Chapter 9

Humboldtian Representations in Medical Cartography

NICOLAAS A RUPKE and KAREN E WONDERS

Introduction

In the course of the nineteenth century, medical thinking took a significant spatial turn. This manifested itself in, among other things, the development of medical cartography. The geographic location, the contours of distribution and the connections with the physical environment of particular diseases were for the first time indicated on maps. On the basis of such cartographic visualizations, etiological hypotheses were formulated. Maps suggestively connected the causes of diseases with their geographic occurrence, and gave considerable weight to views of environmental determinism in thinking about health and disease.

The history of medical cartography has received little attention in the secondary literature. Historians of cartography have tended to ignore it,[1] and so have historians of medicine, with very few exceptions. Among these exceptions was H J Jusatz, who in 1939 published an article on the development of medical cartography in Germany.[2] In 1958, E W Gilbert published a study of early medical maps in England, focusing on cholera maps of towns and also on August Petermann's pioneering cholera map of the British Isles.[3] More recently, Gilles Palsky has discussed the early phase of medical cartography,[4] which nearly coincides with the early period of medical geography in general, reckoned to have begun with the *Versuch einer allgemeinen medicinisch-praktischen Geographie* (vol. 1, 1792; vol. 2, 1795) by the German physician Leonhard Ludwig Finke. In this chapter, our main concern is to look at representational techniques and conventions and trace their development from the late-eighteenth to the mid-nineteenth century. More particularly, we are interested

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[1] See, for example, L A Brown, *The Story of Maps*, Boston, Little, Brown, 1950. A rare exception, however, is A H Robinson, *Early Thematic Mapping in the History of Cartography*, Chicago, University of Chicago Press, 1982, pp. 170–81.

[2] H J Jusatz, 'Zur Entwicklungsgeschichte der medizinisch-geographischen Karten in Deutschland', *Mitteilungen des Reichsamts für Landesaufnahme*, 1939, **1**: 11–22.

[3] E W Gilbert, 'Pioneer maps of health and disease in England', *Geographical Journal*, 1958, **124**: 172–83.

[4] G Palsky, 'La cartographie médicale et anthropologique', in I Poutrin (ed.), *Le XIXe siècle: science, politique et tradition*, Paris, Berger-Levrault, 1995, pp. 207–23.

in the impact on medical cartography of Alexander von Humboldt's innovations in visual representation.[5] In selecting examples, we have restricted ourselves to global maps or maps of large areas of the world.

Stages of Development in Cartographic Representation

We propose that, broadly speaking, there were three stages in the development of representation in early medical cartography. The first stage constituted what one could call the textual map: distribution was indicated by words and short sentences on a conventional geographic map that showed the outline of the world's continental masses; in essence, the verbal narrative was taken from a book's page and spatially reorganized by being spread across a world map; few if any patterns of distribution and interrelationships of disease with physiography emerged, and the many written observations were of an incidental nature. The classic example in early medical cartography of a textual map was the first global distribution map of human diseases, 'Charte über die geographische Ausbreitung der Krankheiten', produced by the German physician Friedrich Schnurrer (1784–1833) and presented by him at the 1827 Munich meeting of the Gesellschaft deutscher Ärzte und Naturforscher (see this volume, Chapter 10, Figure 1).[6] The Schnurrer map represented a spatialized record of historical observations, taken mainly from travel literature and studies of medical topography. Examples of the textual information include that yellow fever arrived on the Antilles for the first time in 1634; or that Monterey, in California, was known for the most severe form of venereal disease. Limits of distribution were shown not by lines or other non-verbal symbols, but by brief sentences, and on Schnurrer's map no systematic correlation or causal connection with the physical environment showed up.

By Schnurrer's own account,[7] his map was inspired by the much earlier world distribution chart of quadrupeds, the 'Tabula mundi geographico zoologica sistens quadrupedis hucusque notos sedibus suis adscriptos', produced by the German mathematician and geographer, and professor in Brunswick, E A W Zimmermann (1743–1815). This map (Figure 1) accompanied Zimmermann's major, three-volume study of zoogeography, *Geographische Geschichte des Menschen und der vierfüssigen Thiere* (vol. 1, 1778; vol. 2, 1780; vol. 3, 1783).[8] Zimmermann opposed the notion of Linnaeus that species were originally created on a paradise mountain surrounded by a primordial ocean; as the oceanic waters receded—Linnaeus had argued—the continental masses emerged and the animals spread across the globe, settling in the appropriate climatic regions. Zimmermann also opposed Buffon, in whose theory of a cooling earth animals first lived at the poles, later spreading to lower latitudes

[5] This follows up on ideas expressed in N A Rupke, 'Humboldtian medicine', *Medical History*, 1996, **40**: 293–310.

[6] The map accompanied F Schnurrer, 'Die geographischen Vertheilung der Krankheiten', *Das Ausland*, 30 March 1828: 357–59.

[7] Ibid., p. 357.

[8] See also E A W Zimmermann, *Specimen zoologiae geographiae quadrupedem domicilia et migrationes sistens*, Leiden, Haak, 1777.

