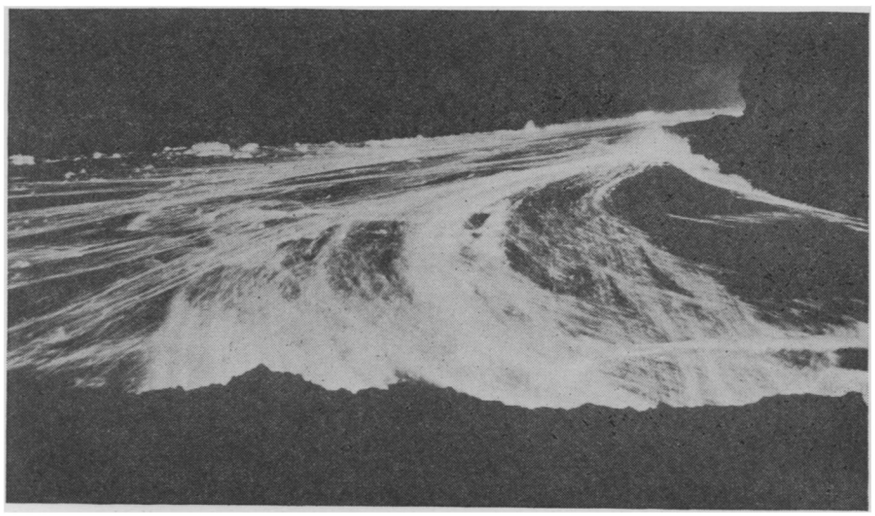


What the volcanologist sees at night: a river of darkness, overstreamed with ribbons of fire.

In the Cause of Science

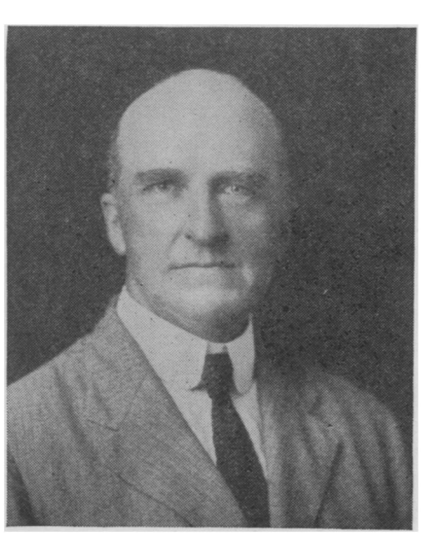
Volcano Watchers Brave Dragons' Breath

Volcanology

By Frank Thone

MYTH and saga of old time are full of tales of heroic mortals or demigods who braved the fuming, flaming breath of dragons to perform some epic deed—to recover a great treasure from its wrongful possessor, or to rescue a princess from dire peril. Perseus, Siegfried, St. George and many another stout-hearted paladin who feared not the most fearsome of all things—fire—hold well-merited places in the pantheon of youth.

Today, in this Twentieth Century of prosaic flivvers and plodding city-bound jobs, there has arisen a new generation of men who have no fear of dragons' breath. Unlike the heroes of old, who went forth with sword and lance for a single spectacular bout in the weird wilder-



Dr. T. A. Jaggar, pioneer American volcanologist, who has lived for seventeen years on the rim of Kilauea.

nesses where the monsters wound their ways, these new questors after the dragon treasure make their lives a continuous defiance. They leave the comfortable cities and go forth into the wilderness to stay for years, building their eyries high on the fire-flickering lips of the proudest and most terrible of all tellurian monsters—volcanoes. Impudently they cling there, making familiars of the Spirits of Air, Earth and Fire that attend these massive krakens, and of the strangely metamorphosed Water, usually Man's most comforting friend, but here become a veritable Djinn of mischief and menace. Puny in size by comparison, but with quick wit and immovable will, they make us think of the old tales of Thor and his friends among the giants of Jotunheim.

These dragon-defiers of the new times do not seek treasures, for volcanoes have neither gold nor gems. Such are kept by the cold mountains into whose entrails miners may gnaw without reproof. Neither do they seek damsels in distress—though often they bring their own wives with them to share their eyries, and to tend prosaic hearth and cooking fires within a long bowshot of the chimney-pots of the Inferno itself.

