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THE EARTHQUAKE IN CENTRAL ITALY.

THE earthquake of January 13 was by no means one of the first order of magnitude, but it was the most destructive of which we possess any record. In Avezzano, which formerly contained 11,000 inhabitants, the death-rate amounts to 90 per cent., while it rises still higher in some of the adjoining villages, in Cese to 94 per cent., and in Lapelle to 97 per cent. Before this, the highest known death-rate was 81 per cent. at Avendita during the Norcian earthquake of 1703. There can be little doubt that the disastrous character of this earthquake was as usual due to the faulty construction of the houses, which consisted of stones with little or no binding of cement. Partly, also, it was due to the comparative immunity of the central district from great earthquakes in the past, which has allowed such buildings to survive.

Few details of scientific value have as yet reached this country. The earthquake occurred at 7.53 a.m. (or 6.53, Greenwich mean time). At Rome, it lasted from 15 to 20 seconds. Near the epicentre, there was one shock of great violence, followed by three others. In other neighbouring places, two prolonged shocks were felt. The principal epicentre was no doubt close to Avezzano, probably within five miles of that town. It was in this district that the high death-rates occurred. There was apparently, however, a secondary epicentre including Sora, where 500 persons lost their lives, and Isola Liri; and it is

possible that the double shock noticed at some places was due to impulses in two corresponding foci, about twenty or twenty-five miles apart. The area of perceptible damage to buildings extends almost across the peninsula, from Rome on the west to Chieti on the east, these places being 110 miles apart. Towards the north, the shock was felt at Ancona, Perugia, and Grosseto, and, towards the south, at Naples and Potenza; that is, over an area roughly 300 miles long, 240 miles wide, and containing about 56,000 square miles. The shock was recorded at many distant observatories, including those in this country and at Washington. The after-shocks must have been very numerous in the epicentral area. More than 120 were registered at Rome during the first two days, all of them slight, with the exception of one at 8.14 a.m. on January 14.

Earthquakes are neither frequent nor severe in the district chiefly affected. Dr. Baratta, in his "I terremoti d'Italia," defines in it two distinct seismic zones, one including Sora and Isola Liri, the other, less important in the past, extending from Avezzano to Anticoli. To the former zone belong the strong earthquakes of August 19, 1777, and May 9, 1891; and, to the latter, the earthquake of April 10, 1885. The recent shock must have been far stronger than any of these earthquakes, and, as pointed out above, it seems to have consisted of almost simultaneous impulses in both the Avezzano and Sora centres.

C. DAVISON.

VICE-ADMIRAL SIR GEORGE NARES, K.C.B., F.R.S.

BORN at Aberdeen in 1831, G. S. Nares entered the Navy on board H.M.S. *Canopus*, an old battleship captured from the French, in 1845, and was transferred to the *Havannah*, a frigate for service in the Pacific, in 1847. He passed his examination for lieutenant in 1851, and, coming home shortly afterwards, was appointed to the *Resolute*, and sent to the Arctic in the expedition under Captain Sir E. Belcher in search of the Franklin Expedition. His service up to the time he was a lieutenant was entirely in sailing vessels, the motive power of which was the wind applied to the propulsion of vessels by masts, yards, and sails, and this early training made him a thorough master of managing vessels in all circumstances of wind and weather, and although during his service after returning from the Arctic in 1854 he was employed in vessels that were furnished with auxiliary steam power, he was always pleased when he could navigate his vessel under sail alone. One instance of this may be given. When at Malta in the *Newport* in 1869 the chief engineer of that vessel, who was anxious not to go to sea on the day named because he wanted to attend some function on shore with his wife, asked to be given forty-eight hours to take off the cylinder covers, Captain Nares, as he then was, replied: "By all means." The chief engineer was jubilant,

but on the day originally named, after the usual morning muster by division, the order was given "Hands make sail," and the ship sailed out of the harbour, much to the chagrin of the engineer staff. This was a good lesson given with tact and judgment.

During his service in the *Resolute* he took part in the sledge journeys in search of any remains of Franklin. It is not generally known that Arctic sledging was introduced in order to search all the coasts which could not be reached by the vessels for any token of the Franklin Expedition. The ice near the coast is, as a rule, comparatively smooth, consisting of new ice found on the surface between the grounded bergs and the shore line, and this ice is less difficult to travel over than the hummocky ice found in areas off the shore where floes get piled up one on the other from various causes, consequently the sledge parties were able to cover long tracts and to delineate the coast line of numerous islands and straits.

