

Chapter 10

The first Global Map of the Distribution of Human Diseases: Friedrich Schnurrer's 'Charte über die geographische Ausbreitung der Krankheiten' (1827)

RAINER BRÖMER

The practice of global cartographic representation of diseases dates from the first third of the nineteenth century, that is, from a time when, in the context of large-scale exploration of the physical world, naturalists such as Alexander von Humboldt (1769–1859) devised the conceptual means for such visual representation, namely, the technique of isotherms.¹ By means of these, a coherent, geographical distribution of physical parameters could be visualized. Leonhard Ludwig Finke's (1747–1837) early, three-volume *Versuch einer allgemeinen medicinisch-praktischen Geographie* (Essay on General Medico-Practical Geography) was not accompanied by any cartographic representations (although he may have attempted such a map).² Yet disease maps were published before 1830, the year commonly associated with the emergence of a widespread interest in medical geography, when a cholera epidemic threatened Europe.³

In 1827, the Swabian physician Friedrich Schnurrer (1784–1833), *Amtsarzt* (public health officer) in Vaihingen on the Enz (near Stuttgart), presented what is believed to be the first global 'Charte über die geographische Ausbreitung der Krankheiten' (Map of the geographical Distribution of Diseases).⁴ The map is here interpreted as

Rainer Brömer, Cultural History Group, University of Aberdeen, Old Brewery, Aberdeen AB24 3UB, Scotland.

¹ See Nicolaas A Rupke, 'Humboldtian Medicine', *Medical History*, 1996, 40: 293–310.

² L L Finke, *Versuch einer allgemeinen medicinisch-praktischen Geographie*, 3 vols. Leipzig, Weidmann, 1792–5. See also Frank A Barrett, 'Finke's 1792 Map of Human Diseases: The First World Disease Map?', *Social Science and Medicine*, 2000, 50: 915–21.

³ As has been held, e.g., by H J Jusatz, 'Zur Entwicklungsgeschichte der medizinisch-geographischen Karten in Deutschland', *Mitteilungen des Reichsamts für Landesaufnahme*, Berlin, 1939, vol. 1, pp. 11–22.

⁴ Helmut Siefert, 'Hygiene, ein Thema in der Frühzeit der Gesellschaft', in Hans Querner and Heinrich Schipperges (eds), *Wege der Naturforschung 1822–1972 im Spiegel der Versammlungen Deutscher Naturforscher und Ärzte*, Heidelberg etc., Springer, 1972, pp. 171–85, esp. on p. 173.

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part of the contemporary emergence of Humboldtian representation and as a typical product of the transition from Romantic speculation to “natural historical” medicine.⁵

Life of Friedrich Schnurrer

Schnurrer was born in Tübingen in 1784. His father, Christian Friedrich Schnurrer (1742–1822) was an important theologian and orientalist who later became chancellor of Tübingen University. In 1800, at the age of nearly sixteen, Friedrich enrolled at Tübingen. Among his teachers in the Medical Faculty were Gottlieb Konrad Christian Storr (1749–1821), Wilhelm Gottfried Ploucquet (1744–1814), Karl Friedrich Kiemeyer (1765–1844), and Johann Heinrich Ferdinand Autenrieth (1772–1835). In 1805, Schnurrer obtained his MD under Kiemeyer with a dissertation entitled *Observata quaedam de materierum quarundam oxadatarum in germinationem efficientia pro diversa seminum rerumque externarum indole* (Observations on the Effects of Certain Oxydated Substances on the Germination of Seeds),⁶ in which he developed observations made earlier by Alexander von Humboldt in his *Floræ Fribergensis specimen* (1793).⁷ Schnurrer’s dissertation was in part republished in the *Journal für die Chemie und Physik* (1806)⁸ and reviewed in the *Medicinish-chirurgische Zeitung* (1807).⁹ Having obtained his MD, Schnurrer continued academic study for a number of years at Würzburg, Bamberg, Göttingen, and Berlin. In 1807, he visited Paris, and met Georges Cuvier (1769–1832).¹⁰ Later that year, back in Tübingen, Schnurrer passed his qualifying examination for the practice of medicine and again enrolled at Tübingen University.

