spicuous. Subsidence towards isostasy might perhaps induce folding to some degree. If the depression of the Pacific Ocean is thus determined in the main hydrostatically, is there not less room for the cosmic theory that it may represent the cavity from which the moon was originally shed away?

3. *Postscript*.—One observes that these and cognate questions, insistent and fascinating, form the subject-matter of Prof. Joly's recent path-breaking book, "The Surface History of the Earth," which invokes steady evolution of heat by radioactivity of the rocks, interacting with isostatic influences, as the cause of periodic outbursts of surface activity which have fashioned the existing features. There are to be compared the views developed in H. Jeffreys' recent comprehensive treatise, "The Earth." For a condensed account over an extensive range cf. "A Symposium on Earthquakes," by F. A. Tondorf, N. M. Heck, W. Bowie, A. L. Day in *Journal Washington Academy*, May 4, 1926, pp. 233-254 (also more recently G. R. Putnam). In a less special way, such questions have been prominent since the treatise of E. Suess on the earth's surface features. There is also the problem of the time-scale of development, projecting into vast æons of the past, yet with clues arising mainly from the fossil traces of the succession of forms of life.

A few special remarks may be significant here.

It appears that the lag in compensation of accumulating great depths of sediment is but small, compared at any rate with the time of accumulation, for the compensation is always well advanced.

Tidal pulls on these adjustable surface-sheets would on Newtonian principles be differential, and so extremely slight. Thus even the extreme case of an elastic earth surrounded by an ocean of molten lava of the order of 10^2 kilometres in depth, in which

continents would be analogous to ice-sheets and mountains to icebergs, is not unthinkable dynamically, however it be thermally; though the existence of the actual oceanic tides would demand a rigid and deep crustal layer.

But even if the lagging tidal pull were large enough, it could only cause a westward drift of the fluid surface material around the earth as a whole, not of continents and mountain ranges floating thereon. For the principle of Archimedes asserts itself; as regards the uniform field of force the floating mass can be replaced by the magma which it displaces, up to the level surface; thus it is the same as if the tidal forces acted on a uniform sheet of magma without surface excrescences and no differential drift could arise—except in so far as a uniform drift may be obstructed or deflected locally by the more solid roots of the floating continents that are carried along with it.

The earliest table-lands, of primitive rock, must have been pushed or floated up, and to great heights; it would appear from the literature that their subsequent denudation by areal influences accumulated stratified deposits along the coasts of the oceanic hollows, which gradually sank into the magma by their own extra weights, perhaps most in the middle so as to curl over by the lateral pressure,—themselves sinking down while the adjacent denuded high land is floated up, until by accumulation combined with sinking, and helped by effusions from below, they attained to considerable slopes and great thicknesses, even five miles or more, that then somehow they were pushed up again bodily, yielding after repetitions of such processes folded mountain-ranges of stratified rock such as geologists know, the primitive elevations having passed largely out of sight. At any rate nothing more plausible seems to have been hitherto thought of.

The Golden Eagle.

By SETON GORDON.

"Thrice the age of a dog the age of a horse,
Thrice the age of a horse the age of a man,
Thrice the age of a man the age of a stag,
Thrice the age of a stag the age of an eagle,
Thrice the age of an eagle the age of an oak tree."
—*Old Gaelic saying.*

THE golden eagle is the most magnificent bird of the Scottish highlands. Up to the middle of last century, the erne or white tailed eagle shared the cliffs of the western seaboard and islands with the golden eagle, but the erne is now extinct, although so late as the middle of the last century almost every headland of the Isle of Skye had a pair of these fine birds nesting upon it.

The flight of the golden eagle has inspired many poets, and from the earliest times it has been looked upon as lord of the air. In the Book of Proverbs we read:

"The way of an eagle in the air,
The way of a serpent upon a rock,
The way of a ship in the midst of the sea,
The way of a man with a maid."

These, says the writer, are the four things too difficult to understand. Keats wrote in 1818 "Eagles may seem

to sleep wing-wide upon the air," and how descriptive are Wordsworth's lines "Faint sound of eagle melting into blue." Scott writes that the eagle from her rocky perch on Ben Venue "spreads her dark sails to the wind."

The eagle is the royal bird of Greek mythology; an eagle of gold was the standard of the Romans. At least three countries have the eagle as their emblem: Assyria, Persia, and Rome. It is, or was, the national arms of France, Germany, Russia, Italy, Austria, and Poland.

At the present day the golden eagle is confined to the central and western highlands of Scotland. In the more accessible districts it is terribly harried by egg collectors, and here very few eyries escape. It is unfortunate that the golden eagle, almost alone among Scottish birds, should never lay a second time in a season, even if its first clutch of eggs be taken when quite fresh, but, despite the egg collector's zeal and the keeper's gun, I do not think the eagle is on the decrease, except here and there. Each pair of eagles has two, sometimes three, eyries. The same eyrie is seldom used two years in succession, because the eaglets remain long (about eleven weeks) in the nest and from

the accumulated remains of prey the eyrie becomes foul towards the end of the time and needs more than a twelvemonth to be thoroughly cleansed by winter frost and summer sun. Some of the Scottish eyries have been used regularly for at least half a century, and probably much longer.