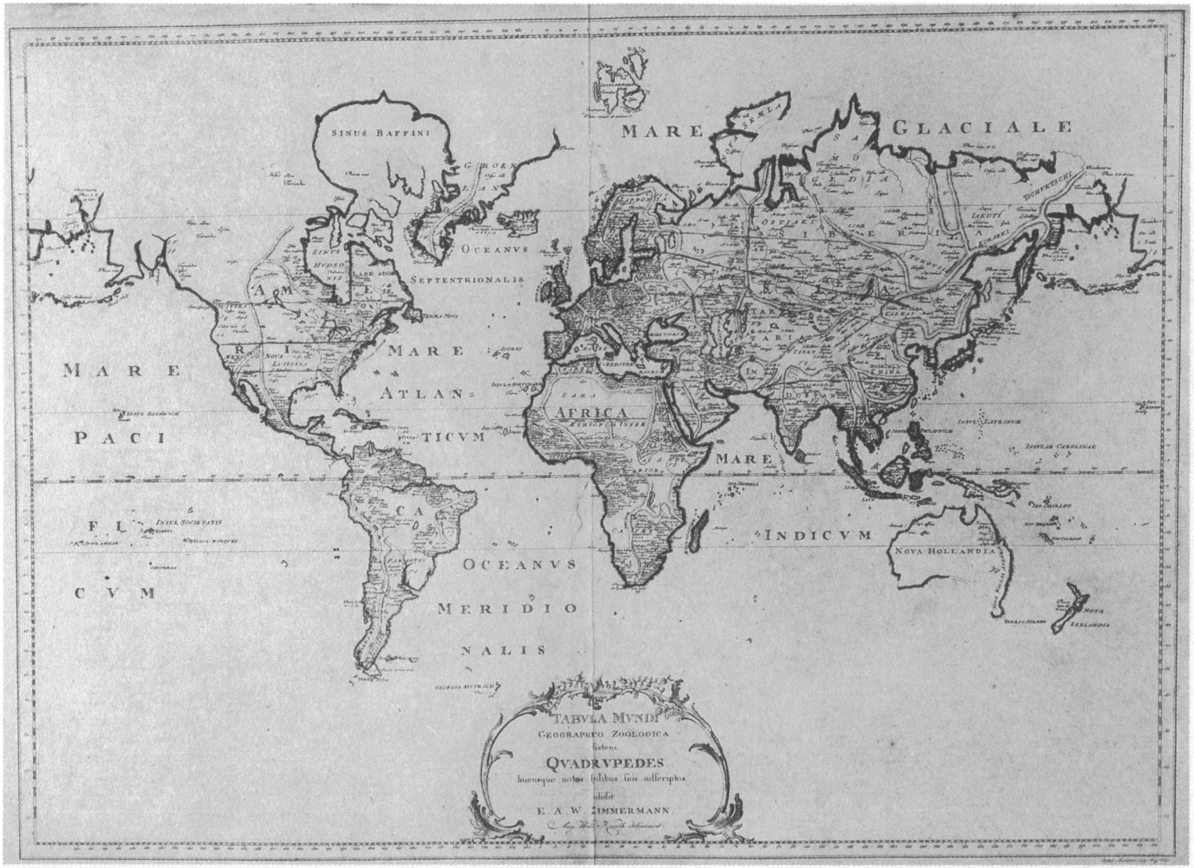

Figure 1: E A W Zimmermann's world map of the distribution of quadrupeds, which accompanied his *Geographische Geschichte des Menschen und der vierfüssigen Thiere*, 3 vols, Leipzig, Weygand, 1778–83.

as the earth's temperature gradually diminished. In Zimmermann's view, living beings occupied *ab initio* those regions, to the climate of which they were adapted.[9]

On Zimmermann's map the occurrence of quadrupeds was textually marked on a background outline of landmasses with major rivers and mountain ranges. An elementary start was made with indicating distribution in the form of zones or provinces, although merely by a few straight lines. In Zimmermann's view, the fact that animals live in climates to which they are adapted means that they can be used as "zoological thermometers". They prove, for example, that at comparable latitudes North America is colder than Eurasia. In support of this contention, Zimmermann drew on his map lines marking the southern limit in North America and Eurasia of reindeer and elk (or wapiti); he additionally drew lines that marked the northern limit of elephants in Africa and India. Yet in spite of these four lines, the map was primarily a spatial, geographic arrangement of textual data.

In the second stage of the representational development of medical cartography, we encounter contoured maps: lines, different types of shading, colours and suchlike codes partially or totally replaced the written word to convey information about the occurrence of diseases; in this way, areas of distribution emerged, and systematic connections appeared, for example with coastal plains or, most commonly, with lines of latitudes as markers of temperature.

The classic example of a medical map using this representational convention was the 'Planiglob zur Übersicht der geographischen Verbreitung der vornehmsten Krankheiten, denen der Mensch auf der ganzen Erde ausgesetzt ist', produced by the German geographer Heinrich Berghaus and published in the second edition of his enormously influential *Physikalischer Atlas* (1852) (discussed by Jane Camerini, Chapter 11 of this volume, Figure 1).[10] Several regions of the distribution of diseases were distinctly delineated, such as the tropical region of leprosy or the coastal strips of yellow fever.

This representational innovation, too, originated in earlier biogeographical cartography. Schnurrer had not only cited as his inspiration Zimmermann, but also the Danish plant geographer and climatologist Joakim Frederik Schouw (1789–1852).[11] Schnurrer's map showed no indications, however, of the representational advances of Schouw's work, but the Berghaus map did. One of Schouw's main works on plant geography, published in Danish in 1822, was translated into German, *Grundzüge einer allgemeinen Pflanzengeographie* (1823), and was accompanied by a *Pflanzengeographischer Atlas*. In this, the distribution of plants across the globe was shown, with the aid of colours, in its relationship to coastlines and lines of latitude (Plate 1). Regions of the globe were characterized by dominant plant forms, and the thus delineated areas of distribution became domains of occupation, and taxonomic

[9] See F S Bodenheimer, 'Zimmermann's Specimen Zoologiae Geographiae Quadrupedum a remarkable zoogeographical publication of the end of the 18th century', *Archives internationales d'histoire des sciences*, 1955, **8**: 351–57.

