tical shaped implement, toothed around its whole exterior), and a few worked flakes. Fragments of clay vases of various shapes and sizes abounded, many of them having a 'herring-bone' pattern of ornament incised upon them. All of these objects evidently belong to the neolithic period; and the monument itself resembles a sort of combination of the dolmen and the sepulchral grotto.

But a novelty among neolithic interments seems to have been discovered at Folha das Barradas, a short distance to the north-east. This is excavated in the natural soil, a white limestone and green marl, and has almost the shape of a covered alley, twelve yards long, extending east and west. The circular chamber at the west was divided by pieces of thin flagstone into partitions intended to contain human remains, of which as many as twelve were found, but in so bad a condition as to be useless for study.

Accompanying the remains were a flint poniard, two very fine lance-points of unusual size, and seven large knives; also a long cylindrical stone 'war-club,' similar to those previously described, but more handsomely ornamented, and two of the 'badges of authority.' A flat pendant, like those already spoken of, and fragments of a few rude clay vases, completed the funeral furniture. But it should be noted, that both in this sepulchre, and the one last described, there was found a large number of the same kind of rolled pebbles as those which occur so conspicuously in the covered alley of Monte Abrahão.

In concluding this brief account of Signor Ribeiro's interesting researches, we can only express the hope that his recent death, which all lovers of knowledge must deplore, may not deprive prehistoric students of the publication of the remainder of the work.

THEORETICAL METEOROLOGY.

Theoretische meteorologie. Ein versuch die erscheinungen des luftkreises auf grundgesetze zurückzuführen. Von ALBERT R. v. MILLER-HAUENFELS. Wien, *Spielhagen & Schurich*, 1883. 130 p. 8°.

THE past twenty years have witnessed a great advance in the science of meteorology, viewed from a theoretical stand-point. Previous to this period, the laws deduced were derived empirically from the observations made; and this is largely true at the present time. The attempts to place the science upon a firmer basis by building upon well-established physical laws, and deducing conclusions by strict mathematical processes, have met with decided success. But this branch of meteorology is yet largely undeveloped: consequently there is no treatise that covers the ground satisfactorily, and there is a large gap between deductive meteorology and the inductive conclusions upon which meteorological text-books are based. The mathematical papers are scattered in the volumes of scientific journals, or published in separate form. Even if they were collected together, and their contents condensed into one treatise, the result would be unsatisfactory. It would be found that a large majority of familiar phenomena are yet unaccounted for, and that many of the conclusions reached by theoretical methods cannot be used for further investigations, on account of assumptions made for the sake of simplifying the work, but which are unwarranted by observed facts. The hope of meteorology as an exact science, however, lies in the success which will attend these theoretical investigations in the future; and therefore any treatise devoted to this branch of the science is welcomed, however fragmentary it may seem to the reader.

The latest publication upon theoretical meteorology is this octavo of a hundred and thirty pages, by Professor Miller-Hauenfels of Graz. It is confessedly incomplete, but seems to be worthy of the attention of the student. As its title implies, it is an attempt to refer atmospheric phenomena to fundamental laws. The author is not a practical meteorologist, but a mathematician, who treats the phenomena discussed as mechanical problems as far as possible, holding that the first thing necessary is to establish the fundamental laws of meteorology, and afterwards to build upon this secure foundation. In the first section the laws of Mariotte and Gay-Lussac are treated, the method giving essentially the same result as that deduced by Rühlmann in his well-known barometric formula. Passing then to the movements of the atmosphere, the author discusses first its general movement, and then the laws of the winds, the latter subject occupying a large part of the treatise. The laws of ascending currents as developed by Hann are briefly referred to, and the laws of moist air-currents also discussed, the formulae for which are based upon Hildebrandsson's exposition of Dalton's law. The fundamental laws of thermodynamics are the basis of the discussion of the disturbances of density giving rise to winds. Numerous theorems are laid down in connection with the phenomena of the winds, and it is recognized that differences of temperature are the original cause of them. The diurnal change of the barometric pressure is explained in a

manner not unlike that usually followed, and the belief is expressed that the moon has an effect upon the atmosphere which would appear by a proper tabulation of barometric observations.

