HILDEGARD OF BINGEN

HILDEGARD OF BINGEN (*b.* Bermersheim, Germany, 1098; *d.* Rupertsberg, near Bingen, Germany, 1179), *cosmology.*

Also called Hildegardis de Pinguia and often called St. Hildegard, Hildegard was a writer on nature and medicine (probably also a practicing "doctor"), a visionary, and transmitter and original transformer of Oriental, Judeo-Christian, and Greek cosmological and allegorical ideas. She was the tenth child of Hildebert of Vermersheim, a member of the gentry, whose estate was near Alzey on the Nahe River in the Palatinate. From 1106 to 1147 she lived at a small nunnery attached to the cloister of Disibodenberg, serving as its head from 1136. She founded her own convent on the Rupertsberg in 1147. Beginning in 1141 Hildegard followed an internal command to "write what you see and hear," that is, the visions of which she had been conscious from about 1113. After a papal inquiry she was encouraged to continue her literary and practical activities by Pope Eugene III and was enthusiastically supported by Bernard of Clairvaux. She now became the spiritual center to which popes, kings, and ecclesiastical and secular dignitaries turned for advice and augury. Her influence was felt throughout Europe, notably in France and England, and even as far as Greece and Palestine. The Holy Roman emperor, Frederick Barbarossa, submitted to her rebuke, met her at Ingelheim, granted the Rupertsberg convent an imperial letter of protection in 1163, and left it unmolested when his troops devastated the Rheingau. Although papal proceedings for canonization were instituted in 1233, it is uncertain that canonization took place.

Hildegard's mystical, visionary, and spiritual writings include *Liber Scivias* (1141–1151), a description (and illustration in a remarkable series of illuminated plates) of visions, notably of the cosmos and man's position therein; *Liber vitae meritorum* (1158–1163), a continuation of her visions, reflecting on ethics and the cosmic effects of virtue and sin; and *Liber divinorum operum* (1163–1170), on the theological significance of the cosmos. To these should be added the corpus of letters, poems ("Symphonia harmoniae coelestium revelationum"), hermeneutica, and other works.

Naturalistic and medical books include *Liber simplicis medicinae* (*Liber subtilitatum diversarum naturarum creaturarum*) (*ca.* 1150–1160), also called (although not by Hildegard) *Physica,* on plants, trees, animals, stones, metals, and elements, chiefly from the medical (curative) point of view; and *Liber compositae medicinae* (*causae et curae—de aegritudinum causis, signis et curis*), on the nature and forms of diseases and their causes, notably the forces of the cosmos—elements, winds, stars—based on an allegorical microcosmic physiology.

All the works listed above are genuine, although there have often been doubts about the naturalistic and medical books and some interpolations do exist. The cosmological motives and allegorical interpretations are identical in both "scientific" and "nonscientific" works. We possess the *testimonia* of the inventories and *necrologia* of Hildegard's convent and of Trithemius (1462–1516), who had seen the original manuscript of *Liber simplicis medicinae* there—it was listed with Hildegard's other works and he copied it for himself. Hildegard herself mentioned it as her own work in the preface to *Liber compositae medicinae* (prior to 1158).

Hildegard was a "simple" woman, typical of the unlearned mystic *idiota* who wrote down what she "saw and heard," following a command given to her by "voices." She is therefore basically original in both her spiritual and her naturalist and medical work. She is depicted as receiving her visions through the head—perhaps reflecting the Platonic idea of the seat of the soul—although she herself located the soul in the heart. This represents the biblical view rather than an Aristotelian allusion. It was too early for such an allusion in the West; and in any case such fundamental Aristotelian concepts as hyle, ether, generation, and corruption do not appear except in marginalia by copyists and in interpolated sections. Her Latin, picked up and inspired rather than properly learned, was richly interlarded with German terms and polished and scripted by her close collaborator Volmar, a monk who died in 1170.

The most important naturalist sources for Hildegard were probably folk medicine and popular tradition, notably a welter of recipes, nostrums, amulets, and magico-religious procedures, such as that for the execration of demons. In addition there was the fundamental Galenic humoralism, which formed part of the Benedictine heritage. Thus phlegm figures as the main cause of disease, since it is connected with the fall of man, who made himself more similar to earth from which he was originally formed. Just as earth brings forth good and evil herbs, good and bad humors arise in man. Flesh ulcerates and is "perforated" because Adam's blood was converted into the evil foam that serves for procreation.

Such biblical and microcosmic analogies form a kind of medicine that is indeed original and, on the practical side, partly the result of her firsthand experience in nature studies and medicine. In *Liber simplicis medicinae* the curative virtue of precious stones

plays a prominent part—the devil hates them because their fire-born splendor illuminated him before he fell. In their use Hildegard followed a tradition somewhat different from that emerging later in the Paracelsian corpus. She regarded sapphire as good for the eyes and as an antiaphrodisiac, whereas it is a cure for cardiac pain in the Paracelsian corpus, in which emerald assumes the roles of Hildegard's sapphire. Carnelian (chalcedony) is a hemostatic in both traditions; but Hildegard omitted the emerald, which is also recommended as hemostatic in the Paracelsian corpus. Hildegard's use of the amethyst to treat rash is perhaps related to that stone's application in the Paracelsian corpus to plague boils.