For volcano-watchers — volcanologists, they like to call themselves—make light of the perils of their trade, and declare that whoever knows his volcano is safer on the rim of its crater, or even down in its lava throat, than he would be on Broadway or Michigan Avenue. They give force and color to the age-old coolness of the Neapolitan and Sicilian peasants, who have for centuries tended vines and olive trees on the flanks of Vesuvius and Etna.

No, these unscareable watchers of the ways of fire-mountains seek neither gold-haired princesses nor gold-crammed treasure caskets. None the less, they are after romance and treasure—the romance and treasure of scientific research. To them the command that was given to our oldest ancestors, "possess the earth," carries with it the implicit obligation to understand the earth; for possession without understanding is a vain thing.

And it is at the burning heart of a volcano that much understanding of the earth may be sought that can not be gained in any other place. These hills that build themselves, adding a cubit to their stature in an hour, or blowing their heads off in a moment of petulance, present tales of the making of the earth in rapid dramatic paragraphs that he who runs may read—and he does sometimes have to run quickly, at that!

Other mountains are of slower birth and more deliberate mode of death, and generations of men may clamber over them and study them at leisure. They can be left alone

from season to season—even from century to century; but he who would read the riddles of the swift and titanic releases of energy within a volcano must be on the spot when the play begins. And since no man knows the day or the hour when a volcano may decide to speak, it behooves the ambitious volcanologist to spend even his hours of sleep where he can leap out of bed like a cosmic fireman, and be on duty as quickly as he can pull on his boots.

Such places, regularly established and equipped volcano observatories, are relatively few, for the business of watching volcanoes, unlike the related business of watching the weather, is a comparatively new science and has as yet not developed a large trained personnel. The United States has only one volcano station, in spite of the fact that this nation owns more active volcanoes than any other—mostly in Alaska and the Hawaiian Islands. Very fittingly, however, this observatory has been built on our biggest crater, which is also the biggest active crater in the world, Kilauea.

Our observatory on this holy mountain of the ancient Kanakas is called, simply and appropriately, Volcano House. Here Dr. Thomas A. Jaggar and his assistants spend their days and large parts of their nights, when they are not actually down in the bottom of the crater itself, holding witches' councils on the edge of the huge fire-pit of Halemaumau, where the real fiery activity of the volcano is centered.

Volcano House is a solid and substantial laboratory, such as you might find on the campus of almost any college or technical school. In it are housed the physical and chemical apparatus needed for the observation of the behavior of Kilauea and for the analysis of the breath of the goddess Pelé, who lives in Halemaumau Pit. Here Dr. Jaggar and his helpers conduct their studies with no more excitement—save at times of eruption—than if they were studying the behavior of the blast furnaces at Pittsburgh or Gary. When an eruption comes, they do without sleep for a while, for the fireworks are too gorgeous to miss for a minute, and new data are belched out of the mighty mouth of the pit so fast that cameras, notebooks and recording apparatus must be at work incessantly.

But as for danger—Dr. Jaggar just laughs. He established this observatory in 1911, he points out, and he has been there ever since, except for visits to other volcanoes, and he hasn't been killed yet. He is so little concerned about mischief from Kilauea that he has built his dwelling-house only a little distance downhill from his laboratory and installed his wife therein, so that he can walk home comfortably to dinner after work.

The Jaggars have neighbors, too; there is quite a little community on the side of Kilauea. The others are mostly interested in plantations. Kilauea, you see, is a rather flat sort of volcano. It does not have the high, towering cone we usually think of in connection with these fire-mountains. Although its summit is about 4,000 feet above sea level, its slopes radiate outward for some 30 miles, so that the upward climb is very gradual. It is the kind of volcano sometimes referred to as "shield-shaped."

