the vireos (7 species), the woodwarblers (38 species), and blackbirds, etc. (12 species) —all groups that are found only in America.

DISTINCTIVE SPECIES

To offset these, in Korea we find the magnificent Eurasian grouse called the black cock, and there, too, we find the ring-necked pheasant, the ancestral species of the ring-necked pheasants introduced for hunting into our country. The large groups of small insect-eating birds mentioned above as being strictly American have their ecological counterparts in the large group of Old World flycatchers (a quite different family from the tyrant flycatcher) and the Old World warblers, only a few of which occur in America.

The thrush family in Korea is interesting to compare with ours. Our robin is a large thrush, as is the European blackbird, and in Korea there are eight species of this type. In addition, there are several small, lightly built thrushes known as chats and redstarts (nothing to do with our warbler known as a redstart). It is to this latter group of thrushes that the robin redbreast of England belongs, the bird from which our robin got its name. The pipit-wagtail family is also much richer in Korea. There one finds twelve species, while in the Chicago area we have but one, and in all North America only seven forms have been recorded.

There are a number of other striking groups of birds, exlusively Old World, that occur in Korea. The button quail is one, a tiny quail-like bird easily recognized by its having only three toes, rather than four as the quail proper has. The bustard in Korea is a large, running bird of the open country, noted for its elaborate display at mating time. The painted snipe belongs to a special family that is noteworthy for the female being larger and the male incubating the eggs, as in the phaleropes. Babblers, a group of passerine birds very rich as to species in southern Asia, are represented by only a single species in Korea. Bulbuls, so common in Asia and especially tropical Africa, are also represented by only a single species, as are the pittas, cuckoo shrikes (represented by a minivet), Old World orioles, white-eyes, hoopoes, and rollers.

Of birds with whose names we might be familiar from European literature, one finds such things as the wryneck, rook, jackdaw, and sand grouse.

About Chicago's streets the pigeon is common. It was introduced from the Old World. In Korea the parent species, the rock dove or, as Austin calls it, the blue hill pigeon, occurs commonly in a natural state.

The house sparrow of Chicago is also an introduction from the Old World. Although in Korea there are no house sparrows, a close relative and very similar-looking bird, the Eurasian tree sparrow, is the common dooryard bird of Korea.

CRIMSON-SNOW MYSTERY OF TOMATO JUICE CREEK

By EUGENE S. RICHARDSON, Jr.
CURATOR OF INVERTEBRATE FOSSILS

LAST AUGUST my son Ned and I spent several days hunting for an exposure of fossil-bearing Middle Cambrian shale, said to be on Granite Creek in the Gros Ventre Mountains of western Wyoming. When we finally found the exposure, it wasn't on Granite Creek at all, but on one of its small tributaries, which we would never have investigated had it not been for its peculiar behavior. For the collection of Middle Cambrian fossils that we were able to bring back to the Museum, we are indebted to two points about that tributary that we couldn't explain offhand.

In the first place, where the tributary crossed the floor of Granite Creek valley, it had deposited several acres of unsorted gravel and boulders, spread along and between five major channels and numerous smaller ones, and had piled them up around trees that had obviously been free of boulders a year before. High-water mark on the trunks showed that the water had run five feet deep at a distance of several hundred feet from the present meager stream. Where it crosses the trail, this is less than a foot deep and only three feet wide. Clearly, there had been a magnificent spring flood on this stream, though other tributaries close by had had no such experience. We wondered why one stream should have flooded when its neighbors had not.

RED IN THE AFTERNOON

More arresting than the signs of flooding was the color of the water itself. Clear and potable in the mornings, it was always red by afternoon! But on two occasions when the preceding night had been warm, the current was running red in the morning. Temperature, then, had something to do with it. Because the stream had no name and was not even indicated on the large map of the Teton National Forest, we called it Tomato Juice Creek.

One day, having still found no trace of the Middle Cambrian shale in the valley of Granite Creek, we postponed our unproductive search and attempted to follow Tomato Juice Creek to its source. Perhaps we'd find a snowbank that melted in the afternoon sun and flowed across a patch of soft red rock. Perhaps we'd find a spring in some red rock, flowing only when warmed in the sun.

From the Granite Creek trail we could see the groove that was Tomato Juice Creek's valley, stretching up the mountainside until lost at the base of a high cliff of buff limestone, stained red where the stream must fall over it. The steep west-facing slope was shadowed in the morning but received the direct rays of the afternoon sun.

Leaving the open floor of Granite Creek's valley we found that the gorge of Tomato Juice Creek was only wide enough for the water itself, while the banks were too steep and smooth to provide a footing. Accordingly, we waded up the stream, and thus, in the side of the gulch, a mile from Granite Creek, we came upon the long-sought outcrop of Middle Cambrian shale. The small valley was choked here and there with a tangle of broken trees, kept green by the running water—alpine fir, aspen, limber pine, and others—over which we climbed.

At one place we crawled through a snow tunnel 30 feet long. The top of the tunnel, too, was littered with fallen trees.

The answer to the first question was before us. Snow deep enough to remain through the summer and the host of displaced trees indicated a snowslide. The many channels, the boulders, and the high-water marks down below told that the snowslide had held back a small lake and that the snow dam, melting in the spring weather, must have suddenly broken.

CRIMSON WATERFALL AND SNOW

The water at our feet was still red; so we climbed on, over small waterfalls, trees, boulders, and more snow, cutting footholds in the bank to detour around a cliff with a red waterfall. By midday we had reached the base of the big red-stained cliff that we had seen from below. The water trickling over the stained cliff was now clear, and at our feet lay the answer to the second question. The stream was bridged by a succession of snow tunnels, and that snow was red! Cutting into it with our picks, we found the snow as red as the inside of a freshly broken red brick. From it, drops and rivulets of dark-red muddy water were falling into the stream, giving it the color that it carried three miles down the hill to Granite Creek.

Time prevented our going around and above the high cliff to find why the snow itself was red and why the cliff was stained, but the answer seems clear. Coming up from Granite Creek, we had climbed in succession over the outcrops of all the formations deposited during the Paleozoic era, from the Cambrian rocks at the bottom to the Permian limestone forming the cliff before us. Above the Permian, as we had found at another locality several miles away, lies a thick succession of red sandstones and shales deposited during the Triassic period. Apparently, at this one place on the divide between the Crystal Creek drainage on the east and the Granite Creek drainage on the west, the Triassic rocks have not yet been stripped away. Wind accompanying the snow must have swept up a cloud of dust from the exposed red shale. This, trapped in the falling snow, made banks of red snow to melt in the summer sun and entice us to the discovery of the Middle Cambrian shale far downstream.