During this further period of study at Tübingen, Schnurrer joined a circle of Romantic poets, the so-called “Schwäbische Dichter”, led by the physician Justinus Kerner (1786–1862),¹¹ the poet Ludwig Uhland (1787–1862),¹² the philologist Gustav Schwab (1792–1850), and another physician, Karl Heinrich Köstlin (1787–1859). Another, temporary, member was the Berlin diplomat and later famous Humboldt correspondent Karl August Varnhagen von Ense (1785–1858).

In 1810, Schnurrer published his first monograph, *Materialien zu einer allgemeinen Naturlehre der Epidemien und Contagien* (Documents for a General Natural History

⁵ Cf. Johanna Bleker, *Die naturhistorische Schule 1825–1845. Ein Beitrag zur Geschichte der klinischen Medizin in Deutschland*, *Medizin in Geschichte und Kultur* 13, Stuttgart, Fischer, 1981.

⁶ Fridericus Schnurrer, *Observata quaedam de materierum quarundam oxydatarum in germinationem efficientia pro diversa seminum rerumque externarum indole*, Tübingen, Litt. Hopffer, 1805.

⁷ Alexander von Humboldt, *Floræ Fribergensis specimen plantas cryptogamicas præsertim subterraneas exhibens*, Berlin, Rottmann, 1793.

⁸ F Schnurrer, ‘Beobachtungen über den Einfluß einiger oxydierter Substanzen auf das Keimen der Samen, nach der verschiedenen Beschaffenheit der letzteren und unter verschiedenen äußern Umständen’, *Journal für die Chemie und Physik*, 1806, 2: 56–76.

⁹ *Observata quaedam* ... (1807), *Medicinish-chirurgische Zeitung*, 1807, 3 (53): 23–5.

¹⁰ Karl Friedrich von Kiemeyer, *Gesammelte Schriften*, ed. F H Holler, Berlin, Keiper, 1938, pp. 235–54 [Kiemeyer to Cuvier, Dec. 1807], especially pp. 235 and 254.

¹¹ Otto-Joachim Grüsser, ‘Der Kerner-Uhland-Kreis und die Entstehung der älteren schwäbischen Romantik’, in idem, *Justinus Kerner 1786–1862. Arzt Poet Geisterseher*, Berlin, Springer, 1987, pp. 48–59.

¹² In the correspondence between Uhland and Kerner, Schnurrer is frequently mentioned: Theobald Kerner, *Briefwechsel Justinus Kerners mit seinen Freunden*, Leipzig and Stuttgart, Deutsche Verlagsanstalt, 1897, passim.

of Epidemics and Contagia),¹³ which was translated into French (1815). In 1811, again in Tübingen, Schnurrer offered a course on 'Die Abänderungen der Krankheiten in verschiedenen Climates und über Krankheiten, die gewissen Gegenden eigenthümlich sind, in Verbindung mit physischer Geographie und Naturgeschichte des Menschen' (The Changes of Diseases in Different Climates and on Diseases Which are Endemic in Certain Regions, Together With Physical Geography and Natural History of Man). This course appears not to have engendered enough interest to attract any paying students.¹⁴

Later that year, Schnurrer became *Amtsarzt* (public health officer) in Herrenberg, not far from Tübingen; this marked the end of the purely scientific phase of his career. The reasons for this change are not known. Uhland regretted Schnurrer's departure and regarded this as an impoverishment of the poets' circle. Schnurrer himself, in the preface to his 1831 *Allgemeine Krankheits-Lehre*, expressed regret that he had not followed a scientific career.¹⁵ Despite practical commitments, Schnurrer was able to continue his scientific work, and in 1813 he published his *Geographische Nosologie oder die Lehre von den Veränderungen der Krankheiten in den verschiedenen Gegenden der Erde, in Verbindung mit physischer Geographie und Natur-Geschichte des Menschen* (Geographical Nosology or Doctrine of the Changes of Diseases in Different Parts of the World, in the Context of Physical Geography and the Natural History of Man),¹⁶ which for the most part was a compilation of historical accounts of various diseases from published sources that Schnurrer had found in the libraries of Storr, von Ploucquet, Kilmeyer, and Autenrieth—and in that of his father.

