

Biomed.
Hist. Div.

Z

7402

F381n

1882

T.S. Patterson, Glasgow. '49.

NOTES ON SOME BOOKS OF TECHNICAL
RECEIPTS, OR SO-CALLED "SECRETS."

BY

JOHN FERGUSON, M.A.,

PROFESSOR OF CHEMISTRY IN THE UNIVERSITY OF GLASGOW.

(From Transactions of the Archaeological Society of Glasgow.)

NOTES ON SOME BOOKS OF TECHNICAL RECEIPTS, OR SO-CALLED
"SECRETS,"

BY

JOHN FERGUSON, M.A.,

PROFESSOR OF CHEMISTRY IN THE UNIVERSITY OF GLASGOW.

[Read at a meeting of the Society held at Glasgow on 20th April, 1882.]

THE following notes may serve to some extent as an introduction to a subject wide in itself, and with numerous and important connections. The history of practical invention and of technical progress is one which might well engage the attention of students of anthropology and antiquities, as it throws light on many points connected with the growth of social life and civilisation. The desire and the power to turn external objects to his service and convenience are developed to such an extent in man, that, among the many differences between him and other animals, may be reckoned the various arts by which he induces nature to accommodate herself to his wants; among the lower animals one looks in vain for anything parallel to the arts of cookery, medicine, metallurgy—to the systematic use of tools, of clothing, of weapons.

In ancient times the various handicrafts were monopolies of certain families or castes; in the middle ages the handicraftsmen were too glad to pursue their callings in obscurity; it is only in the most recent years that arts and manufactures have acquired such paramount interest, that the special or technical education of those who are to exercise them has come to be thought of national importance. While, in the days of the Greeks and Romans, the artizan was a despicable if not an almost infamous person, and, in the middle ages, was oppressed by the military and ruling classes, against whom, nevertheless, he carried on a ceaseless struggle until he succeeded in asserting his importance, and even his equality with them, it has been reserved for the present day for ignorance of arts and manufactures, and indifference to their progress, to be as discreditable as they were formerly dignified. The history of

the growth of the arts themselves, and of the attitude of society towards them, is, therefore, of wider extent, and of greater philosophical interest than at first sight appears. This history has not as yet been written and, as time goes on and material gathers, the more difficult it becomes. The only work in which the attempt has been made is the "*History of Inventions*," of Beckmann, written towards the end of last century.* This work, however, is less a history in the strict sense of the term, than a collection of antiquarian essays upon various objects of manufacture, and upon some technical questions. The essays, besides, are not arranged in any definite order, and have no direct connection with each other, but they are very elaborate, and show a wonderful amount of research and knowledge. Since Beckmann's time, I do not remember any laborious German who has followed up his work. There is certainly nothing on the subject in English.†

* Beckmann's work is entitled "*Beyträge zur Geschichte der Erfindungen*," and it was published at Leipzig, in five volumes, between 1786 and 1805. An English version and abstract appeared in 1823, in two volumes, and a new edition was published by Bohn in 1846, in two volumes.

† In writing the above I had forgotten some systematic works on the history of arts and manufactures which are more consecutive and philosophical but less thorough than Beckmann's collections. There is the work of Antoine Yves Goguet—" *Origine des loix, des arts, des sciences, et de leur progrès chez les anciens peuples*," published at Paris in 1758. It was translated into English, and there were two editions, of which that of 1775, in 3 vols., Svo, is now before me. This book partakes largely of the character of a treatise on antiquities, but it embraces sections on the history of arts and manufactures among all the ancient peoples. It is a curious book, and shows familiarity with the classical writers, but it is of no authority now, after the research that has been expended, not only on almost all the topics that the author includes in his discussions, but also on the authorities to whom he owes his information.

A better and more specialized work is the "*Geschichte der Technologie*," of Johann H. M. Poppe, in three volumes, published 1807-11, and forming part of the Göttingen series of histories of science, arts, and philosophy. In the more recent Munich series of histories there is a "*Geschichte der Technologie*," by Karl Karmarsch, in one volume, 1872. Both of these works give good accounts of the growth of arts and manufactures, and contain numerous references to books and papers on them.

