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Review: Mercator's Life and Labours

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Source: *The Geographical Journal*, Vol. 53, No. 1 (Jan., 1919), pp. 49-53

Published by: geographicalj

Stable URL: <http://www.jstor.org/stable/1780401>

Accessed: 23-06-2016 01:14 UTC

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town one may meet men who are acquainted with all parts of the desert. In one of these cafés I came across a grey-eyed brown-haired "Arab," belonging to the semi-Berber Sha'ambah tribe, who had once taken part in an expedition that some Frenchman had made to the pools of the Wad Mihero, with the object of catching some of the crocodiles that are known to exist there still. In this the expedition unfortunately failed, but my informant had seen their tracks, and had even managed to catch sight of one of the crocodiles themselves, which he said had a head as big as a donkey's.

The Wad Mihero is a small river-bed in the high ground north-west of Ghat, that leads into the Wad Ighargharen, itself a tributary of the Great Wad Igharghar that in earlier days must have been a mighty river. As this part of the desert dried up the crocodiles were apparently cut off, and now exist only in the pools in the river-bed. I have heard in the Libyan desert of a very similar case at the Ershay Lake in Ennedi, which is also said to contain crocodiles large enough to attack camels when they come down to drink. But though the information seemed to be reliable, it has not yet, so far as I know, been confirmed by European observation, and so must be accepted with reserve. But the presence of crocodiles in the Wad Mihero is well established, and their existence is a strong argument—if one be needed—for the comparatively recent desiccation of this part of Africa.

MERCATOR'S LIFE AND LABOURS

Gerhard Mercator und die Geographen unter seinen Nachkommen.— H. Averdunk and Dr. J. Müller-Reinhard. (*Petermanns Mitteilungen, Ergänzungsheft* Nr. 182. Gotha: Justus Perthes. 1914. Price M.14.)

THIS work is dated 1914, but by reason of the war has only lately reached us. A belated notice of the book is justified by its importance as an attempt to bring together all we know of the labours of one of the most meritorious cartographers of the sixteenth or any century.

The excellent biography of Mercator brought out by Van Raemdonck in 1869 has been accepted as the standard authority on the subject, and even now has not by any means been superseded. But during the past half-century so much has been done to elucidate the history of cartography that much can now be placed in its true relations that was obscure in 1869. The point of view of the new work is also somewhat different, fuller attention being given to the technical side of Mercator's life-work, and less perhaps to the more personal side of his career. We are shown in detail the development of the cartographer's geographical ideas and methods, and see in clear relief the astonishing variety and compass of the output maintained by strenuous industry for over half a century.

We can here touch upon some only of the matters of most general importance to the history of map-making, particularly those on which new information has come to hand since Van Raemdonck wrote his 'Life.' The very outset of Mercator's career as a cartographer has received fresh illustration from the

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discovery by Dr. W. Ruge, some fifteen years ago, of the globe of Gemma Frisius, made about 1535, in the production of which Mercator, then quite a young man, co-operated as engraver. A chapter is properly devoted to this globe, as its influence on Mercator's own early productions is of prime importance. The double-heart-shaped map of 1538 and the globe of 1541 are both modelled on the globe of Frisius, though some departures from the copy can be seen in the map and still more in the globe—notably as regards the representation of the hypothetical lands within the Arctic Circle. In the projection chosen for the map and in some other details Mercator followed the French geographer Orontius Finæus, though he kept clear of the latter's error in clinging to the idea of a junction of Asia with North America in fairly low latitudes. It is now possible to compare the geography of the globe with that of the earlier and later productions of Mercator—a thing impossible to Van Raemdonck in 1869, as no specimen of the globe (or globes, for there was a pair—celestial and terrestrial) had come to light when he was writing his 'Life.' The earliest find—made at Ghent in 1868—has been followed by others, so that a fair number of specimens are now known. A feature of the geography is the growing importance assigned to the Great Southern Continent, towards a belief in which Mercator's later maps gave so great an impulse. Mercator was no doubt the foremost globe-maker of his time, but it is singular that while he exercised the greatest care in bringing his *maps* into accord with new discoveries, the geography of the globe seems to have remained in its original state down to the end.

A far greater service was the issue in 1554 of the first edition of Mercator's great map of Europe in fifteen sheets—an immense advance on anything that had been attempted before. For the first time Ptolemy's exaggerated extension of the basin of the Mediterranean, and so of the longitudinal space covered by Europe, was corrected in part, and the best new information available, especially for the north of the Continent, was fully utilized. This map was known to Van Raemdonck only by report, not having been discovered at Breslau (by Heyer) till 1889. The present authors are able to describe not only this first edition, but the second edition of 1572—a still later find, and one that has not yet become generally accessible by a reproduction. It showed still further improvement, especially in the far north-east. The authors mention as a source the well-known map of Russia by Herberstein,* but say nothing of the equally important map of Anton Wied (1542). Both these seem to have been used even for the first edition. The map of the British Isles of 1564 is an equally important production, but Mercator can be credited only with the engraving and publishing, for he avows that the map was sent to him in MS. by a friend in England, whose name is unfortunately not mentioned and whose identity, and the means employed for constructing so important a document, are among the most interesting problems awaiting solution in the history of the mapping of these islands. The great world-map of 1569, when the projection since known as Mercator's was first employed—at least for a map of any importance †—has long been recognized as one of Mercator's chief claims to distinction, and receives due attention in the monograph. The extent to which its wealth of information was drawn upon for subsequent maps (including

* This is usually assigned (as by the present writers) to 1549, and it seems not generally known that there is a copy in the British Museum dated 1546.