In 1814, Schnurrer was appointed *Oberamtsarzt* (district public health officer) in Vaihingen on the Enz, a few miles from Stuttgart, and in the following year he married. After 1817, Schnurrer contributed articles to Ersch and Gruber's *Allgemeine Encyclopaedie der Wissenschaften und Kuenste* on various medical topics, such as 'Air (the disease)', 'Albinos', 'Alopecie', and 'Contagion'.¹⁷ One of the most important entries is the one of 1828 on 'Cholera'.¹⁸ During this period, Schnurrer corresponded with various colleagues in order to collect material for his magnum opus, the two volume *Chronik der Seuchen* (Chronicle of Epidemics) which appeared 1823–1825.¹⁹ Subsequently, from 1825 through 1828, he contributed sixteen reviews on different

¹³ F Schnurrer, *Materialien zu einer allgemeinen Naturlehre der Epidemien und Contagien*, Tübingen, Heerbrandt, 1810.

¹⁴ Klaus Bauer, Friedrich Schnurrer (1784–1833), ein Arzt aus Tübingen, *Bausteine zur Tübinger Universitätsgeschichte*, 1995, 7: 65–82.

¹⁵ Friedrich Schnurrer, *Allgemeine Krankheits-Lehre gegründet auf die Erfahrung und auf die Fortschritte des neunzehnten Jahrhunderts*, Tübingen, Osiander, 1831, p. vii.

¹⁶ Friedrich Schnurrer, *Geographische Nosologie oder die Lehre von den Veränderungen der Krankheiten in den verschiedenen Gegenden der Erde, in Verbindung mit physischer Geographie und Natur-Geschichte des Menschen*, Stuttgart, Steinkopf, 1813.

¹⁷ 'Ansteckende Krankheiten', in J S Ersch and J G Gruber (eds), *Allgemeine Encyclopädie der Wissenschaften und Künste . . .*, vol. 4, Leipzig, Gleditsch, 1820, pp. 243–4; 'Ansteckung', *ibid.*, pp. 244–6.

¹⁸ 'Cholera' in *ibid.*, vol. 17 (1828), pp. 42–8.

¹⁹ Friedrich Schnurrer, *Chronik der Seuchen in Verbindung mit den gleichzeitigen Vorgängen in der physischen Welt und in der Geschichte der Menschen. Erster Theil vom Anfang der Geschichte bis in die Mitte des fünfzehnten Jahrhunderts. Zweiter Theil von der Mitte des fünfzehnten Jahrhunderts bis auf die neueste Zeit*, Tübingen, Osiander, 1823–5.

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medical texts (including his own *Chronik*) to one of the leading review journals of that time, the *Göttingische Gelehrte Anzeigen*.

In 1830, Schnurrer was appointed personal physician to the Duke of Nassau in his residence of Biebrich near Wiesbaden. He published his last work in 1831, a compendium of pathology. Appointed Privy Councillor in 1832, Schnurrer died in 1833 at the age of forty-eight.

Nosology

In 1827, Schnurrer transformed his chronological narrative of diseases into a spatial representation, producing the above mentioned 'Charte über die geographische Ausbreitung der Krankheiten', which was presented and discussed at the sixth annual *Versammlung der deutschen Aerzte und Naturforscher* (Meeting of German Scientists and Physicians) in Munich²⁰ and, the following year, published in the Cotta journal *Das Ausland*.²¹ Schnurrer's map was the first attempt to visualize, on a world scale, the distribution of disease. As he informed the Munich audience, his inspiration for the cartographic representation of the distribution of diseases was derived from the geographic work of Eberhard Zimmermann (1743–1815),²² Carl Ritter (1779–1859),²³ and the Danish climatologist and plant geographer Joakim Frederik Schouw (1789–1852).²⁴ In his paper accompanying the presentation of the map, Schnurrer discussed a variety of methodological problems inherent to his project. He objected to the notion that diseases exist independently of their human hosts and paid considerable attention to the difficulties of graphically representing topographical, historical, and scholarly information. Schnurrer intended to distribute his data over a series of maps of different scales, of which only the first—the global one—was published (though in the report of the Munich meeting, a second map, limited to Europe, was mentioned).²⁵

What did Schnurrer hope to attain in plotting the incidence of disease over geographical space? To answer this question it is necessary to see him against the historical background of the widespread controversy over the contagious character of diseases, a controversy that had far-reaching implications—as Johanna Bleker

²⁰ According to the report on the meeting in Oken's *Isis*, there had also been shown a 'Charte von Europa mit den endemischen Krankheiten', *Isis*, 1828, 21, (5–6): col. 520.