Hildegard admitted that knowledge of nature can be derived from *magia,* including information from evil spirits, but inveighed against diabolical arts (*maleficium*), which turn knowledge to impurity and the pursuit of evil. She paid much attention to the wholesomeness of waters and the necessity to boil some of them. Arabic-Salernitan concepts are absent, as are traces of the philosophical and naturalistic trends characteristic of mid-twelfth-century Chartres, which led half a century later to those of Oxford, Paris, and Toledo.

Hildegard thus remains original in her mystical and naturalist work, the sound as well as the fantastic lore. Perhaps this judgment also applies to her ideas that all brooks and rivers derive from a large salt sea, that salt sources have more fire and virtue than ordinary water, and that soft rain is descending when the sun spends heat—analogous to men who weep for joy. Hail, on the other hand, is regarded as the "eye," that is, the eye fluid, of thunder.

Hildegard's influence was considerable in her own time and lasted far into the Renaissance, when the first printed edition of *Liber Scivias* was published by J. Faber Stapulensis in *Liber trium virorum et trium spiritualium virginum* (Paris, 1513), fol. 28r–118v, and two editions of *Liber simplicis medicinae* appeared (1533, 1544). Reference is made to Hildegard even in the Paracelsian corpus (*Fragmenta cum libro de fundamento sapientiae congruentia,* Sudhoff, ed., XIII, 334); and there are concepts common to both, although they are not necessarily derived from Hildegard or even from a common source. Trithemius praised Hildegard's naturalist and medical work as being of "wonderful and secret things of nature with fine understanding and for a mystical design." Her influence, conceptual as well as iconographical, is prominently recognizable in Agrippa von Nettesheim's *De occulta philosophia* (1531)—Agrippa was a friend and pupil of Trithemius—and particularly in the microcosmic allegorical anthropology and the pictures of Robert Fludd (1617).

HILDEGARD OF BINGEN

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WALTER PAGEL

HILDITCH, THOMAS PERCY (*b.* London, England, 22 April 1886; *d.* Birkenhead, England, 9 August 1965), *chemistry.*

Hilditch was mainly responsible for the advances in knowledge of the chemical constitution of natural fats and oils from 1925 to 1950. He received the D.Sc. from the University of London in 1911 and became a fellow of the Royal Society in 1942 and commander of the Order of the British Empire in 1952.

Both an industrial and an academic chemist, Hilditch followed the advice of his teacher Sir William Ramsay and accepted the post of research chemist for Joseph Crosfield's and Sons, soap and chemical manufacturers. He remained with Crosfield's for nearly fifteen years (1911–1925), during which time he was concerned with the catalytic hydrogenation of fats and the constitution of the less common components of commercial fats. In 1925 Hilditch was appointed the first James Campbell Brown professor of industrial chemistry at the University of Liverpool, a post he held until his retirement in 1951. His work during this quarter century constitutes Hilditch's major contribution to science. He and his students at Liverpool played a major role in transforming knowledge about the constitution of natural fats. With the help of nearly eighty students from all over the world Hilditch published more than 300 papers, dealing mainly with the component acids and glycerides of natural fats and with the experimental methods for studying these substances.

In 1925 the chemistry of fats was a neglected field. Although the chemical structure of fats had been elucidated by Chevreul in the 1820's, no other great figure appeared in this field of research until Hilditch. There was no systematic account of fats in 1925: little quantitative information was available on the component fatty acids of natural fats and none on the component glycerides. Furthermore, techniques for obtaining the fatty acids were inadequate and were nonexistent for the glycerides. By 1951 Hilditch and his students had obtained this information experimentally for a wide range of fats and oils, and their efforts stimulated others to work in this field.

Throughout this long period of work Hilditch tried to discern the underlying patterns running through animal and vegetable fats. He believed that there was a relationship between the distribution patterns of the component fatty acids and glycerides and the order of the evolutionary development of the parent organisms from which the fats were obtained. This relationship was the basis of his most important book, *The Chemical Constitution of Natural Fats* (1940), which reflected in its four editions the advances in fat chemistry made by Hilditch and his school.

Hilditch retired before both chromatographic methods and controlled enzymatic hydrolysis of fats came into general use, but he realized what might be accomplished with these methods. He had the satisfaction of knowing that his students and many other chemists were continuing his pioneering work.

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ALBERT B. COSTA

HILL, GEORGE WILLIAM (*b.* New York, N.Y., 3 March 1838; *d.* West Nyack, New York, 16 April 1914), *mathematical astronomy.*

In the opinion of Simon Newcomb, Hill was destined to rank "as the greatest master of mathematical astronomy during the last quarter of the nineteenth century." In 1903 Hill was ranked second after E. H. Moore by the leading mathematicians in the United States and first, tied with Newcomb, by the leading