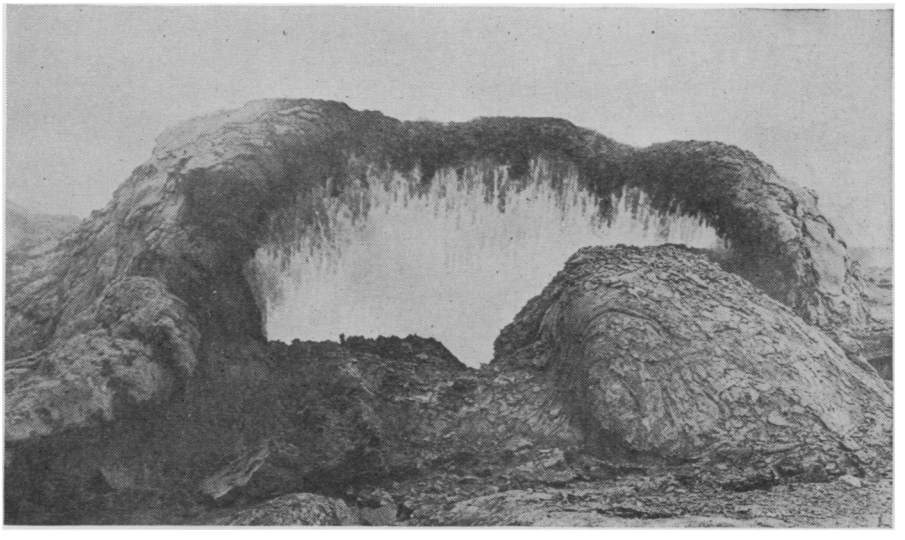
It is, moreover, a mild-mannered monster. It does not indulge in terrific explosions such as the one that smothered Pompeii and Herculaneum in 79 A. D., or the fearful outburst of Mt. Peleé that destroyed thousands of lives on Martinique in the opening years of the present century. It is a lava volcano, and when it has more energy than it can dissipate through the vent of Halemaumau, it pours forth its streams of molten rock through some secondary opening on its side. These sometimes devastate plantations, but they are so slow in their advance that there is plenty of time for people to get out of their way. So life on Kilauea is no more exciting than it is on Pike's Peak or the rim of the Grand Canyon.

But Dr. Jaggar was not the first of modern volcano observers. Volcanology as a science originated in Italy, where the name "volcano" itself originated centuries ago, when these smoking mountains were looked upon as the chimneys of Vulcan's subterranean blacksmith shop.

The most classic case of volcano study was that of the elder Pliny, who lingered on the scene during the destruction of Pompeii in his eagerness to observe the marvellous phenomenon, and paid with his life for his zeal after knowledge. His nephew, Pliny the Younger, has left a record of this first, and so far sole, martyr in the cause of volcanology.

It was therefore natural and proper that Italy's volcanological observatory should be erected on Vesuvius. The stone house, which might pass for a villa if it were on a less cindery hillside, could not be built at the exact summit. It stands some 2,000 feet lower down, and about a mile and half to the southwest of the crater's edge. A mountain-climbing electric line connects it with the city of Naples, the greatest human hive in Italy, for which this little building stands as a sort of sentry-box against the dragon coiled in uneasy and sometimes interrupted sleep under the mountain.

This, the pioneer volcano observatory of the world, is the only one that has been standing long enough to have had a succession of directors. Since the middle of the nineteenth century, when it was established, this dynasty (*Turn to page* 92)



Icicles of flame: a weird grotto formed within the crater of Kilauea, with dripping stalactites of lava.

Amateur Recognized

ANNOUNCEMENT has just been made by the University of Chicago that George Langford of Joliet has been appointed Research Associate in the department of anthropology. This is done in recognition of the work Mr. Langford has accomplished in Illinois archaeology.

In spite of the exacting demands made upon his time and energy by his position as superintendent of a large steel mill at Joliet, Mr. Langford has carried on extensive and systematic excavations in the Indian mounds of the Joliet district, and has accumulated one of the best scientific collections from the upper Mississippi valley. In the Fisher mounds near Shanahan he found three superimposed Indian cultures, terminating in a layer that contained articles of French colonial manufacture in its upper portion, thus linking the mound-builders with historic times. Other excavations which he has conducted throw further light on the sequence of ancient Indian cultures in the Illinois valley, which has always formed the main highway between the Great Lakes and the Mississippi river.