† The possibility that maps had already been drawn on a projection with increasing spaces between the parallels in the direction of the poles was the subject of a note in the *Journal*, vol. 51, p. 270.

even those brought out by Mercator's heirs many years afterwards) is briefly touched upon, but the subject might be elaborated further, particularly in connection with the representation of Northern Asia, for which the map was closely copied for nearly a century. Strange to say, the projection was not much used until long after Mercator's time, and is not once to be found in the atlases brought out by his heirs.

The chapters dealing with the 'Atlas'—not fully published, it must be remembered, until after Mercator's death—permit us to trace the gradual evolution of this monument of early modern cartography at the hands of Mercator and his successors—a subject of much complexity and affording some unsolved problems as well as pitfalls for the unwary. The maps came out in instalments—the special maps of certain European countries before the world-map or the general maps of the continents. When these were ready, in 1595, a general title-page was issued (undated), so that purchasers of the previous parts could bind the whole into a volume, which constituted the first edition of the Atlas. Many of the maps seem to have been sold separately, and to those mentioned by the authors we might add the North Polar map, of which a copy without the author's name, but dated 1597 (it was undated in the Atlas), was in the possession of the late Prof. Sylvanus Thompson. It is not altogether easy to identify with confidence this first edition of the Atlas, for the second (of 1602) was a re-issue with but slight alterations. Bibliographers doubt whether the map of America by Michael Mercator was ready for issue in 1595, and its presence may seem to invalidate the claim of a copy containing it to be the first edition. Now the copy presented to this Society a few years ago by Mr. Yates Thompson, though dated 1602 on the (modern) binding, conforms in every respect, so far as it goes,* to the collation of the original edition, and the date 1595 (altered in the second edition to 1602) appears at the end of the index to the map of Norway and Sweden. Yet this copy does contain the map of America, on paper whose watermark is identical with that of several other maps, and, more important still, of the dated page of the index. The doubt that the map was included in the first edition seems therefore uncalled for.†

The authors treat fully of the successive editions, showing how far Mercator's own maps continued to do service and how far they were supplemented by an increasing number of new maps, either in an appendix or incorporated by re-arrangement. A total of thirty-one folio editions is enumerated, including the English version of Wye Saltonstall of 1635, in which the size of the volume, and still more that of the maps, was greatly reduced. Of this fact the authors hardly seem aware, nor do they mention the re-issue of the work in 1637 by a new or reconstructed firm, with a new engraved title-page (calling it a second edition) and a map of Virginia, now often missing, which was not ready when the first edition appeared. Otherwise the list (which might with advantage have been given in tabular form) seems pretty well complete. Reference is even made in a footnote to the little-known French edition of 1639, in three volumes, which was offered by a German firm in 1913 and secured for the Society's collection through the liberality of the late Sir Henry Bulwer.

Limits of space forbid more than a brief reference to the projections used by Mercator, which were selected by him with much care, due attention being

* The map of Europe and the dedication of Queen Elizabeth are wanting.

† It is impossible at the moment to examine the British Museum copies of the first and second editions, as the war has necessitated their removal from the map-room. Very few perfect copies of the first edition seem to be known.

paid to their suitability to the special subject of the maps. Only that bearing his name can really support a claim to originality, though the authors are inclined to put down in this category—as arrived at independently—the polar projection with equidistant parallels, sometimes known as “Postel’s,” which was used for the polar map first given as an inset in the great map of 1569. From its extreme simplicity when used for a polar map this projection must have had many inventors, and had in fact been used by Glareanus so early as 1510, though this has, it seems, escaped the notice of the authors (see paper by Colonel Close in the *Royal Engineers’ Journal*, vol. 1, p. 303, with coloured reproduction of one of Glareanus’s polar maps; also paper by the present writer in *Journal*, June 1905, p. 652). For the map of Europe of 1554, as also for the maps of Asia and Africa in the Atlas, a projection sometimes known as the “Stabius-Werner” and but slightly differing from the “modified conical” or “Bonne’s” projection was used, and described in a legend on the “Europe.” It was adopted also, in simplified form, for some of the special maps of countries. The early double-heart-shaped map of the world was also constructed on the same principles. For the World-map in the Atlas by Rumold Mercator, the Equatorial Stereographic projection, sometimes employed in modern atlases for the two hemispheres, was used. It seems to have been already used by Gemma Frisius in 1540, but the authors credit Mercator with having been the first to recognize the “orthomorphic” property of this projection. Other projections included improvements on the old methods of Marinus and Ptolemy.

