

## PARACELSUS (1493-1541)

BY PROF. J. R. PARTINGTON, M.B.E.

**P**HILLIPUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM, who afterwards assumed the name Paracelsus to indicate that he believed himself as great a physician as Celsus, was born towards the end of 1493 at Einsiedeln in Switzerland, then part of Germany. His father was a practising physician of repute and his teaching laid the foundation of the medical career of the son. Of the early life of Paracelsus nothing is known beyond conjecture until 1526, when he appeared at Strasburg as a physician, described as doctor and admitted to citizen rights and to a Guild of Surgeons. He studied medicine, but it is not known how. In his writings he emphasizes that he got most of his useful knowledge from artisans and from the humbler assistants of the medical profession, whom he rates higher than the schools. On the other hand, he also once stated on oath that he had become a doctor of the University of Ferrara, and it is difficult to understand his short-lived official appointments unless he was properly qualified. Besides his medical knowledge, Paracelsus also says he had great experience for a long time with many alchemists and metallurgists, and he undoubtedly visited many mines and smelters in his travels some time about 1514. These travels probably took in most European countries, including England, at various times, but those further afield are doubtful.

The information Paracelsus acquired from the miners and alchemists seems, from what he says of it, to have been fairly superficial and such as could have been picked up by almost anyone in conversation. It would, however, have suggested to him the possibility of using metallic preparations as remedies. If he did study in Italy this would have provided a direct source for some features of his teachings, since his so-called philosophy is a mixture of German folk-superstition with the thaumaturgic elements of Neo-Platonism, then popular in Italy by reason of its revival by Ficino. The view that Paracelsus himself was the originator of the use of chemical remedies is quite mistaken, since this had been gaining ground since the time of Arnald of Villanova, who died nearly two centuries before Paracelsus was born.

While at Strasburg Paracelsus must have enjoyed more than a local reputation as a physician, since he was sent for by Frobenius, the celebrated publisher of Basle, whose illness had resisted the attempts of the physicians of that town to effect a cure. Whatever else may be obscure in the life

of Paracelsus it seems quite certain that he was able to relieve diseases the curbing of which was beyond the powers of the regular medical system. It also seems probable, and is directly asserted by Boerhaave, that Paracelsus's medical fame lay in his skill in surgery and in his daring use of remedies, including chemical remedies, which were outside the list of those permitted to the physicians of his time. He was able to effect at least a temporary cure of Frobenius, and by the influence of his patient, and of that of *Cœcolampadius* (who was professor of theology at Basle) and of Erasmus, who was then staying with Frobenius, Paracelsus was appointed professor of medicine at Basle. There is no evidence that he lectured there on chemistry.

For various reasons the stay at Basle was a short one. Paracelsus gave offence by lecturing in German instead of Latin, by abusing the old medical authorities and ridiculing—even it is said publicly burning—their writings, and by litigation with influential persons about his fees. After two years he was forced to leave Basle in disgrace. Thereafter much of his life was spent in precarious circumstances and in moving from place to place. He seems, however, often to have been treated with respect and to have enjoyed the acquaintance and hospitality of prominent citizens, but he also experienced poverty and met with contumely and contempt, which he knew how to return in kind. His arrogance and violence are beyond doubt, but these should not influence us in forming an estimate of his ability or in seeking for evidence of his solid achievements. He constantly emphasizes the futility of mere professional ritual, and in contrasting the silk-clad doctor spending his time cultivating the benevolent interest of the influential, with the alchemist working in his laboratory in a leather apron, he pointed the way which so many since his time have found it necessary to tread if any real progress is to be made. His insistence on the experimental method as contrasted with reliance on tradition is clear, and he is justly regarded as one of the great reformers of medicine.

After his official position came to an end, Paracelsus seems to have spent much of his time writing, and several important works were published in his lifetime. After his death, what were regarded as his genuine works were collected and edited by Huser and published in ten volumes during 1589-1591. This edition is the basis of all later ones and was prepared with unusual care and skill.

