PALEONTOLOGY

When Sharks Ruled the World

Wyoming's "Lost World," Reconstructed From Fossils, More Fantastic Than Conan Doyle's Great Tale

By DR. FRANK THONE

SIR ARTHUR Conan Doyle achieved the climax of his fantasies when he told the tale of the "Lost World"—of a party of explorers finding, in an isolated spot in the tropical jungles, a relict population of the Middle Ages of the animal world: lumbering, spike-toothed dinosaurs, swooping, leather-winged pterodactyls. The book was a thriller, and the ingeniously contrived movie built around it was a classic of its time in the films.

But Sir Arthur's imagination, bold as it was, made only a half-hour's hike into the geological past, when we compare it with the expedition into a "Lost World" of the earth's real antiquity made not so long ago by a young scientist from Princeton University. Conan Doyle's dinosaurs lived only a matter of 120 million years ago. The creatures of Dr. Erling Dorf's discovering played their parts in the everlasting drama of devourer and devoured at least three times that far back on the old earth's calendar.

An Authentic Record

Another point must be claimed in favor of Dr. Dorf's world of weird monsters: it was not simply imaginary; it had a real existence and left a real record. Hundreds upon hundreds of its creatures, when they died, left the imprints of their bodies in soft ooze that has since turned to solid stone. These records are as definite and authentic evidence of life in a community of the past as are the imprints of Babylonian seals on old clay tablets, or the carved hieroglyphs on an Egyptian prince's tomb. Men who can read these cryptic writings pressed into the lasting pages of the rocks find them every bit as fascinating as any product of literary fancy, with the added zest of knowing that these things actually happened.

Their existence was real, and their place was no less real. Out in sun-drenched, wind-swept Wyoming, a little less than twenty miles east of Yellowstone's plateau of wonders, there rises an impressively massive citadel of rock, dominating the plain as a battleship turret dominates the deck. This is Beartooth Butte. It is a kind of an immense geological layer-cake, for it consists of massive stratum on stratum of rock of different geological ages, standing high above a terrain made of some of the oldest rocks in the world.

Once there was no Beartooth Butte. The level of the country was higher than its top in those remote days, and the layers that make it up continued in all directions as parts of the foundation of the land. Then, through slow ages, water and weather ate away the land, leaving only round-sided massive fragments standing here and there. These are the buttes—among them Beartooth.

Readers of the Rocks

To the exposed edges of their piled strata come geologists, reading them as we read the pages of a somewhat puzzling but irresistibly fascinating book. The words are fossils, the punctuation marks are the cracks and discontinuities in the rock. The chapters are scores and hundreds of millions of years of life on earth.

Geologists had come to Beartooth Butte before, read their chapters and went their ways. Then Dr. Dorf and his companions came, and found an entirely new chapter that nobody had seen before. They were to have all the fun of reading it for the first time.

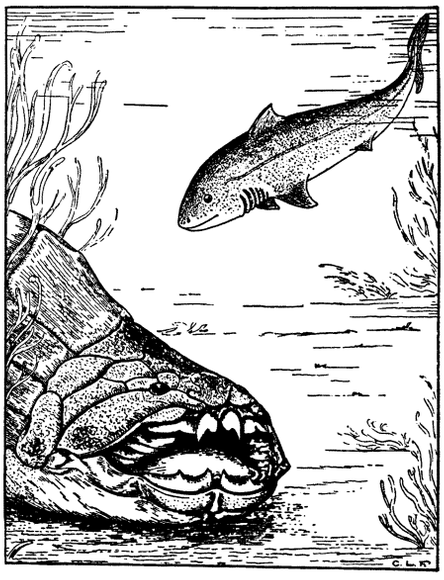
This chapter was found between the banks of what had once been a mighty river mouth, carved in the shores of an ancient continent, and then sunk partly below sea level to form an estuary, like the wide course of the lower Potomac that has its upstream end at Washington, D. C.

