

are emitted in excess; or if the heat is sufficiently intense to produce them largely, as in the melted metal, where the thin films of oxide on its surface glow with perfect whiteness, the metal itself must shine with bluish, or it may be with greenish-blue light, if the heat is only high enough to make the excess of green rays very strongly visible. If this should be, as I suppose, the real explanation of the very curious appearance of depth of a certain tint of colour, contrasting strongly in some parts of the melted stream by its greenish hue with the surrounding redder lights, according as the natural tinted appearance of the vivid metal is effaced or diluted by the floating films of white-hot oxides in lines and parts of the stream depending on the surface-flow, and suggesting in some degree the idea of a transparent cascade, and even from its colour of a waterfall, the process often repeated in large foundries of running gun-metal into large castings presents an instance of well-defined action of the law of exchanges which must be constantly witnessed and noted inquiringly by daily observers, and which certainly presents, if a different and more natural explanation can be given of its origin, to eyes unaccustomed and unprepared to receive it, a somewhat surprising and otherwise unaccountable appearance. In gun-metal, when the proportion of zinc introduced is very small, the coating of the melted surface by copper oxide is comparatively slow, and in melted brass it might not be possible, from the rapid oxidation of zinc upon the surface, successfully to observe the same phenomenon. In order to render melted copper fluid enough for casting, a small proportion of alloy sufficient to give it almost the colour of brass is required to be mixed with it, and large pourings of the pure metal cannot commonly be made; but perhaps in small castings of this metal, and probably also in those of gold, opportunities would present themselves similar to that which I have here attempted to describe, of verifying the same general law of radiation connecting together the qualities of luminosity and absorption in the surfaces of highly coloured metals.

Newcastle-on-Tyne, Sept. 20

A. S. HERSCHEL

Changes of Level in the Island of Savaii

WHILE feeling some diffidence about setting myself in opposition to so careful an observer as the Rev. S. J. Whitmee (NATURE vol. xii., p. 291), I cannot allow his statements in regard to changes of level in the island of Savaii, Samoan group, to pass altogether unchallenged. In the month of June 1874 I spent some weeks on the island, during which time I travelled around nearly the whole of it on foot. Though not a scientific observer, I was on the look-out for indications of change of level along the coast, and it is my decided opinion that such indications are quite as little apparent in Savaii as in Upolu. Mr. Whitmee, whom I had the pleasure of meeting on the island, directed my attention to what he believed to be a line of upheaved cliffs a couple of hundred yards back from the sea, near Tufu, on the south side of the island. On examining the place, after parting from Mr. Whitmee, I particularly observed that the floor of volcanic rock at the base of the cliffs bore exactly the appearance of lava that had cooled in the open air. The creases and ripples left on the surface of the lava in cooling were distinctly visible, which could not have been the case if the rock had ever been exposed to the action of the waves. No doubt was left on my mind that the floor of volcanic rock between the base of the cliffs and the sea was at one time on a level with the top of the cliffs, and that it had broken away and sunk several feet, from some cause which I do not attempt to explain.

I brought away the impression that Savaii was at one time much more fully supplied with barrier reefs than at present, and that recent lava-flows had extended the island out beyond the reef. So far as my observations extended, where reefs do exist they are terminated by points or capes of volcanic rock, looking as if the lava had overflowed and cut off the reef.

One circumstance almost, if not quite, fatal to the theory that Savaii has been upheaved in whole or in part in recent times, is that nowhere are there any signs of coral *in situ* above the sea-level. In this respect it is very different from the island of Rarotonga, in the Hervey group, which has most unquestionably been upheaved several feet, at least on the south side. There the barrier reef is altogether out of water, and what was once the enclosed lagoon is in some places dry land.

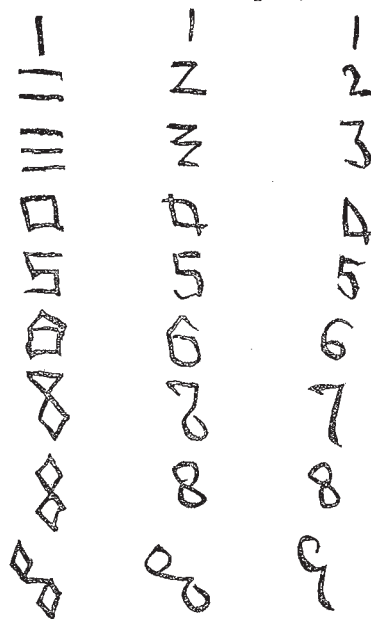
In regard to the absence of barrier reefs in front of lava-flows, I venture to suggest that it is more likely to be caused by the depth of the water or by the recency of the lava-flow than by any effect of existing submarine volcanic action on the coral insect.

San Francisco, Sept. 7

RICHARD WEBB

Origin of the Numerals

HAVING never met with any explanation of the origin of the numerals, or rather of the figures symbolising them, perhaps I am right in supposing that nothing satisfactory is known of it. In that case the following may be interesting to your readers. The first column contains the original figures, each containing as



many lines as the number which it is intended to represent. The other columns show the transitions likely to result from quick writing.

W. DONISTHORPE

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Pugnacity of Rabbits and Hares

I HAVE occasion just now to keep over thirty Himalayan rabbits in an outhouse. A short time ago it was observed that some of these rabbits had been attacked and slightly bitten by rats. Next day the person who feeds the rabbits observed, upon entering the outhouse, that nearly all the inmates were congregated in one corner, and upon going to ascertain the cause, found one rat dead and another so much injured that it could scarcely run. Both rats were of an unusually large size, and their bodies were much mangled by the rabbits' teeth.

I never before knew that domestic rabbits would fight with any carnivorous antagonist. That wild rabbits never do so I infer from having several times seen ferrets turn out, from the most crowded burrow in a warren, young stoats and weasels not more than four inches long.

It is evident that the show-fight instinct cannot have been developed in Himalayan rabbits by means of natural selection, but it is no less evident that if it ever arose in wild rabbits it would be preserved and intensified by such means. And in this connection I should like to ask any of your readers who may be able to supply information upon the point, whether there is any difference between the hares of Great Britain and those of the Continent with regard to pugnacity. I have been assured by Germans that in their country a hare will fight a good-sized dog rather than run, and that it is dangerous to handle a wounded individual. I do not know, however, whether or not to trust these statements, and as there appear to be very few examples of local varieties of instincts, it is desirable that anyone who can should either confirm or deny this curious instance.

Dunskaith, Ross-shire

GEORGE J. ROMANES

OUR ASTRONOMICAL COLUMN

"35 CAMELOPARDI," B.A.C. 1924.—The principal component of this double star is not included either amongst the certain or suspected variables in Professor Schönfeld's last catalogue, but there would appear to be sufficient evidence of change to justify its being placed in the former class. Variability was suspected by the Baron Dembowski from his own estimates of magnitude 1865-