[10] H Berghaus, *Physikalischer Atlas*, 2nd ed., Gotha, Justus Perthes, 1852, part 7, plate 2.

[11] Note 7 above. Little has been published on Schouw in the English language; but see his entry in the DSB by A P M Sanders for Danish studies of him. A recent Master's thesis in German is by H-J Chen, 'Die pflanzengeographischen Ideen von Joachim Frederik Schouw', Göttingen, Institut für Wissenschaftsgeschichte, 2000.

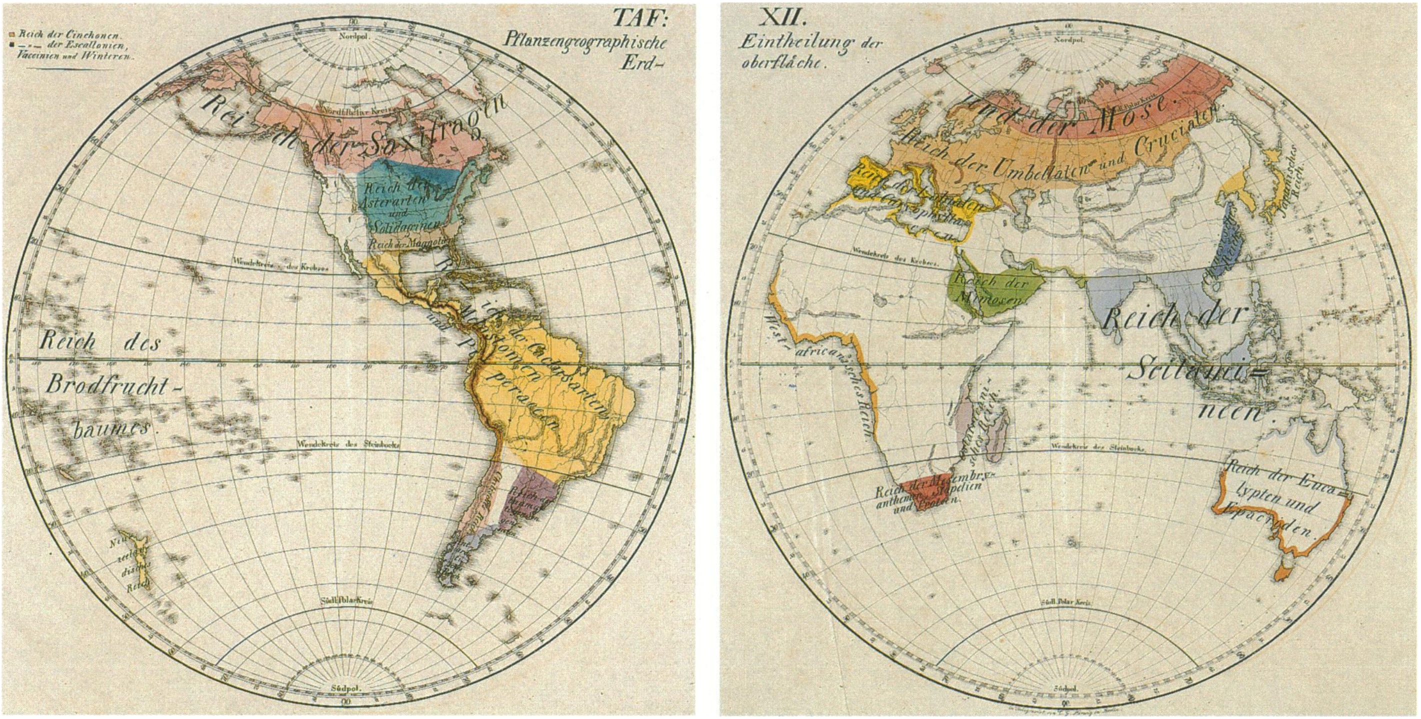

Plate 1: Joakim Frederik Schouw's world map of the distribution of plants, from his *Pflanzengeographischer Atlas zur Erläuterung von Schouws Grundzügen einer allgemeinen Pflanzengeographie*, Berlin, G Reimer, 1823, plate 12.

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kingdoms were turned into territorial kingdoms. For example, along the north polar circle the kingdom of moss and saxifrage dominated. Along the coast of the southern half of Australia, up to the tropic of Capricorn, the kingdom of the eucalyptus was indicated. Schouw did not use Mercator projections for his maps, but plotted his information on twinned hemi-globes which gave a more proportional view of distribution in northern latitudes, in which region he had an expert interest. Later, in popular lectures, he employed the same representational techniques to show the distribution of forests across the globe.[12]

