

The Progress of Hittite Studies—I.<sup>1</sup>

By Prof. J. GARSTANG.

THE remarkable development in Hittite studies, which the circumstances of the War tended to obscure, now merits the attention of all students of history. This progress is due not so much to the results of excavations or further exploration, interesting though these be, as to the decipherment of an important section of the Hittite archives from Boghaz-Keui which opens the doors to more than one library of contemporary documents. The clue was found and established on an Indo-European basis, by Prof. Hrozný of Prague in the early years of the War. Since then a circle of eminent German philologists (amongst whom may be mentioned Drs. Weber, Forrer, Weidner, Figulla, Götze, as well as Profs. Friedrich, Sommer, Zimmern, and others) has placed the new study on a scientific basis by the continuous publication of texts and transcriptions no less than by philological and critical discussion. A new light plays upon Asia Minor under the Hittite kings.

It is both interesting and instructive to look back at the origins of the subject. The Hittites have long been known, from the numerous references in Biblical literature, either as scattered settlers in Palestine or as military peoples in the north of Syria. The latter impression was confirmed, from the time when Egyptian hieroglyphs came to be understood, by scenes and inscriptions on Egyptian temple walls depicting the conflicts of the Pharaohs with this war-like rival, whom they encountered in Syria and called Ḫ-t-3. Two generations ago Dr. Wright hypothesised that certain unexplained hieroglyphic inscriptions found at Hamath and elsewhere in northern Syria must pertain to the same peoples. French scholars and others adopted the idea, and it was recognised that the distribution of such inscriptions was not confined to Syria; but that ruined cities, religious sculptures, and numerous groups of pre-Hellenic monuments bore witness to the same culture-influence in Asia Minor itself. Then Prof. Sayce, who lives to see the verification of his far-sighted conclusions, after examining and comparing certain inscribed sculptures on the western coast near Ephesus, constructed his theory of a long-forgotten Empire of the Hittites, whose kings held dominion over Asia Minor and played their part in oriental history so long before the fall of Troy that their memory scarcely survives in Homeric legend. It was these kings who descended from beyond Taurus and battled with the Pharaohs in the fourteenth and thirteenth centuries B.C.

A theory so comprehensive, albeit plausible, was naturally followed by a period of reactive scepticism and investigation. It suggested, none the less, the lines of practical research. British explorers and scholars, notably Ramsay, Hogarth, Anderson, and others, joined in the quest: new materials were found and cautiously examined.

Early in this century English and American universities (Liverpool, Cornell, and Princeton) organised expeditions to collate materials and collect new data. Asia Minor being diplomatically closed, excavations were undertaken by the Liverpool institute and by the British Museum at promising sites in northern Syria.

Meanwhile the German Orient Society had received permission to excavate among the remains of the largest ruined city of pre-Hellenic character in Asia Minor, at Boghaz-Keui, a small village in the north-east of the plateau within the circuit of the Halys River; and there Dr. Winckler, early in the work, had the fortune to discover hundreds of fragments of inscribed clay tablets, numbers of which were in Semitic and could be read. They contained names of Hittite kings and places (some of which could be recognised), names of Syrian princes known from Egyptian sources, records of campaigns and negotiations in Mesopotamia and in Syria; and, most important for history, the names of contemporary Egyptian rulers. Being present at the time, the present writer was courteously permitted to investigate the circumstances of the discovery, and shared in Dr. Winckler's anticipations. It was clear that these tablets contained imperial archives; their presence seemed to fix the royal palace there where they were found, and this was soon confirmed. The Hittite capital was called Ḫattušaš, the homeland Ḫatti. The latter was clearly the counterpart of the Egyptian Ḫ-t-3. Not only was the Hittite Empire a reality, but the Hittite kings emerged into the full light of history, claiming their part in the contemporary events of near Asia. There remained an apparently inexhaustible supply of documents to be scrutinised, but a great proportion was found to be unintelligible though written in cuneiform script. Dr. Winckler was able, however, to publish before his death a number of the Semitic texts, chiefly concerning affairs in Syria, some of them narrating events of which parallel accounts existed from the Egyptian sources, including references to and a draft of the treaty with Rameses II. Hittite studies stood at that stage when last reviewed at the Royal Institution under the same title nineteen years ago.

It now appears from various sources that about 20,000 tablet fragments were recovered, for further discoveries were made in the next year of work. From these some 700 documents have been reconstructed and about 260 have been published. Analysis shows that, apart from the Semitic texts, six 'native' languages are involved, and of these only one, which we may call for the present 'official Hittite,' can be translated with certainty. This language is called by some Kaneshic. It forms all kinds of words by suffixes, and three-quarters of its grammatical forms are to be found in Indo-European languages in the same sense. It is safe to premise at any rate a common even though

<sup>1</sup> Summary of three lectures delivered at the Royal Institution on Feb. 24, Mar. 3 and 10, 1927.

remote parentage (Proto-Indo-European). Hittite names, on the other hand, are prefixing, and analogy is to be sought rather in the Caucasus. In Mesopotamia, again, the Mitannian rulers' language was seemingly Aryan with Sanscrit affinities, differing from the common language of the area, which also has Caucasian elements.