²¹ 'Die geographische Vertheilung der Krankheiten, vorgelesen in der Versammlung der deutschen Aerzte und Naturforscher zu München den 22 Sept. 1827. Von Dr. Schnurrer. (Mit einer Charte)', *Das Ausland*, 30 March 1828, no. 90: 357–9.

²² Professor of mathematics and physics in Brunswick, 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, 34: 351–7; also Josef Schmithüsen, *Vor- und Frühgeschichte der Biogeographie*, Biogeographica XX, Koenigstein, Koeltz, 1985, pp. 65–8.

²³ One of the most famous geographers of the time, see Schmithüsen, note 22 above.

²⁴ See J F Schouw, *Pflanzengeographischer Atlas zur Erläuterung von Schouws Grundzügen einer allgemeinen Pflanzengeographie*, Berlin, Reimer, 1823.

²⁵ *Isis*, see note 20 above.

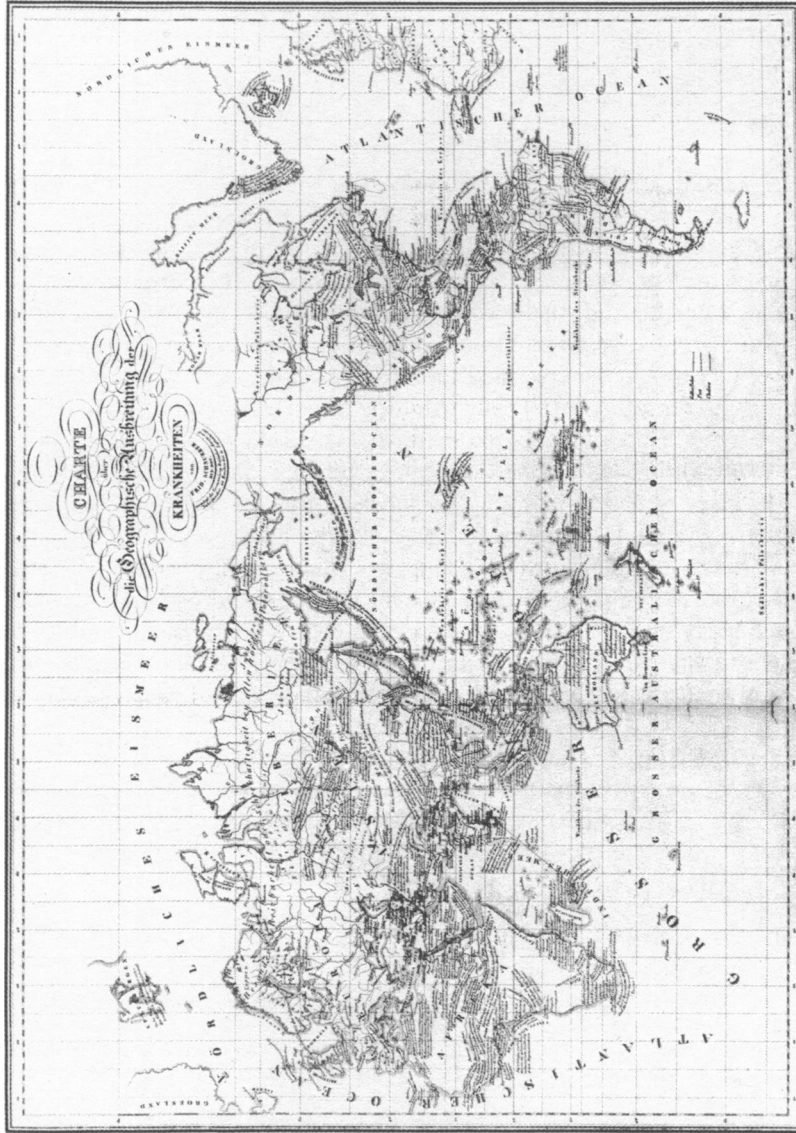


Figure 1: 'Charte über die geographische Ausbreitung der Krankheiten', in 'Die geographische Vertheilung der Krankheiten, vorgelesen in der Versammlung der deutschen Aerzte und Naturforscher zu München den 22 Sept. 1827. Von Dr. Schnurrer. (Mit einer Charte)', Das Ausland, 30 March 1828, no. 90, pp. 357–9.