The third stage in the development of representation in medical cartography was marked by the use of isotherms. The zonal distribution of diseases was emphasized and the connection with climate made tighter than can be effected by the use of straight latitudinal lines. Although on the Berghaus map a number of isotherms were drawn, little if anything was done with these in delineating the spread of diseases. By contrast, isotherms formed the main distribution-defining feature on the 'Skizze einer noso-geographischen Karte', produced by the German physician and Göttingen "Privatgelehrter", Adolf Mühry (1810–88), in his influential *Die geographischen Verhältnisse der Krankheiten, oder Grundzüge der Noso-Geographie* (1856) (discussed by Rupke, Chapter 5 of this volume, Figure 1).[13] On Mühry's map, isotherms were used as boundary lines to indicate the limits of distribution of particular diseases in a northerly or southerly direction. For example, the 40°F isotherm was identified as the northern limit of malaria, and the 74° isotherm as the southern limit of typhoid. Mühry was by no means the only medical geographer to use isotherms; in fact, isotherms became a common representational tool in medical cartography.[14]

In producing his chart, Mühry copied and superimposed two maps from the school edition of Berghaus's atlas, the *Physikalischer Schul-Atlas* (1850), namely the world map of isotherms (Figure 2) and the one of oceanic currents.[15] The various editions of the Berghaus atlas and the many copied and plagiarized versions of its maps gave wide circulation to the isoline technique.[16] The isoline was—and continues to be—a powerful instrument of representation, and quickly became used to visualize a range of phenomena. In addition to annual temperature averages (isotherms), summer temperatures (isotheres), and winter temperatures (isocheims), isolines were used to plot rainfall (isohyets), tidal waves (isorachs), magnetic declination (isogonics), magnetic dip (isoclines), total magnetic intensity (isodynamics), soon to be followed by many more. Isolines were a means of accurately visualizing invisible phenomena that could be measured with precision instruments.

In this way, the isoline came to symbolize advanced, cutting-edge science, and

[12] J F Schouw, *Die Erde, die Pflanzen und der Mensch. Populäre Naturschilderungen*, Leipzig, Carl B Lorck, 1851, plate opposite p. 153. The same book contained a map of the global distribution of "Brodpflanzen" on which the old technique of textual inscription was used.

[13] A Mühry, *Die geographischen Verhältnisse der Krankheiten, oder Grundzüge der Noso-Geographie*, Leipzig and Heidelberg, C F Winter, 1856, vol. 1, opposite p. 224.

[14] See, for example, C F Fuchs, *Medizinische Geographie*, Berlin, A Duncker, 1853, plate 2.

[15] H Berghaus, *Physikalischer Schul-Atlas*, Gotha, Justus Perthes, 1850, plates 1 and 7.

[16] On the history of lines of equal value, see, among others, M Eckert, *Die Kartenwissenschaft*, 2 vols, Berlin and Leipzig, Walter de Gruyter, 1921–5.

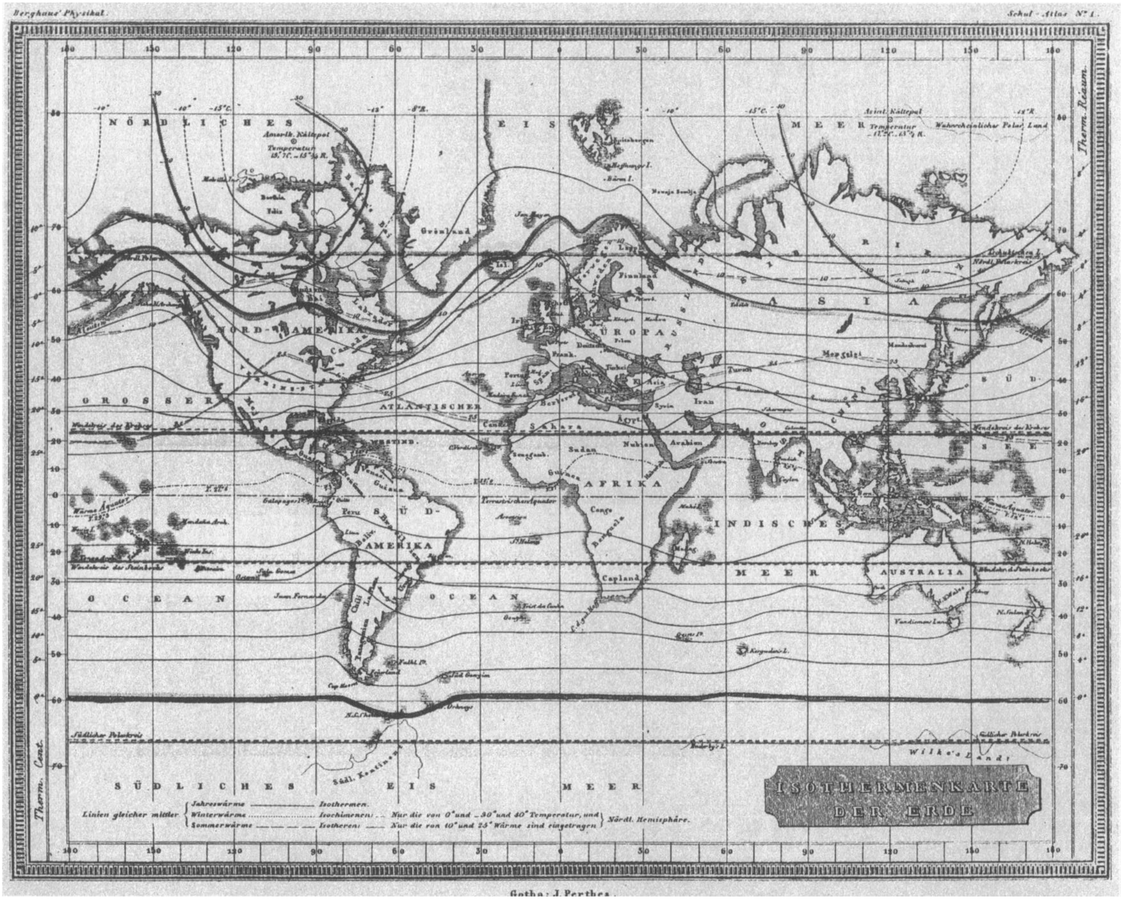

Figure 2: Isotherm map of the world, from Heinrich Berghaus, *Physikalischer Schul-Atlas*, Gotha, Justus Perthes, 1850, plate 1.