In an estuary, the slow down-flowing current must always strive against periodic up-flowing tide. This makes for slack water, a good deal of the time, so that sand and silt carried by the water will settle to the bottom, and in the end will choke up the channel. Whatever falls into this bottom ooze gets sealed in and stands a very fair chance of becoming a part of the permanent geological record. If you were to dredge up a lot of Potomac mud, for example, you would find in it the bones and scales of the fish and other water animals that swam there in the recent past. You would also find stray evidences of drowned land life: bits of waterlogged wood and leaves, a tin can, a dull safety-razor blade. You would have a record, albeit perhaps a scrappy one, of the life in the river and along its shores.

Dr. Dorf's filled-up ancient estuary yielded just such a record of the life in this forgotten river and along its banks, a third of a billion years or more ago, in that remote age of the earth's history which geologists call the Devonian, because the rocks of that age were first recognized and studied in Devonshire in England.

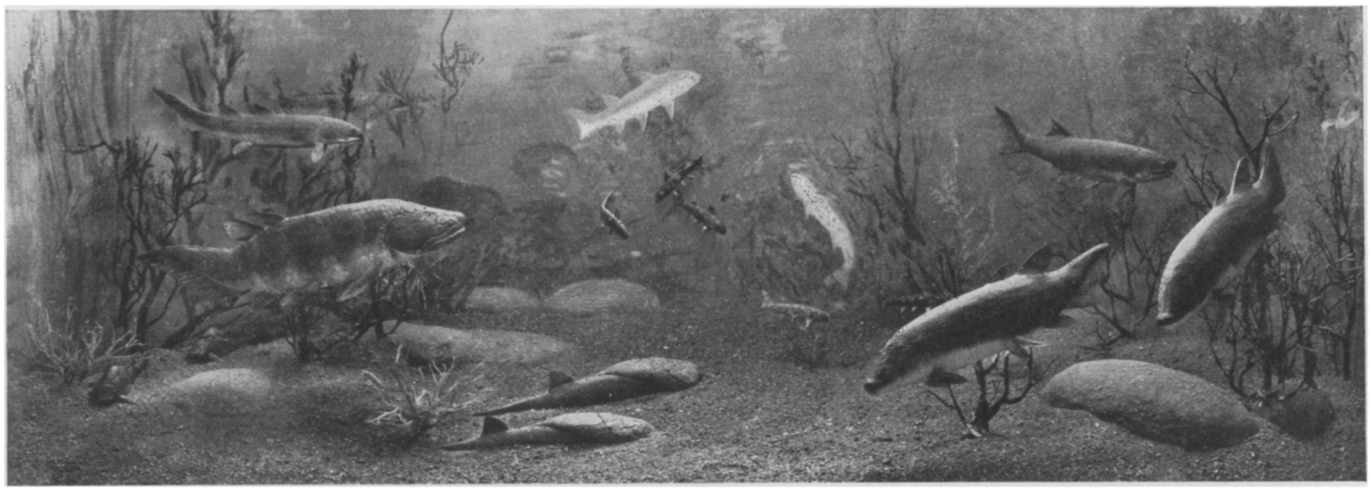
The Devonian has been called the Age of Fishes, because at that time no higher forms of backboned animals than fishes are known to have existed. The seas swarmed with animal life then as they do now. There were many strange, often terrifying creatures in the water, which have long since died out completely, leaving no near relatives. There were also others, particularly among the fishes, that have modern surviving kin.

Plants grew in the water—seaweeds. Plants grew on land also, but they were of kinds we would hardly recognize now, save that a few looked rather like the horsetail rushes that grow along railway tracks and in wet sandy places, and others



DINICHTHYS

He of the bear-trap jaws, lying in wait on the bottom. Restoration drawing by Carroll Lane Fenton.



DEVONIAN FISHES

These particular forms swam the ancient seas over the land that is now Scotland; but the fishes of Dr. Dorf's "Lost World" in Wyoming were quite similar to them. From a restoration in the Americau Museum of Natural History.

remotely resembled ferns. Of animal life on land, however, there is hardly a trace. Plants were either much more venturesome than animals in going ashore, or else the animals on shore leave died without leaving any last testimony. Dr. Dorf suggests that since animals depend upon plants for subsistence, therefore plants had to become established before animals could take advantage of the land habitat.