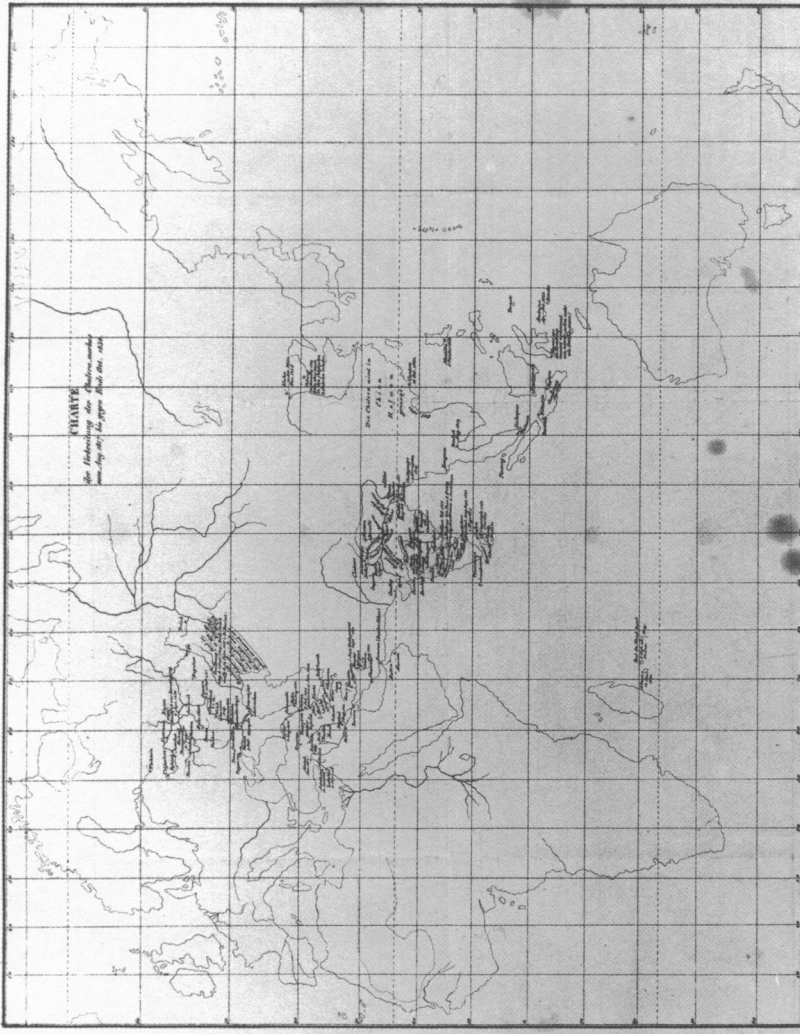


Figure 2: 'Charte der Verbreitung der Cholera morbus vom Aug. 1817 bis gegen Ende Oct. 1830', in F Schnurrer, *Die Cholera morbus, ihre Verbreitung, ihre Zufälle, die versuchten Heilmethoden, ihre Eigentümlichkeiten und die im Großen dagegen anzuwendenden Mittel. Mit der Charte ihres Verbreitungsbezirks*, Stuttgart and Tübingen, Cotta, 1831.