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various attempts were made to introduce isoline representations into medical geography as a means of linking medicine to scientific progress. There were authors who argued, for example, that a causal connection could be demonstrated between isoclinal lines and waves of pandemic diseases.[17] Most commonly, however, isotherms were used to provide a climatological, environmentalist criterion for classifying and explaining the occurrence of diseases. This is how Mühry employed the isoline technique and with him other medical geographers, such as Caspar Friedrich Fuchs (1803–1866), in the illustrations to his *Medizinische Geographie* (1853).[18]

The popularity and scientific cachet of the isotherm was such that in a number of instances it was not merely used to indicate the precise extent of distribution of certain diseases, but to dictate this. On Mühry's map, for example, the boundaries of malaria and typhoid were not drawn on the basis of a systematic documentation of the geographical occurrence of these diseases, but on that of the presumption that their distribution was climate-controlled and could therefore be delineated by the accurate representational technique of isotherms. This constituted an example of a representational convention taking precedence over the data it was meant to illustrate. The most remarkable example of this probably can be found in a French textbook, *La Géographie médicale* (1884), written by the professor of medical geography at the École d'Anthropologie in Paris, Arthur Bordier (1841–1910) (discussed by Michael Osborne in Chapter 2 of this volume).[19] On several of the distribution maps that illustrated his book, Bordier drew isotherms, in particular the 5°, 15° and 25° Centigrade ones, relating various disease occurrences to these. In the case of the plague (see Figure 2, Chapter 2, in this volume), he simply colour-coded the zone created by the 5° to 25°C isotherms for this disease, although leaving unmarked parts of Northern Africa and Western Europe; the zone of plague as meticulously marked for the Near and Far East was in the precision and details of its northern and southern borders not determined by observed and plotted instances but by the course of the isotherms.

Humboldtian Representations

The single largest publication in medical cartography of the nineteenth century was the *Atlas de la distribution géographique des maladies dans leur rapports avec les climats* (1880), which accompanied the major, four-volume *Traité de climatologie médicale* (1877–1880), written by the Genevan physician Henri-Clermond Lombard (1803–1895) (see Chapter 2 in this volume). The atlas contained 25 coloured maps, several of which were world distribution maps of single diseases, such as malaria, yellow fever, pulmonary tuberculosis, cholera, tubercular leprosy, and dysentery and hepatitis. On none of these maps, however, were isolines of any sort used, reminding us of the fact that the above discussed examples of medical cartography belonged

[17] See for example R W Felkin, *On the geographical distribution of some tropical diseases, and their relation to physical phenomena*, Edinburgh and London, Young J Pentland, 1889, plate 16.
[18] Fuchs, op. cit., note 14 above, plates 1–12.
[19] A Bordier, *La Géographie médicale*, Paris, C Reinwald, 1884, pp. 252–64 and plate 4.

to a restricted, largely German tradition of what has been called Humboldtian medicine.[20]

Susan Cannon, long ago, remarked that during the early half of the nineteenth century, the use of isolines characterized the studies by naturalists who worked in the tradition of Alexander von Humboldt.[21] Mühry was an outspoken, self-confessed Humboldtian in medical geography. His stated aim was scientifically to upgrade and reform medicine by integrating it with the physical geography of Humboldt and his fellow meteorologists. Whereas Finke had dedicated his *Versuch einer allgemeinen medicinisch-praktischen Geographie* to the followers of Hippocrates, Mühry dedicated his *Grundzüge der Noso-Geographie* to Humboldt.[22] Berghaus, too, was a devoted Humboldtian: his *Physikalischer Atlas* was inspired by Humboldt, who acted as an advisory editor; moreover, it effectively was the volume of illustrations to Humboldt's *Kosmos*.[23] Also Schouw's Humboldtian credentials are beyond doubt;[24] and, as Brömer argues, Schnurrer's world map of medical geography must be seen in the context of contemporary Humboldtian influences.[25] Zimmermann's map preceded the Humboldtian innovations in worldwide, comparative physiography, but his globalization was incorporated in Humboldt's scientific style and greatly diversified.

The secondary literature on Humboldt is phenomenally numerous; yet very little has been written on his remarkable contributions to visual representation.[26] What has been most frequently referred to is Humboldt's interest in the aesthetic appreciation of landscapes and in landscape painting. In 1833, Humboldt gave a classic presentation to the Breslau Versammlung deutscher Naturforscher und Ärzte on the topic of 'art and science', 'Über den Einfluss, den eine Richtung der modernen Literatur, die Landschafts-Malerei und der Anbau exotischer Gewächse auf die Belebung des Naturstudiums ausgeübt haben' (On the influence that a branch of modern literature, landscape painting and the cultivation of exotic plants have exerted on the animation of the study of nature).[27] Humboldt later incorporated the views expressed in this talk in the second volume of *Kosmos*.[28] Art historians have explored the influence exerted by Humboldt on landscape painting, especially of North and South American scenery. Humboldt himself provided very few landscape illustrations, and in another study there is a discussion of exactly how he visualized the "views of nature" he verbally described.[29] Here we restrict ourselves to Humboldt's contributions to visual

[20] See Rupke, op. cit., note 5 above.