A kindred subject is that of the various prime meridians used by Mercator. The authors mention them severally in their proper places, but do not discuss the subject as a whole, nor compare Mercator’s practice with that of others of his time, which was very lacking in consistency. Mercator drew the line now through some point or other in the Canary Islands (Ferro in the big map of Europe, Fuerteventura in the globe, and an intermediate point in the heart-shaped map), now through one of the Cape Verde Islands (World-map of 1569) as he believed that this was on the line of no variation of the compass. The last was practically identical with the meridian of St. Michael in the Azores (used in the Molyneux Globe and by Hondius, Blaeu, etc.), and others employed at the time passed through Corvo in the Azores (Hoeius), Toledo (the map by F. G. accompanying Hakluyt’s edition of Peter Martyr), or the westernmost point of Africa—the last chosen by Edward Wright in 1599 for his chart of the Earl of Cumberland’s voyage to the Azores.

The monograph treats also of Mercator’s lesser writings; of his life at Duisburg, where his most important works were printed; of his correspondence with geographers and others; of those among his descendants who carried on his work, of whom his youngest son Rumold was the most active; and of the commemoration of his achievements in after times. It is packed with information throughout, and considering the extent of the material dealt with, errors seem but few. Even so however the subject of Mercator’s geographical labours is far from exhausted, and interesting results might be gained from an attempt to trace the sources of his geography in greater detail than has been possible in the present memoir. In this, when treating of the early map and globe, reference is made to the Polissacus Flumen as one of the great rivers of Eastern Asia, but the origin of the name (which appeared in Ruysch’s map of 1507–8 as that of a *gulf* in a combined Asia and North America) is not explained. In reality it is the Pulisangin of Marco Polo (Persian for “Stone Bridge”) applied by him to one of the minor rivers west of Peking crossed

by a bridge of twenty-four arches. The name had already appeared (as *Polisanchin*) on Fra Mauro's great map of 1459, with a picture of the bridge, and recurs in many maps of the century following, as well as in Mendez Pinto's travels (as *Puxanguim*). It is instructive also to see how an error or imaginary feature once introduced may affect cartography for centuries, and examples might be found in Mercator's retention, as Greenland names, of the words of an old Folk-song introduced by Claudius Clavus into his map of Greenland of the early part of the fifteenth century; and in the part which he played in the propagation of the distorted hydrography of Central Africa—notably the representation of the Lake Sachaf or Saphat which is a perennial feature in African maps down to the end of the seventeenth century. While referring to this the present authors give a by no means complete account of the provenance of the feature or of its occurrence on maps. They have failed to notice that it already appeared on Waldseemüller's map of 1507 or that a similar name is to be found in maps and literature of the previous century, no doubt derived from information received from Abyssinia of the headwaters of the Blue Nile. Owing to its subsequent transference to a far more southern region, our authors seem disposed to connect it with the Zambezi.

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REVIEWS

EUROPE

La Dalmazia.— **Dott. Prof. Giotto Dainelli.** Novara: Istituto Geografico De Agostini. 1918. 10 *lire*.

THE appearance of this little geographical and statistical handbook on Dalmatia, a companion volume to Cesare Battisti's 'Il Trentino,' is especially opportune at the present moment. The excellent atlas, which contains sixty maps, is as good a piece of work as the Istituto Geografico De Agostini has yet produced. Prof. Dainelli follows Battisti in the arrangement of his material, and covers the like ground equally thoroughly, but he is more diffuse. He does not attempt to tabulate his facts so systematically. To us he seems to devote an undue proportion of his space to a discussion of the nationality statistics, seeing that the Slavs far outnumber the Italians in Dalmatia. It is highly probable that the official estimate of 18,028 Italians is under the mark, and is due to some extent to Austrian pressure; for Austria has always played off the Slavs against the Italians. But except at Zara the Italians have been steadily losing ground of recent years. Prof. Dainelli's estimate of 80,000 is hardly less certainly an exaggeration on the other side.

But the influence of the Italians is far greater than their numbers suggest. Italian is still the language of culture in Dalmatia. The Italians are not only the best educated members of the community, but they supply most of the initiative in business. Dalmatia undoubtedly belongs to the Slav world; but that is no reason why Italy should lose her influence there. Hitherto the Austrian Government has always done its best to thwart Italian commercial enterprise; yet under a different *régime* Italy might render invaluable assistance in developing the resources of the country, especially in introducing more scientific agricultural methods. And the building of railways from the hinterland to the coast will certainly stimulate Dalmatian trade with Italy.

Prof. Dainelli maintains that history shows that Dalmatia and Italy are necessary to each other. Rome and Venice ruled Dalmatia when at the