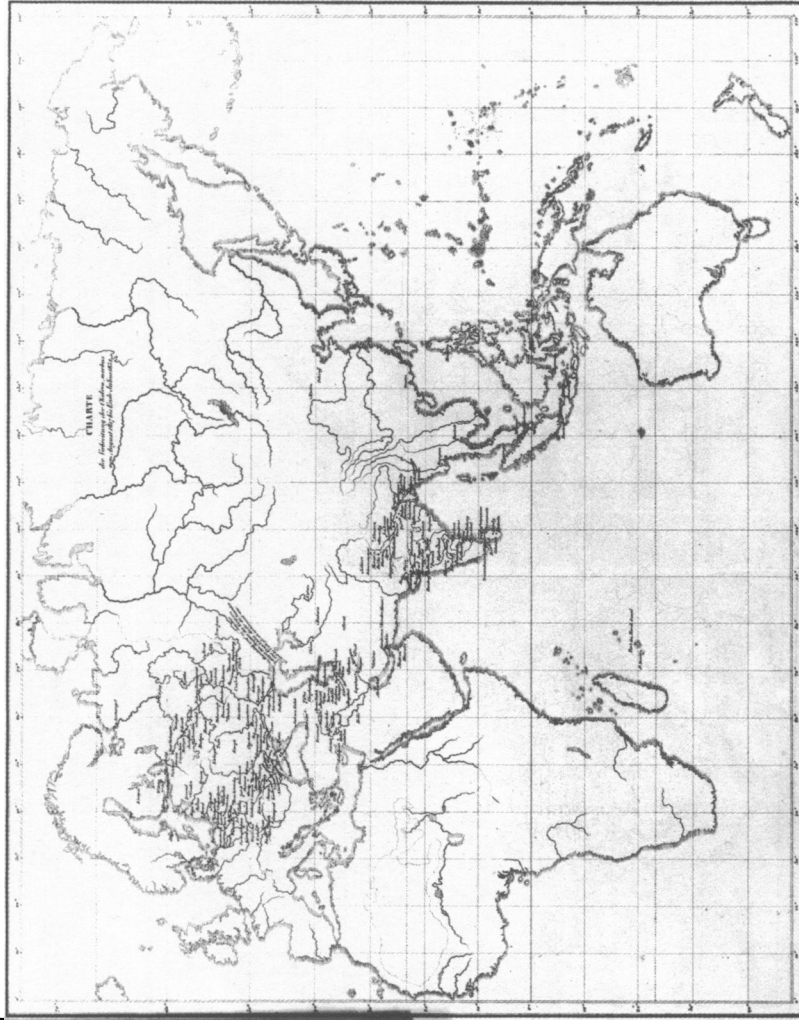


Figure 3: 'Charte der Verbreitung der Cholera morbus vom August 1817 bis Ende Julius 1831', in F Schnurrer, *Die Cholera morbus*, second edition, Stuttgart and Tübingen, Cotta, 1831.

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and others have pointed out—for commercial trade, state power, and social stability.²⁶ At the end of the seventeenth century, the English physician Thomas Sydenham (1624–1689) had developed a method for classifying diseases that was analogous to the systems used to classify plants.²⁷ Later, at the turn of the eighteenth century, it was still an open question whether diseases were fixed, as organic species were believed to be, and, if so, how it was that new diseases periodically originated. Thus, by the first decade of the nineteenth century, a number of naturalists began to investigate the natural history of diseases. Schnurrer mentioned, among others, Philipp Friedrich Hopfengärtner (1771–1807), August Heinrich Ferdinand Gutfeldt (1778?–1808), and Joachim Dietrich Brandis (1762–1845).²⁸ He himself considered diseases as constant entities that were susceptible to environmental influence, stressing the value of empirical study. His goal was to achieve a complete *Enunciatio Facti*—a work of such encyclopedic scope that it would render all subsequent theories of contagion “superfluous”.²⁹

The Map

Schnurrer’s major writings, in particular his *Chronik der Seuchen*, received much attention from doctors and historians, yet his 1827 map remained virtually unknown. In spite of the fact that he lectured to an international audience—for the Meetings of German Naturalists and Physicians attracted foreign participants—only a brief notice of Schnurrer’s presentation appeared in Lorenz Oken’s (1779–1851) *Isis*.³⁰ Only in 1828 did the *Naturforscherversammlungen* begin publishing their own memoirs, and thus, in the case of Schnurrer and his map, it was up to the author to decide whether and where to publish. It may seem odd that Schnurrer had his map and Munich lecture published in the popular Cotta journal *Das Ausland*,³¹ despite Oken’s invitation to the speakers of the Munich meeting to contribute their papers to *Isis*.³² One reason for his choice may have been that he was an ardent reader of Cotta’s magazines, as he wrote to Cotta in 1830.³³ Yet he may also have preferred a periodical known for the excellence of its illustrations and for its honoraria.³⁴

²⁶ Johanna Bleker, ‘Die historische Pathologie, Nosologie und Epidemiologie im 19. Jahrhundert’, *Medizinhistorisches Journal*, 1984, 19: 33–52; eadem, ‘Die Idee einer historischen Entwicklung der Krankheiten des Menschengeschlechts und ihre Bedeutung für die empirische Medizin des frühen 19. Jahrhunderts’, *Berichte zur Wissenschaftsgeschichte*, 1985, 8: 195–204; see also Erwin H Ackerknecht, ‘Anticontagionism Between 1821 and 1867’, *Bulletin of the History of Medicine*, 1948, 22: 562–93.

²⁷ Thomas Sydenham, *Observationes medicae circa morborum acutorum historiam & curationem*, London, G Kettilby, 1676.