[21] S F Cannon, *Science in Culture: the Early Victorian Period*, New York, Dawson and Science History Publications, 1978, p. 77.

[22] Rupke, op. cit., note 5 above, p. 297.

[23] See N A Rupke, 'Introduction', in A von Humboldt, *Cosmos. A Sketch of the Physical Description of the Universe*, vol. 1, Baltimore, Johns Hopkins University Press, 1997, pp. vii–xxxv.

[24] See note 11 above.

[25] This volume, Chapter 10.

[26] But see N A Rupke, 'Humboldtian distribution maps: the spatial ordering of scientific knowledge', in T Frängsmyr (ed.), *The Structure of Knowledge. Classifications of Science and Learning since the Renaissance*, in press.

[27] See D von Engelhardt, *Wissenschaftsgeschichte auf den Versammlungen der Gesellschaft deutscher Naturforscher und Ärzte, 1822–1972*, Stuttgart, Wissenschaftliche Verlagsgesellschaft, 1987, p. 88.

[28] A von Humboldt, *Kosmos. Entwurf einer physischen Weltbeschreibung, vol. 2*, Stuttgart and Tübingen, Cotta, 1847, pp. 3–134.

[29] K Wonders, 'Visual representations of Humboldt's "Ansichten"', forthcoming.

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representation in the form of diagrams of scientific and medical data and phenomena. These contributions can be classified into four groups.

The first group consists of illustrations from Humboldt's "Jugendarbeiten", publications written before he undertook his famous journey of exploration of the Americas (1799–1804). Particularly richly illustrated were his *Versuche über die gereizte Muskel- und Nervenfaser* (1797–[98]).[30] The eight tables with 89 figures expounded some of the physiological experiments Humboldt had conducted. Yet as visual representations, these illustrations were no improvements on contemporary practices and conventions.

The second group is composed of the illustrations to Humboldt's enormously popular book on Mexico, the *Atlas géographique et physique du Royaume de la Nouvelle-Espagne* (1811).[31] As Anne Godlewska points out,[32] in this atlas Humboldt pioneered various maps that highlighted the new interest in distribution rather than location. He devised novel block diagrams to compare territories, populations and natural resources. It is possible that in designing these illustrations, Humboldt was influenced by new representations in political economy, such as August Crome's statistical maps.[33]

The third group is small in number, but contains the best known of Humboldt's diagrams, namely his illustrations of the zonal distributions of vegetation and other climate- or temperature-related phenomena. Among these is the iconic 'Tableau physique des Andes et pays voisins' (1808), the cross-sectional profile of the Andes from the Pacific to the Atlantic at the latitude of Chimborazo, showing the zoned occurrence of different types of vegetation from low to high altitude.[34] Later Humboldt expanded this diagram with a table entitled 'Geographiae plantarum lineamenta' that demonstrated the "law" that the changes in plant distribution by altitude matched those by latitude.[35] This law was depicted, too, by Berghaus,[36] and by many other authors.[37] Medical geographers, such as Fuchs, used these representational structures for nosological purposes.[38]

The fourth and last category is also the smallest, consisting of a single illustration, namely Humboldt's original drawing of isotherms. In 1817, Humboldt proposed to

[30] For a discussion of this work, see W F Kümmel, 'Alexander von Humboldt und die Medizin', in W-H Hein (ed.), *Alexander von Humboldt. Leben und Werk*, Frankfurt am Main, Weisbecker, 1985, pp. 195–210.

[31] A von Humboldt, *Atlas géographique et physique du Royaume de la Nouvelle-Espagne*, Paris, F Schoell, 1808–11.

[32] A M C Godlewska, 'From Enlightenment vision to modern science? Humboldt's visual thinking', in D N Livingstone and C W J Withers (eds), *Geography and Enlightenment*, Chicago and London, University of Chicago Press, 1999, pp. 236–80.

[33] S Nikolow, '"Die Versinnlichung von Staatskräften": statistische Karten um 1800', *Traverse. Zeitschrift für Geschichte/Revue d'histoire*, 1999, **6**: 63–82.

[34] A von Humboldt, 'Tableau physique des Andes et pays voisins', Paris, F Schoell, 1808. See also H Beck and W-H Hein, *Humboldts Naturgemälde der Tropenländer und Goethes ideale Landschaft*, Stuttgart, Brockhaus Antiquarium, 1989.

[35] A Bonpland and A von Humboldt, *Nova genera et species plantarum*, vol. 1, Paris, Librairie Grecque-Latine-Allemande, 1815, first, unnumbered plate.

[36] See, for example, H Berghaus, *Physikalischer Schul-Atlas*, note 15 above, plate 20.

[37] See, for example, T Bromme, *Atlas zu Alexander von Humboldt's Kosmos*, Stuttgart, Krais and Hoffmann, 1851, plate 31.

[38] See Rupke, op. cit., note 5 above, p. 300.