This then was the setting for Dr. Dorf's "Lost World" that lived in a sunken river when the earth had not yet grown old. Under the dim waters swam and crept ghostly, cruel fishes, and monsters, shell-armored and claw-armed, that looked like nightmares of giant lobsters. Shovelling in the mud for a living were other shell-backed things that were neither backboned fish nor backboneless crustaceans. They may possibly have been the great-great-great-grandparents of fish (and hence of all the rest of us proud vertebrates), living on like "contemporary ancestors" among their more progressive descendants. One may wonder a little if the fishes of those days were vaguely annoyed by their reproachful presence, as some of us are, sometimes, by the appearance of our poor cousins, the apes.

A Complex Society

There was enough variety in the community of Beartooth Estuary to give the social structure some complexity. Dr. Dorf's list comprises a total of 29 species of animals of many kinds. They were identified for him by Director William L. Bryant, of the Park Museum, Roger Williams Park, Providence, R. I.

When you get so many different life forms all in one place, each kind of animal with its own habits and needs and ambitions and fears, life is apt to be reasonably lively. There will be the active, the aggressive, the rapacious, exercising boldly the right of the strongest. There will be the sly, the furtive, the creeping, watching for opportunity to stab or strangle in the dark. There will be the patient, the meek, of manifold birth and rapid growth, seemingly made for the role of unresisting victims. We have them in our cities, they are known among the beasts of the field and the birds of the air; and their types were not lacking in the "Lost World" of Erling Dorf.

There were, for example, sharks—six kinds of them. They were not identical with any species of shark that swims the seas today, but we should have had no difficulty in recognizing them for what they were.

Corsair Conservatives

These lithe, restless corsairs of the subseas world would have been, most probably, the easiest to recognize among all the inhabitants of Beartooth Estuary. Like many other gentlemen of excessive appetites and deficient ethics, sharks are conservatives; they have changed little in a third of a billion years.

Another conservative among the fishes was a lone lungfish. Only one specimen was found: apparently a solitary aristocrat in this turbulent aquatic community of the Old Wild West. There are lungfishes still in existence, in out-of-the-way places of the world: interior Africa and Australia, and a limited area in South America. They are really a bit pathetic; the lungfishes are and apparently always have been rather inoffensive creatures, asking only for mud to burrow in and a little air to breathe—for lungfishes are unique among their kind in that they use their airbladders as genuine lungs, as do land-living animals; though they are not regarded as ancestral forms. The lone lungfish of Beartooth Estuary doubtless had companions, but thus far no scale or tail of them has been found.

But when we leave the company of the sharks and the lungfish, we are at large in a "Lost World" indeed. All the other 22 species of animal life represented in Dr. Dorf's collections are unlike anything that now lives in the waters that are under the earth.

There is still a third group of fishes, much more numerous in individual remains than either of the other two, but no fish of this order now exists, or has for many millions of years. They bore the harsh name of arthrodires, and they were the heavy armored barons of the Devonian watery world. They were enclosed in heavy bony plates instead of the flexible scale coats of modern fishes, and some of them had terrific shear-like jaws. Burdened with armor as they were, it is unlikely that they were very active; more probably they lurked on the bottom waiting for unwary prey to swim within snapping distance of those bear-trap jaws.

Sea-Scorpions

Among the animals without backbones the most conspicuous was a huge sea-scorpion, of which Dr. Dorf found just two specimens. These sea-scorpions were not so very closely related to the little sting-tailed land scorpions of today, but they were not closely related to any other living things, either. In external appearance they were more like enormous lobsters, or perhaps horse-shoe crabs, rather

flat-bodied and otherwise misshapen: some of them were as much as six feet long. Their claws, however, were disproportionately small, if we take the lobster as our standard of beauty.

The bulk of the population of the Lost World of Beartooth Buttee, the common people of this aquatic settlement, was made up of smaller, shell-cased, wide-headed fish-like creatures that were not yet fish—the then contemporary ancestors, the ostracoderms. (That four-jointed word means "shell-skins," and describes them very neatly). These poor folk were the multitudinous meek of the Devonian "Lost World." They were bottom-creepers, mud-shovellers; they not unlikely lived on the scraps and leavings that fell from the tables of the sharks and the arthrodires. And in the end, they did not inherit the earth: the last ostracoderm perished ages ago, and the sharks are still with us.

