

tional advantages of operating from an airship is that under favourable conditions the shadow of the vessel appears on the photographs (Fig. 1), thus providing a control over the orientation and scale of the map.

As an example of what can be accomplished by airship survey, we reproduce the map (Fig. 2) of a part of south-eastern Novaya Zemlya showing the coastal region and the inland ice. The

map is on the scale of 1/200,000 with contours at 100 m. intervals, and the errors in scale and height are stated not to exceed 10 per cent—probably not 5 per cent. The latitude and longitude may be as much as 1° out, and to correct this it would be necessary to determine by astronomical methods on the ground the true position of some point identifiable on the photographs, or to extend these to include some known point. L. H.

Obituary

SIR DORABJI TATA

IN the memorial to his wife which he settled shortly before his death on June 4, Sir Dorabji Tata described himself as "The Last of his House". That is painfully true; with his passing an end comes to a family which played a great part in the intellectual and industrial renaissance of India.

Dorab Tata's rôle in this was that of the executor rather than the creator. The pioneering was done by his father, Jamsetji Tata. Having founded the family fortune firmly by establishing a prosperous cotton-spinning business, he bent his adventurous talents to three great enterprises—the establishment of an Institute of Science to prepare Indians for the direction of modern large-scale industries; the construction of iron and steel works as an essential link in the economic cycle; and the harnessing of the prolific rainfall of the Western Ghats to electric power stations to relieve the dependence of Bombay on far-distant coal-fields. But he died before any had reached the final stage; on the contrary, the freedom with which he spent on the development work rather seriously 'locked up' the family resources.

At this stage Dorab Tata took control of the business. With the active sympathy of his brother, the late Sir Ratan Tata, he set himself the filial task of completing his father's work. After many discouragements, thanks to the co-operation of Lord Curzon and the Government of India, the Institute of Science was established at Bangalore. Thence a steady stream of well-trained Indians has passed into the service of Indian industry. Unfortunately, Bangalore, though admirably suited climatically, is so far from the industrial centres that its activities do not command the interest and support which they should receive; but the work goes on.

The history of the Iron and Steel Works at Jamshedpur reads like a romance. The dogged tenacity with which Dorab Tata and his expert advisers searched the Central Provinces for ore surprised even his closest friends; for he was born to easy days. When their patience was rewarded by the discovery of a hill of iron ore of the finest quality at Gurumashini, the quest for capital was as baffling as that for "The Golden Girl". British enterprise does not come well out of the test. Though the existence of the requisite materials was established beyond doubt, and the home market justified the establishment of large-scale manufacture, British capital was timid and exacting, and

no progress was possible. Fortunately, on the crest of the *swadeshi* wave India took this opportunity to itself and subscribed the money with an ease which surprised everyone; but equipment and operation were American and German when the British industrialist and financier missed their opportunity.

The same wave of constructive enthusiasm launched the hydro-electric works with Indian capital. Though the three associated companies—the Tata Hydro-Electric, the Andhra Valley, and the Tata Power—are capable of delivering electrical energy in Bombay far beyond the capacity for absorption, the heavy capital cost, especially during construction, has not given industry the cheap power which it demanded.

Here Dorab Tata himself would have been glad to call a halt. He was a rather reluctant partner in the manifold activities into which his house launched, and which brought anxious days when the post-War reaction set in. But he rose to the occasion and placed his private fortune behind the Iron and Steel Company when the dark days came, and, backed by the indomitable courage of his cousin, the late Mr. R. D. Tata, weathered the storm.

The qualities which Dorab Tata brought to this work were those of tenacity rather than of originating power, and a fine financial integrity. He was always willing to pay for brains, even extravagantly if he got the best. His monument is the Institute of Science, with its encouragement of pure industrial research, and the iron and steel industry, with linked enterprises, which has created a hive of industry in the virgin forests of Chota Nagpur. The contribution of his house to the renaissance of India is the recognition of the indispensability of science to modern industry, and the patriotic vision which looked beyond 'penny-in-the-slot' enterprise to the foundation of key industries, which though expensive are essential to the economic cycle.

STANLEY REED.

DR. B. A. BEHREND

DR. BERNARD ARTHUR BEHREND died on March 25 this year, in Wellesley Hills, Mass., at fifty-six years of age; and a correspondent who knew him intimately has sent us the following appreciation of his life and work, to supplement the many memoirs which have appeared in our engineering contemporaries.

Behrend was a man of the widest interests, and