Recently Mr. Langford presented his entire collection of mound-builder cultural and skeletal remains to the University of Chicago, where it is now being installed for exhibition and study.

"Old grads" of Yale remember George Langford as the best man who ever pulled an oar for their university, and as an outstanding performer on the gridiron in the days when football was football.

Archæology
Science News-Letter, February 8, 1930

Volcano Watchers—*Continued*

of Italian watchers of the dragon has included L. Palmieri, who observed the great eruption of 1872; R. V. Matteucci, witness of the eruption of 1906; Giuseppe Mercalli, a scholarly priest; and the present incumbent, Alesandro Malladra.

The claim of volcanologists that theirs is a safe occupation receives paradoxical support in the tragic but ironic end which befell Father Mercalli, the only one of the group who did not die a natural death. After defying for years the unweighable thousands of tons seething fire in his volcano, he was burned to death in his own study, by a pint of oil from an overturned lamp!

His successor, Signor Malladra, was an active member of the observatory staff at the time of his chief's tragic death, and remained as acting director until two years ago, when he was given full charge of the work. Dr. Henry Washington, a leading American volcanologist, knows Signor Malladra well and has spent many hours climbing the shifting scoria slopes of Vesuvius with him.

The most recent recruits to the task of keeping vigil over dragons have been the Dutch. Uncle Sam owns a lot of volcanoes, but most of them, like those in Alaska, are in uninhabited wilderness; so studying them is as "pure" a science as can be found in these days when even abstruse things like relativity are being put to practical use. But the volcanoes that are the unruly property of Her Gracious Majesty Queen Wilhelmina are located in one of the most densely populated and most richly productive regions in the world, and keeping watch over them is not only a matter of scientific interest but one of good hard guelders.

If you will look at a map of the Dutch East Indies, where the real wealth of Holland lies, you will see that Sumatra, Java, and the long line of smaller islands that trail off to the eastward, are really one continuous but partially submerged mountain range. The peaks that knot that range, like vertebrae in the backbone of an immense saurian skeleton, are almost all of them volcanoes, and there are many more volcanoes in Celebes, Dutch Borneo and other Dutch islands there in that corner between the Indian and Pacific oceans.

Hence the intense interest now displayed by the government in the development of volcanology in Java. With headquarters at the town of Bandung, under the shadow of three large volcanoes, the volcanological service has established a chain of seven observatories to watch seven other fire-mountains. Their names sometimes ring like the silver-bronze gongs of a Javanese orchestra, sometimes crash harshly like the dragon-voices of the mountains; Kawah Kamodjang, Kawah Idjen, Kelut, Merapi, Papandajan, Tankuban Prahoe, Krakatau.

Krakatau is a champion "bad volcano" of the East Indies. In 1883 this volcano simply blew itself and the small island on which it stood into bits, and snuffed out the lives of over 36,000 people. With the exception of the explosion of Tambora in the Sunda Islands in 1815, which killed 56,000, this was the worst eruption in history.

Papandajan, Kelut and Galungung are other "bad actors" among Javanese volcanoes, each with death-lists running into the thousands chalked up against it, though each has had but one major eruption during historic time. Merapi is responsible for fewer deaths, but has had three fatal eruptions in a little over a century; it is regarded as potentially very dangerous.

So the watching of the dragon goes. The little group of modern Siegfrieds will increase as time goes on. It will increase rapidly where governments realize, as the Dutch have, that there is something economic as well as "just scientific" to this business of sitting on a crater and watching the lava boil, and counting the landslides that tumble into it, and going down and measuring infernal temperatures and catching flasks of mephitic gases for analysis. In the end, we may be able to predict volcanic eruptions as we now predict storms and as we hope before long to predict earthquakes.

Science News-Letter, February 8, 1930

The Pennsylvania State College has developed a correspondence course in "Elements of Mechanical Flight."

A Dane who is serving a term for larceny in a New York State prison has almost completed a Cornell correspondence course in poultry breeding, his lowest mark on a lesson being 99.