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depict the distribution of heat over the northern hemisphere by means of lines of equal average temperature.[39] Significantly, these lines did not run parallel to lines of latitude, but showed systematic deviations due to the distribution of land and water, to oceanic currents, etc. Suddenly, measurements of temperature and other variables across the globe took on a new significance as the isoline technique bound such previously scattered observations together into a systematic pattern, linking the most peripheral places on earth in a meaningful way to the legitimizing centres of Western European scientific culture.[40]

Representation and Ideology

In spite of the scientific caliber of such representational innovations as isolines, the distribution maps were not neutral, objective records, but drawn up by certain subjective criteria, expressing particular values and political agendas. A careful reading of the medical maps reveals much ideological content. Humboldtian cartography was cosmopolitan and yet by no means free from national prejudices. In fact, Humboldtian cartography significantly contributed to the scientific construction of a world view that was crudely Eurocentric.[41] More specifically, Humboldtian medicine was an integral part of this endeavour, glorifying Europe's geographic features and climate, the health of its inhabitants and the pre-eminence of its culture—thus contributing to the intellectual foundations of nineteenth-century colonialism and arguing Euro-imperialism in new ways.[42]

The notion that the European climate is exceptionally salubrious, and that the physical, mental and moral health of Europeans is superior to that of other peoples was, of course, not new to the nineteenth century. One only has to thumb through the *Remarks on the Influence of Climate . . . on the Disposition and Temper, Manners and Behaviour, Intellects, Laws and Customs, Form of Government, and Religion, of Mankind* (1781), written by the Bath physician William Falconer (1744–1824) to see how extraordinarily pronounced such Euro-glorification could be during the second

[39] A von Humboldt, 'Sur les lignes isothermes', *Annales de chimie et de physique*, 1817, **5**: 102–11; this abbreviated version of Humboldt's widely published paper on isotherms and the distribution of heat across the globe carried the actual illustration of isotherms by Humboldt. See W Meinardus, 'Die Entwickelung der Karten der Jahres-Isothermen von Alexander von Humboldt bis auf Heinrich Wilhelm Dove', *Wissenschaftliche Beiträge zum Gedächtniss der hundertjährigen Wiederkehr des Antritts von Alexander von Humboldt's Reise nach Amerika am 5. Juni 1799*, Berlin, W H Kühl, 1899, pp. 1–32.

[40] See R W Home, 'Humboldtian science revisited: an Australian case study', *History of Science*, 1995, **33**: 1–22.

[41] N A Rupke, 'Eurocentric ideology of continental drift', *History of Science*, 1996, **34**: 251–72; also idem, 'Paradise and the notion of a world centre: from the physico-theologians to the Humboldtians', H-K Schmutz (ed.), *Phantastische Lebensräume, Phantome und Phantasmen*, Marburg, Basilisken-Presse, 1997, pp. 77–87.

[42] On the issue of cartography and imperialism, see among others J Browne, 'Biogeography and empire', in N Jardine, J A Secord and E C Spary (eds), *Cultures of Natural History*, Cambridge, Cambridge University Press, 1996, pp. 305–21; O Dreyer-Eimbcke, *Die Entdeckung der Erde: Geschichte und Geschichten des kartographischen Abenteuers*, Frankfurt am Main, Umschau, 1988, pp. 236–45; G King, *Mapping Reality: an Exploration of Cultural Cartographies*, Houndmills and London, Macmillan, 1996, pp. 137–66.

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half of the eighteenth century.[43] Nor was this unique to the Humboldtians: F Bisset Hawkins, for example, in his Gulstonian Lectures delivered at the Royal College of Physicians on Elements of Medical Statistics (1829), while maintaining the non-Humboldtian view that "the maladies of the individual appear to depend much more upon his habits and condition, and occasional local peculiarities, than upon the varieties of climate", also expressed a conviction as to the medical superiority of his own, temperate climate.[44]

Such views acquired a new scientific basis within the context of Humboldtian physiography, when the belief that Europe was the pinnacle of human civilisation was underpinned with a physiographical argument, namely that northwestern Europe is located precisely in the longitudinal and latitudinal middle of the world's continental masses. The map by means of which the physiographical centrality of Europe was defined, showed two hemiglobes, one exhibiting the maximum concentration of dry land, the other of oceanic waters.[45]

This physiographical definition of northwestern Europe as the centre of the world was accompanied by a new, Humboldtian way of marking Europe's climate as exceptional. The isotherms did not run parallel to the lines of latitude and, in the case of Europe, exhibited an exceptional deviation northwards, producing a major bulge that enveloped also the northern part of Europe in the mild embrace of the temperate zone. This temperate zone—it was argued—was the most favourable to health. Here old age is more often attained, diseases are less virulent, and the human temper most equipoised.

Yet the distribution of diseases was not easy to fit a Euro-glorification model. World distribution maps appeared to show that the healthiest places on earth were to be found in the southern hemisphere. The superior salubrity of the European, temperate region was indicated, if not by the absence of diseases, then by various features of normal body physiology—by health. Berghaus's planiglobe of diseases appeared as part of four anthropographical maps, separately published under the title *Allgemeiner anthropographischer Atlas* (1852).[46] Collectively, these maps showed Europe (or just northwestern Europe) as the world's pivotal region, where race and bodily health, mental development, diet and clothing, systems of government and religious beliefs all reached a global optimum. Various marginal insets provided a subtext that spoke the clearest Euro-glorification language: on one, it was shown that the tallest people on earth lived in the temperate zones, and that of these tall people the Germans were the very tallest (Figure 3); on another, it showed that the onset of puberty was delayed in the temperate as compared with polar and tropical climates (a late onset of puberty was seen as a mark of high civilization), and that

[43] W Falconer, *Remarks on the Influence of Climate, Situation, Nature of Country, Population, Nature of Food, and Way of Life, on the Disposition and Temper, Manners and Behaviour, Intellects, Laws and Customs, Form of Government, and Religion of Mankind*, London, C Dilly, 1781.