The whole works have recently been edited by Sudhoff, the foremost authority on Paracelsus, and at least fourteen volumes of this edition have appeared. Besides his genuine works there are several, mostly of an alchemical or mystical character, which are regarded as spurious, and it is on the basis of these that many unfavourable estimates of his character and beliefs have been based. In his case, however, apparent contradictions in separate works have little weight in deciding their authenticity. Apart from editions of his works there has been a really tremendous literature on Paracelsus, and a Paracelsus Society was recently established in Germany. A summary of the literature on Paracelsus and an appreciation of his contributions to science have recently been given by Dr. A. F. Titley in *Ambix* (the journal of the Society for the Study of Alchemy and Early Chemistry; 1, No. 3; 1938)

The reasons for this great interest in Paracelsus are various. The historians of medicine turn to a study of the reformer, whose violent methods recall and were probably modelled on those of his contemporary and countryman Luther. The historians of chemistry are anxious to find some justification for the claims that Paracelsus was of importance in their science. Those wider circles interested in the occult and superstitious find in his chaotic writings, not excluding the spurious ones, much of interest in their field. The man himself has formed the subject of poetry and romance.

The genuine writings of Paracelsus which appeal especially to the historian of science are the "Archidoxa" (of which an English translation appeared in 1663) and the "De Natura Rerum", which contain much of interest but nothing which can reasonably be said to constitute a definite advance in scientific knowledge. They emphasize that the main task of alchemy is not to make gold and silver but to prepare powerful remedies, and this certainly had a good influence on the development of chemistry and pharmacy. Many new mineral remedies, such as preparations of antimony, appeared as a result of this redirection of effort, but it has been emphasized above that Paracelsus had precursors in this field. An important feature of his teachings was his insistence that from a large bulk of inert material there could be extracted some small potent quintessence or arcanum in which the virtue of the medicine is concentrated (a view which is emphasized in the "Alchymia" of Libavius in 1597), but this idea again is to be found in the works of Arnald of Villanova and in the treatises attributed to Raymond Lully. The great stewpans of broths and messes of the Galenic and Arabian medicine gave way after Paracelsus's time to the small stoppered phials of the chemical pharmacist, and if some of these, with their arsenical and

mercurial contents, were to wreak havoc in the hands of less-skilled practitioners, the ultimate gain was real and permanent. Many of his younger followers were men of great ability and he certainly inspired much valuable and enduring work in chemical pharmacy.

The writings of Paracelsus are very difficult to read and more difficult to understand. They provide an excuse for the charge frequently made that he was a charlatan, but when allowance is made for his extraordinary style they reveal his sincerity and receptiveness. They abound in strange words, but the terminology of contemporary medicine was far from perfect or adequate. They contain much which is superstitious, and material concerned with magic, charms and amulets, which is not really a new feature but a sediment from long-established medical practice. There is little of scientific interest, apart from a few vague remarks on mining and metallurgy and a mention of zinc, all of which is miner's gossip. There is much hinting at wonderful new chemical remedies, but no intelligible accounts of experiments by which they were discovered or processes by which they were prepared. There is no indication that Paracelsus did make any experiments in chemistry on scientific lines, although tradition, some of it good, suggests that he did. The views that the chemical information in the works attributed to Basil Valentine is due to Paracelsus, and that some of the important views found in the writings of Van Helmont are really his, will not bear close examination. His writings contain a great deal of boasting and harsh judgments of the physicians. Some allowance must be made for this. Paracelsus was certainly ahead of most of his plodding contemporaries, and his eager reforming zeal irritated them into malicious attempts to undermine his authority and bring him to contempt. This must have exasperated a man with much less patience and restraint than he possessed, and in circles where so much bitter opposition was met a violent reaction is only to be expected.

Where so few actual scientific contributions can be found it is perhaps a fair estimate of Paracelsus's merit in science to say that he pointed the way along which fruitful progress could be made and showed that nothing can be achieved by reliance on tradition in itself. He gave hints which in the hands of his followers came to fruition. He is regarded as the originator in chemistry of the famous theory of the three "hypostatical" principles, mercury, sulphur and salt, which Boyle said were professed by the "vulgar spagirists" of his time. Of these three, two and the most important, mercury and sulphur, were very much older than Paracelsus's time, although they had not been regarded as so widely distributed as he assumed;

and his salt is such a vague entity that it can scarcely be said to have any value in chemical theory. Still, some link may be traced between this *tria prima* and the three 'earths' of Becher, which led in turn to the phlogiston theory, an important phase in the development of theoretical chemistry.

