words 755 of the Montana and Yellowstone Park species are extending eastward. This includes transcontinental and boreal plants, as well as plain and prairie species. Of these not more than half or not fully 20 per cent. of the whole number reach as far east as the Alleghanies or the Great Lakes. If the flora of Colorado should be compared in a similar way with that of the east, one would find that a much smaller number of species was common to the two. It is therefore safe to say that not 20 per cent. of the plants of the Rockies are found in the Alleghanian region and that these consist almost exclusively of transcontinental and boreal plants.

In comparing Montana with the Pacific Coast, I found that 487 (mostly transcontinental and boreal plants), plus 520 (mostly Columbian and Cascade Mountain plants) or 1,007 species or nearly 51 per cent. of the plants of that State are also found west thereof. These figures can not be taken as a fair average, for in Colorado we find fewer plants that are common to that State and the Pacific Coast. I should judge that even 20 per cent. would there be a high number. I think, however, that it is safe to say that between 30 and 40 per cent. of the plants of the Rockies are also found in some part of the Pacific Coast region.

The families best represented in the Rock Mountain flora are the following in the order here given: COMPOSITÆ, GRAMINEÆ, PAPILIONACEÆ, CYPERACEÆ, SCROPHULARIACEÆ, ROSACEÆ, CRUCIFERÆ, RANUNCULACEÆ, CICHORIACEÆ, POLYGONACEÆ, ONAGRACEÆ, UMBELLIFERÆ.

In Montana the composites (with CICHORIACEÆ and AMBROSIACEÆ excluded), constituted about 15½ per cent. of the species of flowering plants, the grasses about 10 per cent., the pea family 6 per cent., the sedges and rushes 5 per cent., etc. Of COMPOSITÆ over 45 per cent., of GRAMINEÆ over 41 per cent., and of PAPILIONACEÆ nearly 50 per cent., but of CYPERACEÆ only 25 per cent. are endemic species.

In Montana the following genera are represented by the largest number of species: *Carex*, *Senecio*, *Erigeron*, *Potentilla*, *Pentstemon*, *Astragalus*, *Poa*, *Aster*, *Ranunculus*, *Salix*, *Artemisia*, *Polygonum*, *Castilleja* and *Eriogonum*. In the whole Rocky Mountain region these genera will have nearly the same order, except that *Pentstemon* and *Polygonum* have to be moved slightly further down and *Eriogonum* a little higher in the scale.

P. A. RYDBERG.

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*A TERTIARY CORAL REEF NEAR BAINBRIDGE, GEORGIA.**

THIS fossil coral reef is located near Russell or Blue Spring, about four miles below Bainbridge, Decatur County, Georgia, along the Flint River. My attention was first called to the presence of reef corals in this vicinity by finding two species, collected by Professor Raphael Pumpelly, in the United States National Museum. These species were described by me in Monograph XXXIX. of the United States Geological Survey, under the names *Stylophora minutissima* and *Astrocœnia pumpellyi*, both species being compared with species from the Antiguan Oligocene. Subsequently, in February, 1900, Mr. Alfred H. Brooks, of the United States Geological Survey, brought me from the same locality a species of *Orbicella*, which I identified with an Antiguan species and specimens of *Astrocœnia pumpellyi*. Because specimens of *Pecten* (*Pseudamusium*) *ocalensis* Dall and *Orbitoides* were brought with the corals, I referred the latter to Dall's Ocala horizon of the Vicksburgian Oligocene. It will be shown later that I was mistaken as to the stratigraphic position of the corals.

Because of the interesting character of the corals from Russell Spring, I requested

* Published by permission of the Director of the U. S. Geological Survey.

permission from the Director of the Geological Survey to visit the locality during the present field season.

Three localities where fossil reef corals of the same horizon are found were studied. The best and most important one is on the left bank of the Flint River, about a quarter of a mile below where Russell Spring empties into the river. About a half mile farther down stream on the right bank is another exposure. At Cherry Chute, some three miles below Bainbridge and about a mile above Russell Spring, is another exposure of the same rock on the right bank of the river. The following section was observed at the locality just below Russell Spring and the locality one-half mile farther down stream. It should be stated that the Vicksburgian Oligocene was not seen at the latter locality.

1. Yellow clay and yellow argillaceous limestone, composed largely of comminuted shells, spines of sea-urchins. Fossils fairly numerous, but only a few species are represented; they are a large species of *Orbitoides*, several species of echinoids, *Echinocyamus* is one of the genera, and *Pecten* (*Pseudamusium*) *ocalensis* Dall. The stratum belongs to the Vicksburgian Oligocene. Its upper surface is very irregular, showing decided evidence in favor of Professor Pumpelly's conclusion that the Vicksburg is separated by an erosion unconformity from the succeeding Chattahoochee. Thickness (to water's edge) a few feet.

2. Bluish or whitish sandy clay, sometimes purplish, rarely greenish. In this bed large limonitic segregations are abundant. The segregations occur in pockets often of many feet in horizontal extent and several feet thick. The purplish clay in places contains carbonaceous particles. Thickness variable, from 5 to 10 feet or even more.