[44] Cited in Rupke, op. cit., note 5 above, p. 304.

[45] H Berghaus, *Physikalischer Atlas*, Gotha, Justus Perthes, 1845–8, part 3, plate 1. For a discussion and reproductions of the map, see note 41 above.

[46] H Berghaus, *Allgemeiner anthropographischer Atlas: eine Sammlung von vier Karten, welche die Grundlinien der, auf das Menschen-Leben bezüglichen Erscheinungen nach geographischer Verbreitung und Vertheilung abbilden und versinnlichen*, Gotha, Justus Perthes, 1852.

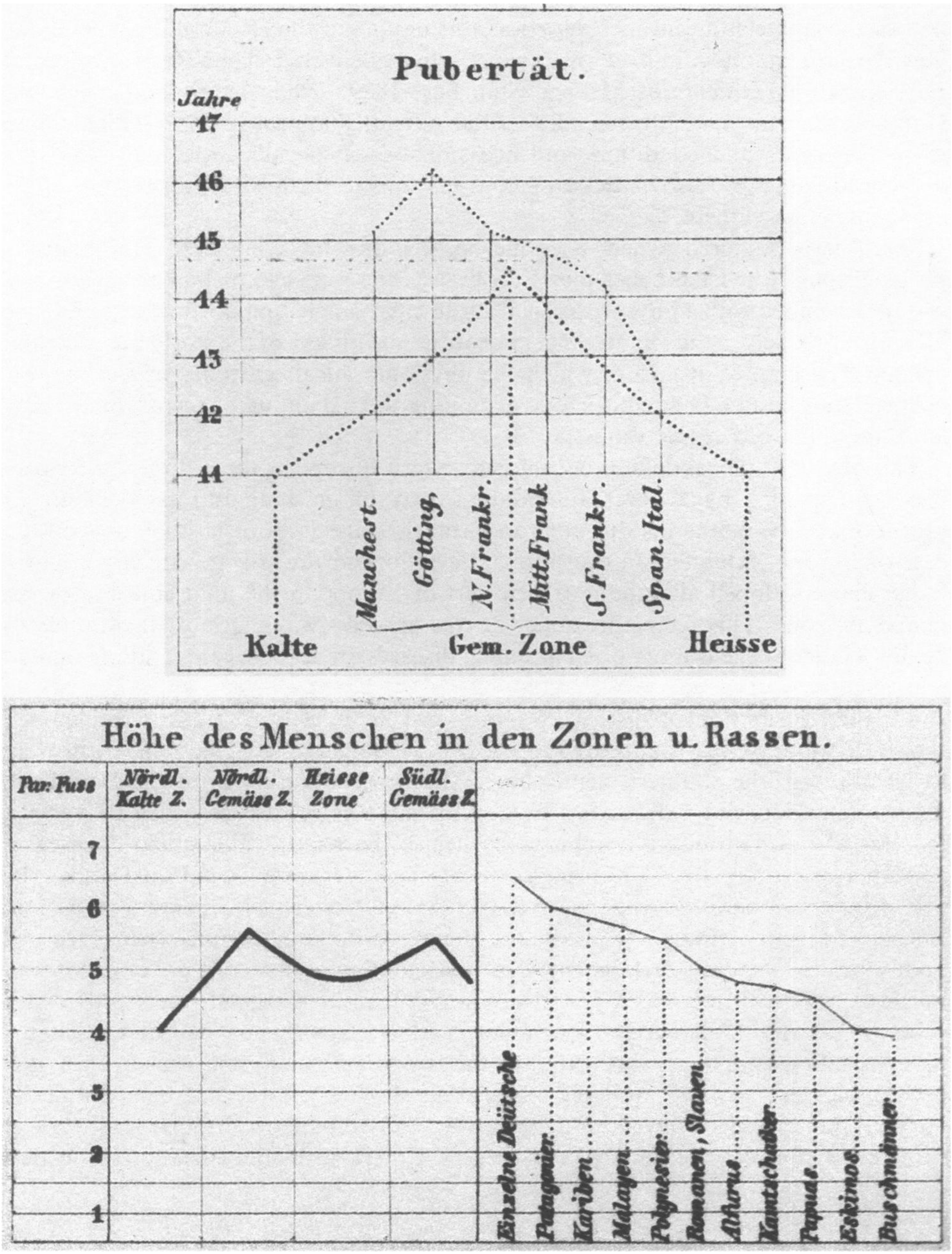

Figure 3: Marginal insets on the maps 'Geographische Verbreitung der Menschen-Rassen' (top) and 'Planiglob zur Übersicht der geographischen Verbreitung der vornehmsten Krankheiten, denen der Mensch auf der ganzen Erde ausgesetzt ist' (bottom); from Heinrich Berghaus, *Physikalischer Atlas*, second edition, Gotha, Justus Perthes, 1852, part 7, plates 1, 2.

within the northern temperate zone, the very latest onset was known from the famous university town of Göttingen (Figure 3). Not only physical health, also moral constitution reached a global maximum in northwestern Europe: here—on the fourth of Berghaus's anthropographical maps—sessile agriculture, Christianity and constitutional monarchy dominated and, moreover, the highest degree of mental development was reached, namely among the Protestants—that is, among the very people who, for the first time, employed the Humboldtian representational innovations in producing maps of medical and anthropological cartography.