In calling to memory the death of Paracelsus at Salzburg on September 24, 1541, we can point to little which is definite in his scientific contributions, but his insistence that Nature has little regard for theoretical systems or cherished traditions is essentially scientific and certainly played a

part in the progress which was to lead to the "Sceptical Chymist" of Robert Boyle, a work in which Paracelsus is respectfully quoted and criticized. It seems that much of the fame of Paracelsus (like much of the discredit which is attached to his name) rests on popular estimates, and his contributions are not nearly so important as those of men whose names are practically unknown. It is probably certain that but for his emphatic lead the advances in chemistry which followed him so closely would have been deferred, and he well deserves a place in the annals of science quite apart from his contributions to medicine.

## P. S. PALLAS (1741-1811)

BY ENG.-CAPTAIN E. C. SMITH, O.B.E., R.N.

ON September 22 occurs the bicentenary of the birth of Peter Simon Pallas, one of the greatest naturalists and scientific explorers of the eighteenth century. Though German by birth, he passed forty-two years in the service of the Russian Government, and the most fruitful part of his life was the six arduous years, 1768-1774, which he spent exploring the eastern parts of European Russia and the plains and mountains of Siberia.

The son of a surgeon, Simon Pallas (1694-1770), he was born in Berlin, and after studying at Halle and Göttingen graduated in medicine at Leyden. He then spent about a year in England examining and studying zoological collections and afterwards at The Hague published his first work on zoology. It was, however, not long before a more active career opened before him. In 1768, at the age of twenty-seven, he accepted the invitation of the Empress Catherine II to occupy a chair of natural history in the Imperial Academy of Sciences, St. Petersburg, and this led almost immediately to his appointment to an expedition being sent out, first to observe the Transit of Venus of 1769, and secondly to gather information about the peoples, plants, animals, climate and geography of the vast dominion of Siberia and of other little-known parts of the Russian Empire.

Scientific expeditions by land and sea under official auspices were a feature of the eighteenth century, and most of these expeditions were fostered by the Royal Society of London, the Paris Academy of Sciences and similar bodies. Among such expeditions was that made during 1733-1743 by Behring, J. G. Gmelin, G. F. Muller, S. Krascheninnikof and others for the Russian Government; this added immensely to the knowledge of northern Asia from the Urals to Kamchatka. Two

years after this expedition set out the Paris Academy of Sciences sent Bouguer, Godin and La Condamine to Peru to determine the figure of the earth, while others were sent to Lapland. The Transit of Venus of 1761 saw other expeditions. One of these was carried out for the Paris Academy of Sciences by the Abbé Jean Chappe D'Auteroche (1722-69), who observed the transit at Tobolsk, the capital of Siberia. When this astronomer published an account of his travels he made some remarks about the state of Russia which led Catherine, who had literary leanings, to reply in a brochure entitled "Antidote contre le voyage de l'abbé Chappe".

As the 1769 Transit of Venus approached, Catherine determined to arrange expeditions second to none, and the Imperial Academy of Sciences, most of whose leading members were foreigners, was asked to draw up full instructions. Altogether seven astronomers and five naturalists with several assistants were attracted by Catherine's offers. The Swiss astronomers, J. A. Mallet (1740-90) and J. L. Pictet (1739-81), were sent to Lapland; the German scientific worker, W. L. Kraft (1743-1814), to Orenburg; the Russian mathematician and geographer, S. Rumoffski (1734-1815), to the Pola peninsula; and G. M. Lowitz (1722-74) to the Volga district. To the south-west of Russia were also sent the naturalists, S. G. Gmelin (1743-74), nephew of J. G. Gmelin, and J. A. Guldenstaedt (1745-80). Pallas himself left St. Petersburg in June 1768, spending the summer in the Russian plains and wintering at Simbersk on the Volga. He next visited Tartary, examined the shores of the Caspian, and in 1770 crossed the Urals to Catherinenburg. Having examined the mines in the district he went to Tobolsk and in 1771 visited