

quake that destroyed the Minoan city of Akrotiri, on Thera, occurred long enough before the eruption—to allow people to return and attempt some initial clearance (C. Doumas, Thera). The eruption itself clearly started with an ash-fall of ~1–2 m thick over the city and was preceded by a very fine pumice fall, only some 1–2 cm thick, which may have been sufficient warning for those clearing the site. The main pumice, however, seems to have been in the form of a base surge, followed by a chaotic ash-flow stage during which large volcanic bombs continued to be spouted out of the volcano. There were clearly no distinct *nuée ardente* deposits, although some pumice debris on wall frescoes has been used to determine the direction of flow of these glowing dust clouds (P. Hédervari, Budapest). One of the most puzzling observations was that preliminary palaeomagnetic data indicated that the walls of the Minoan city had not even been warmed by the volcanic debris and that both the ash-fall, base-surge and ash-flow deposits seemed to have been emplaced very close to room temperature (D. H. Tarling, Newcastle), thereby indicating mud-flow origin (A. Bond & R. S. J. Sparks, *J. Geol. Soc.*, 132, 1; 1976) at ambient temperatures. Whatever the origin, there was clear agreement that these deposits were all accumulated in a very short time so that the interval between the Thera eruption and the end of the Cretan thalocracy could not be interpreted in terms of a succession of eruptions spread over, for example, 50 years. There was also surprising agreement on the improbability of the pumice ash, that undoubtedly fell on eastern Crete (F. W. McCoy, Columbia), having any great effect on the harvest for that or subsequent years unless the pumice also included poisonous gases, such as fluorine (D. Vitaliano, Indiana). It was even suggested that the thin ash-fall, at most 5 cm thick, could have been beneficial.

The effects of tsunami (I. Yokoyama, Hokkaido), associated with either the earthquake or volcanic eruptions, received surprisingly little direct attention. In general, most earth scientists were mainly concerned with establishing that any tsunami would not have affected ships at sea and any effects would be restricted to the damage of ships at anchor and harbour installations. There is little evidence for harbours along northern Crete at that time (N. C. Fleming, Godalming)—an observation which received little comment yet must have important implications for the idea of a thalocracy governed from Crete. The only solution seems to be that the catastrophic series of events had such a psychological im-

pact that any religious-based administrative system would have collapsed. Nonetheless, such a disintegration would still be expected in late Minoan IA times and not up to 50 years later. The <sup>14</sup>C dating of both short-lived materials (grain, shrubs, burnt bone for example) and long-lived materials has raised more problems than it has solved (P. Betancourt, M. Biddle & E. Ralph, Philadelphia). Unlike most other sites, both types of material show an extraordinary range in values, with 70% of the ages for both types of material more than one standard deviation older than the expected 1500–1400 BC date—an age which is known from the good correlations between the precise Egyptian chronology and Minoan pottery styles on Crete. Although the Congress was only presented with the carbon dates, it seems that the only sensible interpretation is that the region of Akrotiri was completely abnormal for well before the earthquake which was to destroy it. It seems unlikely that the <sup>14</sup>C dates have been affected by later contamination as most of the materials were well sealed with the archaeological deposits, so the most likely, but still imponderable, explanation is that the vegetation in the area was accumulating varying degrees of old carbon in its structure whilst growing. The processes by which this occurred are unclear, as any volcanic gas emanations would rapidly mix with the atmosphere and clearly much more detailed study is required to establish how such a situation may arise as it is clear that the normal assumptions on which <sup>14</sup>C is based do not seem to be valid here and must raise doubts as to their validity in other situations, until the cause of the internal scatter in the Akrotiri materials can be satisfactorily explained.

The archaeological basis for a difference in age between the Thera eruption and the Minoan decline has changed little. In general, most archaeological and historic studies confirm that there was a real time-gap between the Late Minoan IA pottery motifs found in Thera and those extant in the Late Minoan IB period in Crete at the time of the takeover by the Mycenaeans (S. Hood, Oxford; A. Furumark, Uppsala). The evidence suggests that the takeover was not a deliberate invasion but that a Mycenaean exploratory fleet came across a Minoan Empire that was in complete disarray for unclear reasons.

To some extent, therefore, Earth scientists have provided a somewhat more uniform picture of the sequence of events during the Thera earthquake and eruption, but such models are still likely to be drastically modified if archaeological evidence can be ob-

tained for a revision of the relationship between several earthquake events during the period 1500–1400 BC and the volcanic eruption. It will be surprising, however, if such a major series of tectonic events should not be directly related to the otherwise puzzling, rapid decline of the Minoan civilisation at a similar time. □



### A hundred years ago

AMONG the resolutions passed by the International Congress on Weights, Measures, and Coins, at Paris, was the following:—The Congress learns with pleasure the progress of the metric system; it deplores that England, Russia, and the United States have not yet entered into the same path; and it is of opinion that the Governments of those countries should be solicited to give effect as early as possible to an act of progress so eminently useful to science, commerce, and international relations." The British and American members had a separate meeting, and resolved to petition their respective Governments to appoint a mixed commission to consider adoption of the metric system by both countries, and to make all necessary recommendations for the proper legislation to secure the desired end.

I AM able to confirm the accounts given by Mr. Simson in your last number as to the probability of the hearing of insects. When travelling on the River Magdalena, New Granada, in 1861, the mode of which is by a long boat, arched over with bamboo, on which the sailors (bogas) passing from one extremity to the other, propel it with long poles, hugging the river bank, accompanied with wild cries and execrations, I observed on several occasions that these cries suddenly ceased, a dead silence following, and on inquiring the cause they pointed to nests high up in the trees, whispering the word *vispa* (wasp). As the bogas pursue their avocations in a state of semi-nudity, they have the greatest dread of these insects, fearing to speak aloud, as their only alternative if attacked by them is to plunge into the stream, where alligators abound. The wasp is long, slender, and black in colour.

From *Nature* 18, 26 September, 576; 1878.