Returning from the Arctic in 1854 he was promoted to lieutenant on October 21, and was sent to one of the armour-plated bombs, constructed specially for the war, 1854-6, for service in the Mediterranean.

From the Mediterranean Nares was transferred to the training-ship for naval cadets, then recently established (1) in the *Illustrious*, and (2) in the *Britannia*, and whilst so serving compiled "The Naval Cadet's Guide and Seaman's Companion." Promoted to commander at the end of 1862 he served in the *Boscawen*, another training-ship, and was then sent to a paddle-wheel vessel, the *Salamander*, engaged in keeping open communication with a party of marines established at Cape York. In his voyages backwards and forwards between Sydney and Cape York he did some useful surveying work and on his return to England in 1867 was selected for the command of the *Newport*, a vessel commissioned for surveying service in the Mediterranean. The opening of the Suez Canal in 1869 necessitated a survey of the Gulf of Suez, and the *Newport* was selected for this service, and was engaged in it during the winter of 1870-71, but in May, 1871, she was sent to England, and her officers and crew turned over to the *Sheerwater*, which vessel, under Nares, proceeded to the Gulf of Suez in the autumn of 1871, and completed the survey from Suez to Koseir by April, 1872.

On the voyage out the *Sheerwater* was instructed to investigate the Gibraltar Strait current, and Dr. W. B. Carpenter embarked on board to assist in that investigation on behalf of the Royal Society. The work was so well done as to mark out Nares for other scientific work, and when, early in 1872, the Admiralty decided to commission a vessel for exploration of the oceanic basins of the world, Nares was chosen to command the ship, and was ordered home to prepare the *Challenger* for her voyage. Leaving England in December, 1872, the *Challenger* executed a series of sections across the Atlantic, and it was then that the system of sections showing the temperature of the

ocean from the surface to the bottom was first introduced. Before that time the temperatures were merely plotted in curves. This system of sections gradually revealed the fact that over certain areas the temperature at the bottom remained the same, but that in other areas, adjacent to the first area, the bottom temperature differed, although remaining constant over another considerable space. From this fact it seemed likely that in areas where at equal depths the temperature at the bottom differed in areas adjacent to each other, the difference was caused by a submarine ridge which prevented free circulation. Thus it was known that whilst the Mediterranean had a uniform temperature of from 55° to 56° below a depth of 100 fathoms, the water of the Atlantic adjacent to the Mediterranean decreased in temperature gradually to 36°. The soundings in Gibraltar Strait, just outside the entrance between Cape Spartel and the Spanish coast, revealed the existence of a submarine ridge, and it was then considered probable that in all areas differing much in temperature at equal depths the difference could only be accounted for by the existence of submarine ridges.

The *Challenger* reached the Cape of Good Hope in November, 1873, and in December left for Kerguelen Island to examine a suitable spot for observing the transit of Venus in 1874. This necessitated a triangulation of Kerguelen and a determination of its position. Three weeks were occupied in the work, and records were deposited in cairns to inform the transit of Venus party of the spots considered suitable for the observations. Leaving Kerguelen at the end of January, the *Challenger* then proceeded to the southward as far as the Antarctic Circle to investigate temperatures and depths, and during that cruise, all on board had an opportunity of appreciating the skill of Captain Nares in handling his vessel amongst the icebergs. Gales and snowstorms were not infrequent, and Captain Nares, after consideration, adopted the plan of keeping close to a berg under steam, during night, or in mist or snowstorms, and thus preventing the vessel drifting or sailing into danger. Arriving in Melbourne in March, 1874, and at Sydney in April, the ship was docked and re-fitted, and it was curious to observe how the copper on the bottom was quite corrugated from the strains encountered during the southern voyage. From Sydney the *Challenger* took other oceanic sections across the southern part of the Western Pacific, from Sydney to Wellington, N.Z., from Wellington to the Fiji Islands, and from the Fiji Islands to Raine Island, Australia. From Raine Island the vessel proceeded through the Arafura Sea, the Banda Sea, the Sulu Sea, and the China Sea to Hong Kong, at which port she arrived in November, 1874. On this voyage it was again noticed that the area of some parts of the Sulu Sea differed greatly in temperature at the bottom from the adjacent seas. At Hong Kong Captain Nares was recalled to England to take command of an expedition about to be organised for Arctic research.