²⁸ Schnurrer, op. cit., note 13 above, preface.

²⁹ *Ibid.*, pp. iii–iv.

³⁰ *Isis*, note 20 above.

³¹ As indicated by the subtitle ‘Ein Tagblatt für Kunde des geistigen und sittlichen Lebens der Völker, mit besonderer Rücksicht auf verwandte Erscheinungen in Deutschland’.

³² ‘Versammlung der Naturforscher und Aerzte im September zu München’, *Isis*, 1828, 21 (5–6), col. 417–596.

³³ Letter dated 11 November 1830. Schiller-Nationalmuseum/Deutsches Literaturarchiv, Cotta-Archiv (Stiftung der Stuttgarter Zeitung), Marbach am Neckar, Cotta Br. Schnurrer, Friedrich 3. Schnurrer explicitly mentions the journals *Allgemeine Zeitung*, *Morgenblatt*, and *Das Ausland*.

³⁴ Schnurrer’s choice was ill-fated. Various bibliographies of Schnurrer’s works cite the map as a separately published sheet. None mentions the journal *Das Ausland* or Schnurrer’s programmatic comments at Munich. Furthermore, there is no indication how a similar map of disease in Berghaus’ *Atlas* may

Figure 1 shows Schnurrer's map. At first glance, one is struck, if not confused, by the density of information. Little use was made of colour, as only yellow fever, plague, and cholera had yellow, red, and blue lines respectively under their topographic names. Global routes and historical patterns of the spread of epidemics remained unclear, since occurrences of the diseases from antiquity to Schnurrer's own times were superimposed.³⁵ In the case of some diseases, such as the "particular irritability and nervousness of all polar peoples", the distribution stretched around the whole Eurasian arctic coast, but most of Schnurrer's indications were more localized or even anecdotal, referring to single reports from voyages of exploration. Schnurrer drew few lines to indicate areas of distribution of certain pathological phenomena, with the exception of the "Northwestern boundary of intermitting fever", which ran from Ireland in a slightly convex arch over to Karelia, taken up in Mongolia and continuing to Kamchatka and beyond. The cartographic idiom of Schnurrer's map resembled that of Zimmermann's animal geography, which also showed few lines of distribution (see Chapter 9 in this volume). Schnurrer's reluctance to use lines was odd, since in the lecture accompanying his map, he spoke extensively of areas of distribution.

... the intermitting fever, which characterizes man over the animals and mostly occurs only in adult age, is a disease which accompanies European man on his journeys, at least sometimes, but, according to the observations of Nil Dalberg, Debes, Manicus, and Kratsheninnikow, is not present on the islands to the north of Great Britain, on the Faeroe Islands, in Iceland, in Northern Sweden, and on Kamchatka, notwithstanding its marshes and moors. Within these latitudes, it occurs in all places where man shifts between opposing influences of the soil, and it even strikes the Indians in Spanish Guyana as soon as they are transplanted to the missions from their free existence in the woods, and even those inhabitants of unhealthy regions who exchange their residences for healthier ones.³⁶

Other diseases that Schnurrer described in his Munich address were intermitting fever affecting the spleen, compared with two diseases affecting the thyroid: goiter and cretinism. The last part of his lecture dealt with recent epidemics that had spread over large areas of the globe: "cholera, the plague, and yellow fever". Schnurrer cited the distribution map of cholera by Alexandre Moreau de Jonnés (1778–1870) and the map of plague by Carl Christian Matthäi (1770–1847), though he seemed

have been inspired by Schnurrer's effort. The contributor to the third edition of Berghaus's *Atlas* did mention Schnurrer's name, but no book or journal title, so he may well have been referring to his better known *Chronik der Seuchen*. Herm[ann] Berghaus (ed.), *Berghaus' Physikalischer Atlas*, 3rd edn, Gotha, Justus Perthes, 1892, Section VII, 'Atlas der Völkerkunde', ed. Dr Georg Gerland, p. 4.

³⁵ Schnurrer once used a line to show that cholera moved from Ceylon to the island of St Louis near Madagascar.