The difficulty of language was evidently felt by the archivists of the time, for glossaries were compiled for the translation of unfamiliar expressions, and some documents were set out in parallel bilingual columns. The tablets were in fact the contents of royal libraries of the thirteenth century B.C., and many of them are copies of older documents that had been damaged. They cover a vast range of subjects, from imperial affairs to domestic detail. Treatises on non-political matters were so numerous as to call for a proper inventory or catalogue by the names of authors (both male and female). Among the state documents or copies of them, those of most immediate interest historically include foreign correspondence with Egypt and with Babylonia, correspondence and treaties with the Amorite chieftains of Syria and the smaller states to the north (Aleppo, Nukhašše, Barga, Carchemish, etc.); treaties with a Mesopotamian (Mitannian) prince, as well as private letters between the members of the various royal families. Happily for us to-day, a historical instinct pervaded the foreign office of the time, so that many treaties contain preambles setting forth in chronological sequence the outline of events and past relations between the contracting states or princes down to the framing of the new agreement. These prefaces contain names of old-time kings and places, records of campaigns and rebellions and former treaties. They can be checked in some cases by the prefaces to earlier or later treaties, and occasionally by allusions in documents relating to other states. They are new materials for history; and it is already possible to reconstruct and trace in outline the development of the imperial organisation, in which diplomacy and military genius play a leading part.

The earliest references to Hatti occur in the

Babylonian records of Sargon and Naram-Sin of Agade, which take us back before the middle of the third millennium B.C. It would appear that Hatti was at that time one of the leading tribal areas of Asia Minor. After an interval which can only be approximated at about 500 years, the Hittite archives indicate a period of struggle for the over-lordship of Asia Minor: the first Great-King whose dominion reached to "the sea" and included Hatti, resided at Kuššar. Thereafter there is record of some forty-nine Hattic rulers, whose reigns cover approximately the thousand years ending with 1200 B.C. An important synchronism is found in the annals of an early King Mursil, who claims to have captured Aleppo and Babylon, and it is confirmed by the Babylonian records that this invasion brought the first Babylonian dynasty (that of Hammarabi) to an end. Unfortunately, the date of this event is not agreed on by Babylonian scholars, being variously estimated as between 1950 B.C. and 1750 B.C. Further study of the Hittite archives may help to settle that point and others connected with the Hyksos period.

When first Hatti became dominant among the Hittite tribes of Asia Minor, their kings continued, it would appear, to reside at Kuššar, but from the epoch of the sack of Babylon the capital is found fixed at Hattušaš, and so continued with possible political interruptions until the end. Aleppo claimed great power and temporary independence a century or so later, a date which may have fallen within the Hyksos period. From about 1470 B.C. onwards the records of the Hatti dynasty are continuous, comprising twelve consecutive reigns, some of which are described with instructive detail. Relations direct or indirect with Egypt under the eighteenth dynasty, particularly the penetration of Subbiluliuma into Syria (period of the Amarna letters), the battle between Mutalliš and Rameses II., and the treaty of Hattušil III. with the same Pharaoh, give a series of fixed chronological positions on which the framework of international events can be constructed.

(To be continued.)

## Wave Mechanics and Classical Mechanics and Electrodynamics.

By Prof. G. A. SCHOTT, F.R.S.

RECENT articles in this journal by Mr. R. H. Fowler, Prof. M. Born, and Dr. P. Jordan have dealt with the relation between Schrödinger's wave mechanics and the quantum theory, but it is admitted that they scarcely express the views of Schrödinger himself or those of his predecessor, L. de Broglie. The object of the present article is to give an account of the researches of these two authors from the viewpoint of classical mechanics and electrodynamics, to which they are closely related, both in subject-matter and method. A brief bibliography of their papers, as well as a few by other writers on the same subject, is appended, to which the reader is referred for details, for an

outline only of the line of thought can be given in the present article.

The root of these researches is to be found in the papers of Sir W. R. Hamilton, published a century ago, in which he pointed out the close analogy subsisting between Fermat's Principle of Least Time in optics and Maupertuis' Principle of Least Action in dynamics. Just as Fermat's Principle enables us to trace the paths of light rays with considerable accuracy when the linear dimensions of our apertures and obstacles are large compared with the wave-length of light, but fails when they are so small that diffraction becomes important, so Maupertuis' Principle enables us to predict the