

DESPITE THE HEAVY SNOWS this winter, several early bird arrivals have been noted with the coming of spring. On February 16 large flocks of Cassin's Purple Finches arrived on the South Rim where they remained for several weeks. On March 11 a Cassin's kingbird, and on March 12 a Say's Phoebe were seen along Bright Angel Creek.

- E. D. McKee -

A SMALL SPECIMEN OF FISH collected in the lower part of Garden Creek last May has been identified by Dr. B. W. Evermann as Tiaroga cobitis Girard. He states -- "This species is rare in collections ... (and) is the second specimen that I have had an opportunity to examine in recent years".

RECENT MEASUREMENTS made in Bright Angel Canyon show that there are slightly more than 4,000 feet of tilted Algonkian Strata exposed there. Four formations of that age are represented -- the Bass Limestone, Hakatai Shale, Shinumo Quartzite and Dox sandstone.

- E. D. McKee -

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GRAND CANYON

NATIONAL PARK