That expedition consisted of two vessels, the *Alert* and *Discovery*, and its primary object was to reach, if possible, the North Pole. Leaving England in the summer of 1875, the vessels proceeded through Davis Strait to Smith Sound, where a secure harbour was found in which to moor the *Discovery*, to form a base of retreat, whilst the *Alert* pushed northward as far as was possible. The ice in the northern part of Smith Sound presented unexpected obstacles, and subsequent observations showed that the polar basin northward of Smith Sound produced masses of icebergs and floes which, being drifted against the coast, were piled one on the top of the other and closed all navigation excepting between the coast and the ice grounded near it. Here, again, the skill of Captain Nares guided the vessel into a fairly secure position between the coast and the grounded ice, a position which it would have been unsafe to take excepting for the *Discovery* left in a secure harbour as a base to fall back on. The winter of 1875-6 was spent in organising sledge parties, one of which, under Commander Markham, was to get as far northwards as possible, one under Lieutenant Pelham Aldrich was to proceed along the coast line in a north-westerly direction, and the third, under Lieutenant Beaumont, was to cross Smith Sound and proceed northward along the Greenland coast. The expeditions along the coast line were successful, as there the ice offered comparatively little obstruction to sledge work, but the rough, hummocky ice encountered by the party under Commander Markham proved to be of such a nature that progress to the northward was very slow and difficult, and the hardships which his party underwent can scarcely be exaggerated.

The sledge parties returning to the vessels towards the end of the summer, Captain Nares decided that it was useless trying to reach the pole from Smith's Sound, and proceeded homewards. The manner in which the *Alert* was extricated from her perilous position and brought safely to England with the *Discovery* was a feat of seamanship any man might be proud of.

After his return from the Arctic Captain Nares was made K.C.B., in recognition of his services, and in 1878 was again given command of the *Alert* to prosecute surveying work in Magellan Strait, but was recalled from that ship in 1879 to act as Marine Adviser to the Board of Trade. This appointment he held for about twenty years. During his retirement, like many another sailor, he took up gardening and was very successful in growing roses.

He died on January 15 and was buried at Long Ditton Church on January 19. The funeral was attended by Captain J. F. Parry, R.N., the hydrographer, who represented the Admiralty, and by several naval officers, most of whom received their first instruction in seamanship from him on board H.M.S. *Britannia*, and many of whom were associated with him in his Arctic Expedition or in the *Challenger* exploring expeditions.

NO. 2360, VOL. 94]

NOTES.

THE Executive Committee of the proposed Meteorological Conference at Edinburgh has handed over to the Scottish Meteorological Society the balance of the funds subscribed for the expenses of the meeting with the hope that when the opportunity once more arises the society will take the initiative in carrying the project into execution. It has been decided that the committees in London and Edinburgh shall be kept in being.

WE learn from *Science* that Prof. J. H. Pettit, professor of soil fertility in the college of agriculture and chief of soil fertility in the experiment station of the University of Illinois, died on December 30 at Pasadena, California; and that Prof. S. B. Christy, professor of mining and metallurgy in the University of California and dean of the college of mining, died in Berkeley, California, on November 30, 1914, at the age of sixty-one years.

PROF. GEORGE FORBES, who has been entrusted by Lady Gill with the duty of preparing a memoir of her late husband, asks us to announce that he would be glad to be favoured with any letters which have been preserved by Sir David Gill's numerous correspondents; and would greatly appreciate any notes—narrative, historical, appreciative, or anecdotal—relating to Sir David's life and personality. All original letters or other documents will be carefully preserved, and returned to the senders at as early a date as possible. Such communications should be addressed to Prof. Forbes at 11 Little College Street, Westminster.

OWING to the war, the fifth International Congress of Philosophy, arranged to be held in London next September, has been abandoned. The General Organising Committee has expressed an earnest hope that the confederacy of the entire philosophical world, which has subsisted since the inauguration of the series of congresses in 1900, and seemed to have attained the rank of a permanent institution, will not be set aside for a longer time than outward circumstances render absolutely imperative. The committee has pledged itself as soon as possible after peace is restored to promote the continuance of this international bond, either by renewing the invitation to meet in this country or by obtaining an invitation from a neutral country.

A REUTER message from New York states that at a dinner given on January 14 at the Aero Club of America, Government officials announced a plan of the Post Office Department to introduce into the postal service 2000 airmen, who would carry sacks of first-class mails. The routes have already been selected by the Department, and it is hoped that the Bill authorising this scheme of aerial transportation of mails will pass next Congress. It may be recalled that, with the sanction of the Postmaster-General, an aerial postal service, for the idea and organisation of which Mr. D. Lewis Poole was chiefly responsible, was carried out successfully between Hendon and Windsor on September 9, 1911, that is, in Coronation year. A sack of letters was conveyed between these