³⁶ "Das intermittirende Fieber, das den Menschen vor den Thieren und auch meistens nur dem erwachsenen Alter zukommt, ist ... eine Krankheit, welche den Europäer wenigstens auf seinen Wanderungen zeitweise begleitet, doch nach den Beobachtungen von Nil Dalberg, Debes, Manicus und Kratscheninnikow auf den Inseln im Norden von Großbritannien, auf den Farröern, auf Island, im nördlichen Schweden und auf Kamtschatka, aller Marsch- und Moorgründe unerachtet, nicht mehr vorkommt. Innerhalb dieser Breiten tritt dasselbe überall hervor, wo der Mensch zwischen sehr entgegengesetzten Einflüssen des Bodens wechselt, und befällt selbst den Indianer im spanischen Guiana, sobald derselbe aus dem freien Leben in seinen Wäldern in die Missionen verpflanzt wird, ja sogar häufig den Bewohner ungesunder Gegenden, wenn er seinen bisherigen Aufenthalt mit dem in gesunden tauscht." Schnurrer, op. cit., note 21 above, pp. 357–8.

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well aware of the methodological shortcomings of their approach. At the beginning of the lecture, Schnurrer outlined the difficulties which differentiated his project from the models of plant and animal geography created by Zimmermann,³⁷ Ritter, and Schouw. Since “diseases do not exist autonomously, as do other products of organic life, but are instead bound to the distribution of the latter, and especially that of man, registers of disease are dependent on maps of humankind”.³⁸

After further remarks, on the difficulties involved in establishing the distribution of diseases by direct observation, Schnurrer continued: “Since diseases, like species of plants and animals, are at the same time expressions of the original formative force of the earth, and maintain inalterably their own character, their connective areas can be outlined on a global map”.³⁹

In fact, Schnurrer proposed a whole atlas of maps based on the one he presented. A second map would encompass Europe, Western Asia to the east coast of the Caspian Sea, and the northern edge of Africa. A third of the same region was to represent the epidemic diseases historically, and a fourth one the epizootics (animal diseases). On an even larger scale, for each of the greater European states, Schnurrer proposed detailed topographical and historical maps, with all recorded dates of epidemics, together with further information on the nosological state of the disease and the topography of the place of outbreak.

Schnurrer did not produce any of the maps he proposed, but he did write a much less ambitious work that proved a major commercial success: a booklet on the cholera, *Die Cholera morbus*, published by Cotta in 1831, with a second edition the same year. This contained a map of the distribution of the contemporary cholera epidemic,⁴⁰ with only a few dates and references to travel accounts (Figure 2), which were left out in the second printing (Figure 3),⁴¹ with the single exception of Alexander von Humboldt’s 1829 encounter with the cholera in Kirgysia. Thus, the second edition of the map, though containing less information, appears to be more homogeneous, and methodologically more up-to-date.

³⁷ Compare esp. E A W Zimmermann, *Tabula Mundi Geographico Zoologica sistens Quadrupedes hucusque notos sedibus suis adscriptos*, Leipzig, Weygand, 1778.

³⁸ “. . . daß die Krankheiten nicht wie andere Productionen des organischen Lebens ihre eigenthümlichen Existenzen haben, sondern an die Verbreitung dieser, zumal des Menschen, gebunden sind, und eine Verzeichnung der Krankheiten daher schon eine Charte des Menschengeschlechts, als ihres Substrats, voraussetzt.” Schnurrer, op. cit., note 21 above, p. 357, col. 1.

³⁹ “Da jedoch die Krankheiten wie die Formen der Pflanzen und Thiere zugleich auch Aeußerungen der ursprünglichen Bildungskräfte der Erde sind, und ihren unvertilgbaren Charakter behaupten, so lassen sich auf einer Welt-Charte wenigstens ihre Verbindungsbezirke einigermaßen andeuten.” Schnurrer, *ibid.*

⁴⁰ ‘Charte der Verbreitung der Cholera morbus vom Aug. 1817 bis gegen Ende Oct. 1830’, in F Schnurrer, *Die Cholera morbus, ihre Verbreitung, ihre Zufälle, die versuchten Heilmethoden, ihre Eigenthümlichkeiten und die im Großen dagegen anzuwendenden Mittel. Mit der Charte ihres Verbreitungsbezirks*, Stuttgart and Tübingen, Cotta, 1831.

⁴¹ ‘Charte der Verbreitung der Cholera morbus vom August 1817 bis Ende Julius 1831’, in F Schnurrer, *Die Cholera morbus*, 2nd ed., Stuttgart and Tübingen, Cotta, 1831.