PALEOMAGNETISM AND THE ALPINE TECTONICS OF EURASIA

PREFACE

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(Received October 15, 1964)

The following paper by Gregor and Zijderveld is the first of a series planned to report results of paleomagnetic investigations in the Alpine area from Italy to the Himalayas. These investigations are carried out in close collaboration between the well-equipped paleomagnetic laboratory of Utrecht University, under the leadership of Prof. Dr. J. Veldkamp, and the Geology Department of the American University of Beirut. They are generously supported by the Netherlands Organization for the Advancement of Pure Research (Z.W.O.) and by the Faculty of Arts and Sciences in Beirut. Sampling in Italy and Switzerland has been delegated to Dr. D. van Hilten, who taught me the sampling procedures during a previous trip in Northern Yugoslavia.

The choice of the area of our investigations is based on the remarkable results presented in a recent series of doctoral theses at Utrecht University. For a concise summary of these (and of research on more northerly regions accomplished in Utrecht) I refer to Rutten and Veldkamp (1964) from whom I quote: "...all of *Meso-Europe* is regarded as a single stable continental block for the time from the Permian onwards. To accommodate the aberrant pole positions for localities of the Alpine foldbelt, large scale crustal wandering seems to be the easiest explanation. The Tethys, the geosynclinal basin out of which the Alps are thought to have developed, now acquires the dimensions of major ocean".

Using a different line of evidence I also advocated the existence of a wide Tethys ocean between Europe and Africa in Permian and Triassic times (Raven, 1961); a similar exposition of continental drift by convection currents in the mantle is presented by Bullard (1964). Applying paleomagnetic evidence more strictly and comprehensively, however, Van Hilten (1964) arrives at very different solutions, both as regards the mechanism and the pattern of continental drift. Rather than elaborate this preface I refer the reader to the four papers mentioned: the key position of the Tethys in the present controversy is evident. The growing wealth of paleomagnetic evidence shows not only that all continents have drifted, but also that most (possibly all) Alpine crustal fragments drifted along paths which differ from those of the adjoining continents. Continents thus appear to grow by picking up geosynclinal slabs from widely scattered origins. This phenomenon is not restricted to the Tethys; Japan and Oregon also show evidence of movements differing from

those of the older cores of Asia and North America respectively. For demonstrating continental drift, only paleomagnetic measurements on the pre-Alpine cores of the continents may henceforth be used; the divergent results obtained in Alpine folded areas have to be considered separately, not confusing their isoclines with those of adjacent continents. Thus the isoclines of fig.9 in the paper which follows which are derived from data on rocks collected from stable areas of Europe, do not hold for the Alpine parts.

The defence of continental drift now has to carry the additional burden of explaining the multiple and apparently haphazard movements of many Alpine fragments. Courageously responding to this challenge, Van Hilten (1964) has suggested a mechanism for an eastward drifting Europe to brush these Alpine units off a westward drifting Africa: originally they would form part of a marginal geosyncline of Africa.

Being unable to follow Van Hilten's conclusions, I plan to respond to the challenge in a future paper of this series, using convection currents for the transport of both continents and island festoons with geosynclines.

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