3. Cherty limestone, or chert—the fossil coral reef. In the section this does not appear as a connected stratum, but in large detached masses, which very often have rolled down the incline to the river, but some are *in situ*. Dr. Dall identified from this bed for Professor Pumpelly *Orthaulax* and *Amauropsis burnsi*, referring it to the Chattahoochee horizon.* Molluscan remains are abundant, but the state of preservation is poor. The shells are completely silicified, or there are only surface casts or chalcedonic internal fillings. *Pecten*, *Venus*, *Xenophora* and *Natica* are common genera. A very large portion of the rock is composed of coral heads, some more than a foot in diameter. The specimens of corals are more easily removed from the matrix in which they lie than are the mollusks. Thickness, 3 feet.

At Cherry Chute the thickness certainly exceeded 8 feet.

4. Reddish sands, containing some gravel, 8 feet.

The bed of the greatest interest is No. 2. The corals from it belong to the basal portion of the Chattahoochee and not, as I once supposed, to the Vicksburg.

The following is a rough characterization of the corals found in the stratum:

| | |
|---|---|
| Caryophylliidæ (probably Paracythus) | 1 sp. |
| Other simple corals (several species) | 2 or more. |
| Bifurcating forms | 2 |
| Calamophyllia | 1 |
| Oculinidæ | 1 |
| Stylophora, probably | 3 |
| Astrocœnia, probably | 2 |
| Orbicella, at least | 3 |
| Siderastrea | 1 |
| Mesomorpha? | 1 |
| Isoporidæ (Madreporidæ Auct.), at least | 2 |
| Poritidæ, about | 3 |
| Alveopora | 1 or more |

and several others.

My estimate is that there are between twenty-five and thirty species.

This is the richest fossil coral fauna

* Dall and Stanley-Brown, *Bull. Geol. Soc. Amer.*, Vol. V., 1894. Pp. 151, 152.

known from any one locality of the continental North American Tertiaries. However, the state of preservation of the specimens is not always satisfactory, and it may not be possible specifically to describe all of them.

The particular interest of this fauna does not lie in its richness, but in its geologic import. The Tertiary coral faunas of the United States below the Chipola horizon were very isolated, no species from the continent, excepting the *Orbicella* mentioned, being found in any other area. This fauna is distinctly Antiguan in types. Besides the *Orbicella* referred to, there is a very large-celled *Orbicella*, very close to *O. crassilamellata* (Duncan), if not identical with that species, found abundantly at Russell Spring. An *Astrocœnia* is extremely close to *A. ornata* of Duncan from Antigua. The same remark will apply to the *Stylophora* and *Alveopora*.

From this field examination it appears that the reef corals of the Antiguan marls and cherts can be correlated with the base of the Chattahoochee limestone, the base of Dall's Upper Oligocene. It is also quite probable that the Oligocene reefs in the vicinity of Lares, Porto Rico, and of Serro Colorado, Curaçao, represent the same horizon. The Bowden, Jamaica, fauna would be slightly higher, to be correlated with the Chipola fauna.

It is evident that this coral fauna from Russell Spring, besides filling a gap in the faunal succession on the continent, furnishes a basis for correlating many of the West Indian fossil reefs with the continental Tertiary section, and we may confidently expect more light upon the correlation of American and European horizons.

One interesting feature of these corals, not already mentioned, is that they apparently bring the fauna of Vicksburg, Mississippi, into closer relation with the succeeding faunas. A great deal is shown regarding the succession and interrelations of the faunas of the continent itself.

A fossil coral reef is always interesting, as it reveals in an accurate manner the physical conditions prevailing in a region during a certain portion of its geologic history.

When the material collected has been carefully studied in the office, a detailed account will be published.

T. WAYLAND VAUGHAN.

BAINBRIDGE, GA., Nov. 3, 1900.

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*PEACH YELLOWS: A CAUSE SUGGESTED.*

SOME scientific problems lie beyond the reach of present knowledge, in the sense that they are inaccessible through combinations of known facts or methods of research; in dealing with such matters speculation is permitted full sweep in the hope that some hypothesis may point the way to experimental effort and demonstration. There are, however, other questions to which it seems that ascertained facts should furnish a sufficient clue, though the solution may long elude us. With regard to these, speculation appears to have less propriety, perhaps because we have learned to expect more from increased skill and improved methods of research than from theoretical considerations. But if one of these apparently ripe fruits of knowledge refuses to fall, the efforts of the investigating scientists take on added interest, and the bystanders may become anxious to tell just how it should be done. Thus far these well-intentioned people have not been permitted much satisfaction in connection with the mystery of the peach-yellows, the vigorous and sustained attack by the first investigator, Dr. Erwin F. Smith,* having left untried no theory or method which had been applied in previous studies of

* Dr. Smith's results were finally summarized in Farmer's Bulletin No. 17, U. S. Department of Agriculture, 1894.