That completes the census of the "Lost World" of Beartooth Butte, so far as animals are concerned. The story of the plants is told much more quickly. All plant remains found belong to one family of land plants, a strange growth with curled stem and no leaves, that probably grew on the marshy edges as cattails and reeds grow on the shores of estuaries today. They were of the group known as the psilophytales, earliest and most primitive of all land plants, and regarded by Dr. Dorf as the undoubted ancestors of all the manifold land-dwelling vegetation of later times.

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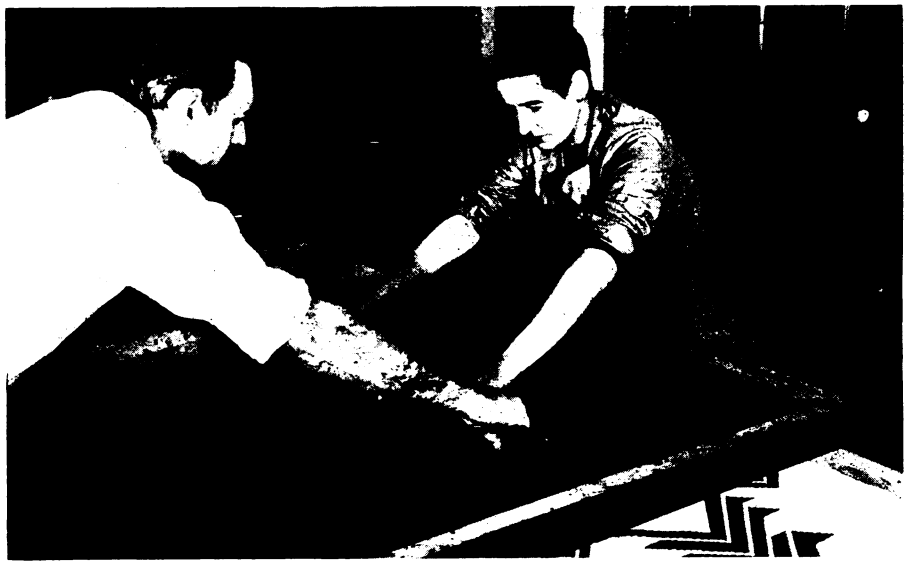
British tests show that certain kinds of trees attain a diameter of only 4 inches after 16 years of growth in Scotland or Canada; whereas in Australia's climate such trees reach 12 inches in nine years.



BLOCK PRINTING

A printer assists Miss Reeves in block printing a design adapted from art of Mayan Indians in Guatemala.

ARCHAEOLOGY—TEXTILES

Designers Borrow Patterns From Ancient America

TEXTILE designers are discovering ancient America.

In a search for novelty and inspiration, artists who pattern silks and other fabrics have struck upon the Guatemalan highlands, where descendants of the famous ancient Mayan Indians are still living. Ancestors of these Indians reached the highest peak of prehistoric American civilization, in architecture, art, and learning. The modern Mayas live simply but in their villages may be seen distinctive American art designs adorning shirts, skirts, headbands, blouses and blankets. Some of the designs are old, traditional; others modern.

The wave of interest had its start last spring when the Carnegie Institution of Washington sent Miss Ruth Reeves, New York textile design artist, to Guatemala to study ancient and modern textiles and costumes. The collection of textiles which Miss Reeves brought back, and costumes collected by Edith Ricketson of the Institution staff, are now being shown at art institutes around the country, under auspices of the National Alliance of Art and Industry.

Thus modern science and art return a compliment which Indians paid to white men four hundred years ago—the compliment of imitating or borrowing. Indians, dazzled by Spanish costumes in their midst, adapted fashions and designs. The conventionalized double-headed eagle on Guatemalan Indian textiles may have been a borrowing from the Hapsburg coat of arms, royal emblem of the Spanish colonial official. So, at least some people have interpreted this Indian design; though others believe the two-headed birds to be a native art idea much older than Spanish Conquest days.