The above summary is sufficient to give an idea of the scope of the work. It is introduced to the public by Dr. Julius Hann, who remarks, with regard to deductive investigations, "Even where results derived deductively find no immediate application in nature, since the actual conditions are never so simple as those which must furnish the basis of the conclusions reached, yet they are of great interest and value in advancing knowledge, since they increase our insight into the nature of phenomena, and open the path upon which, in the course of time, we shall attain to their complete understanding."

The execution of the author's design, however, is not wholly satisfactory. On account of the fragmentary nature of the work, it is often difficult to understand the bearing of the subjects discussed, or to see what use can be made of the formulae derived. It is also not always easy to follow the author in his argument, and consequently the general effect upon the reader is one of disappointment. The treatise does not merit the title which is given it, though it may furnish useful suggestions to those who are investigating the subjects which it discusses.

HISTORY OF LAND-HOLDING.

The early history of land-holding among the Germans. By DENMAN W. ROSS. Boston, *Soule & Bugbee*, 1883. 8 + 274 p. 8°.

THIS work of Mr. Ross starts from the principle of individual ownership and isolated farmsteads, as the primitive usage of the Germanic nations. The evidence for this the author finds in the sixteenth chapter of the Germania of Tacitus, in which he explains the *vici* to be villages, not of free tribesmen, as is generally assumed, but of serfs. Of community of ownership he finds no evidence, either in Caesar or Tacitus. In the period of the barbarian laws, too, the facts which have usually been understood to point to common or collective ownership he explains as meaning *undivided* property. He has no difficulty in proving the general prevalence of the principle of individual ownership at this latter period, so far as the laws and other documents of the period afford any evidence. That ownership is common wherever it appears in these documents, is as a rule temporary, and subject to individual claims, seems also fully established. The gap in the evidence is as to the two or three centuries which intervened between Tacitus and the barbarian codes, — a gap which is of no importance, if his interpretation of Tacitus is correct, but which leaves room, if that interpretation be not accepted, for the development of free village-communities in this interval, which may then, in some cases, have survived to a later period, by the side of the system of individual ownership which we must accept as the prevalent one for this period.

After developing these general principles, Mr. Ross proceeds (p. 26) to show how the isolated household may, in the course of a few generations, have developed into a clan-village; here, again, into a community of ownership which is not really corporate in character, but is on its way to divided and individual ownership (p. 38). The rules and usages of the inheritance and transfer of land are described with great fulness, after which the usages which appear to tell in favor of an original collective ownership — the rights of *vicini* to exclude strangers, to purchase in preference to strangers, and to inherit in case of lack of heirs — are discussed. Certainly these usages, which, it must be admitted, may accompany a system of private ownership, are, nevertheless, most easily explained on the assumption of a *previous* condition of collective ownership. We cannot think the explanation given on p. 52 to be wholly satisfactory.

The breaking-up of the clan-system is next considered, this being effected especially by female inheritance, adoptions, and alienations. An important topic is the founding of free colonies, off-shoots of the clan-communities, but modelled upon the serf-communities; and their organization and management are described with great fulness and lucidity. The relation between these free villages and the serf-villages — clan-villages of proprietors and of tenants — is discussed; and there is much here that would apply equally well to the village-community theory. They are indeed essentially the same in character with those assumed by that theory, only that they are represented by Mr. Ross as a later outgrowth instead of a primitive organization. The essay (which occupies 109 pages) ends with some brief considerations upon immunity, primogeniture, etc. The conclusions of the essay are supported by a mass of 'Notes and references,' occupying about 130 pages, and containing copious extracts from documents. There is a full index. This book is every way a thorough piece of