The nesting site may be a tree or a rock. In the central highlands a tree is frequently chosen, and I have seen nests in a Scots fir, and, rarely, in a birch. In her choice of nesting material the golden eagle is most particular. The eyrie may be from six to eight

was watching an eyrie when the male bird flew up the corrie and settled on a branch a few yards from where his mate was brooding her eggs. I hoped that I might witness the 'change over,' but, after apparently satisfying himself that all was well, the cock shook himself like a dog (there had been a heavy hail shower a few minutes before), spread his great wings, and was gone from my sight.

Although the golden eagle usually lays two eggs, she frequently rears only one bird, and there is no doubt that one eaglet sometimes kills the other. Last

season my wife and I built a hiding tent thirty feet from an eagle's eyrie, and spent between two and three hundred hours in it photographing and observing the home life of the birds. As usual, one eaglet was a hen, the other a cock. In birds of prey the female is the larger, and when the eaglets were ten days old there was a marked difference in size between the two. During the early days of their lives the young hen frequently drove her brother round and round the eyrie. The attack was always entirely unprovoked. Sometimes when the cock eaglet was lying asleep in the nest his sister rose and walking unsteadily over to him aimed a deliberate and vicious blow at him. Fortunately for him the young cock was the quicker of the two on his feet, and I am convinced that on more than one occasion his superior speed alone saved his life. Each time his sister pecked him she tore out much of his down, until the eyrie and the heather around were strewn with this white down. The victim never once retaliated; indeed he was a miserable young person at this stage.

Sometimes, after almost exhausting herself by her attacks on her unfortunate brother, the aggressor stood up unsteadily in the eyrie and flapped her downy wings (her feathers had not as yet commenced to grow), uttering as she did so a wild yell of defiance. It was a weird and very extraordinary cry, and I shall never forget it. Once the mother eagle returned in the midst of this bullying and calmly watched the down being torn from her unfortunate son. Perhaps she thought it better that he should be brought up in a Spartan school.

This pair of golden eagles brought to the eyrie a varied collection of prey for the youngsters. Blue hares, grouse, and ptarmigan were brought regularly, and, more astonishing, the birds hunted squirrels and brought them to the nest. Although the eyrie was in a deer forest no red deer calves were brought, but two roe deer calves were carried up to the eyrie from the low ground. My wife had the good fortune to

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FIG. 1.—The hen golden eagle preparing to feed the family.

feet in diameter, and the crown on the nest is composed entirely of green fir branches (if there are any fir trees in the district), which the eagle breaks off the trees with her powerful bill. Near one eyrie that I know of a solitary fir grows, and each spring the eagles fly to it and strip it of some of its branches. The lining of an eyrie is, when possible, always made of the great woodrush, *Luzula sylvatica*.

Eagles build early, and I have seen a large branch being carried to the nest on January 27. In the more sheltered nesting-places the eggs are laid in mid-March, and the eaglets hatch between April 29 and May 1.

It is not known whether the cock bird takes his turn at hatching the eggs. In April of the present year I

be in the 'hide' when one of the calves was brought. The calf was minus head and entrails, and even then its weight was such that the cock eagle had to rest several times upon trees on his way to the nest. He

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FIG. 2.—Cock golden eagle tearing up a hare for the eaglet.

was carrying the calf in one claw, and when he arrived he threw down his burden and stood breathless at the edge of the nest. The eaglets were filled with excitement, and the young hen pounced upon the calf with the same weird yells of triumph she had uttered after her fierce attacks upon her brother. The latter picked up a feather from the floor of the eyrie and dashed about holding it in his mouth!

The cock eagle was a magnificent bird. He was smaller than the hen, and his plumage was lighter than hers. He was dashing and debonair; the gleam of his eye was magnificent, and he was a true king of the hills.

One sunny afternoon the interior of the 'hide' was so stuffy that I put my head half out of the entrance to get a breath of air. Against the blue of the sky I saw a small black object which I thought at first glance was an insect. But with incredible speed the dark speck grew in size until I saw that it was the cock eagle rushing down towards the eyrie from the high snow-streaked corries above. He was travelling like a thunderbolt. In one claw he held a ptarmigan, and this extra weight no doubt increased his speed. I suspect that I shall be accused of exaggeration when I say that his speed was at least two hundred miles an hour, but I am convinced that this is no over-statement. I have seen nothing in the bird world to equal that

splendid downward rush, and to see it was worth many hours of patient watching.

Regularly about three o'clock each afternoon the cock eagle arrived at the eyrie from his hunting. In the eyrie he laid his prey, and, after looking at his yelping brood for the space of about a minute with indifference, he spread his great wings and sprang into space. On these occasions his mate must have been watching him from a neighbouring tree, for almost immediately he had left she glided down to the nest and fed the family on the prey he had brought.

When the eaglets were small there were days of wild west wind, when the squalls of hail pattered like small shot against the sides of the 'hide.' The eagle's tree rocked in the wind, and the mother eagle, as she guarded her young after having fed them, swayed gently to and fro, balancing herself with all the skill of a sailor when his ship is meeting heavy weather. The young hen eagle left the nest early in July, but the cock, being more backward (partly, no doubt, because of his ill-usage in his early days), was not ready to follow her. For some days the parents fed him in the eyrie, but then seemed to decide that he was ready to leave. Each day they brought him less food, and at last the eyrie was bare. The parents were starving him, and daily he became weaker and constantly

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FIG. 3.—The cock golden eagle brings in a rabbit.

scanned the skies for his father or mother. He practised wing exercises repeatedly during these days, and also practised 'grabbing' exercises with great ferocity. At last, on July 16, the eyrie was vacant—starvation had compelled him to take his first flight, the biggest step in his young life.