Quite recently I came across a little work entitled "*A pleasant and compendious History of Inventions*," London, 1686, 12mo. In it an attempt is made to give, in briefest outline, the origin of some important inventions. Defective as were both the plan and execution of this booklet, the

2
7407
F-81n
18-1

It is not my intention now to say anything about the progress of arts and manufactures at all, but only to bring under your notice a section of literature which is nearly ignored by bibliographers and antiquarians, and is altogether out of the ken of book-reprinting clubs.

It is hardly to be expected that a practical art can have any literature worth speaking of. The man who is busy practising it can have little time to write about it, and he who wishes to learn it must put to his hand and work at it, and that under the supervision of a master, and not by merely reading books. This is the apprenticeship that every one must serve. No amount of reading will make a sculptor, or a gardener, or a shoemaker, or a surgeon, or a musical executant. The arts must be acquired by practice, and they are extended and improved by practice. Every one who exercises them comes to have special power and certain ways of doing things, which may enable him to surpass others who are similarly engaged. These are his "secrets," which very often he cannot, or will not, reveal to others. Rapid insight into a particular case, power of overcoming physical obstacles, ingenious adaptations of means to ends, exhibition of due care at the right time, enable one man to effect what others cannot.

In earlier times artists were very chary indeed of telling their secrets, and in the great craze of the middle ages—the craze to make the philosopher's stone—the adepts were continually on their guard to conceal their art from the unworthy, while revealing what was thought suitable for the genuine artist to know. The philosopher was warned to admit no one to his laboratory—or to his confidence. Even at the present day, secrets have not wholly died out; there are manufactures which are still undivulged, and any one engaged in the scientific investigation of some phenomenon or law of nature, will not tell his professional brethren unreservedly

author had a very clear notion of the importance of his subject, and of its general interest.

So far as I know, no complete and systematic work on the history of arts and manufactures has appeared in this country. A collection of essays by David Bremner on the Industries of Scotland was published at Edinburgh in 1869. They deal chiefly with the then state of the industries, although there are usually short historical narratives prefixed. The work entitled "*Manufacturing Arts in Ancient Times*," by James Napier, London, 1874, 8vo, is occupied almost entirely with the history of metals and of dyeing.

what he expects to discover, before he has finished his labours.

It would seem, however, that in spite of the precautions of the older artists, their private ways of working, of producing substances, of making colours, and effecting all kinds of material changes, oozed out and became at last public property. But even after their publication, these methods and receipts retained, paradoxically, the name of "Secrets,"* and many collections of them appeared during the last three or four hundred years. It is beyond my power to give a complete list of these; my purpose at present, as I have already said, is to exhibit a few of those to which my attention happens to have been recently directed, and of which some at least are possessed of a certain amount of archaeological and bibliographic interest.

This set of books divides into several groups, but perfect classification of them is impossible on account of the way the themes interweave.

I. There are collections of secrets of nature, or treatises on natural history, general science, and cosmogony. Of this set, Pliny's history seems to have been the model.

II. There are treatises on what was called natural magic (as distinguished from black magic or necromancy)—that is, the production of secret effects in optics, acoustics, magnetism, &c., &c., by natural causes. This is the form which natural philosophy originally took.

III. There are treatises which deal chiefly with chemical, pharmaceutical, and medical secrets.

IV. There are treatises on life and generation: physiological secrets.

V. There are treatises on technical or art secrets, strictly so called, and they may be arranged conveniently in two classes: general collections containing receipts relating to a variety of arts, and special collections containing receipts of use in one art or handicraft only.

I have examples of each of these classes to exhibit.

The earliest medieval treatise on the subject of the practical arts to which I can refer at the present moment is that of Theophilus.

* In the remarks which followed the reading of the paper it was pointed out that not so long ago chemical works were known, everywhere in Scotland at least, as "secret works." Some are still practically such.

It exists in MS. in several libraries and was first edited with translation, introduction, and notes by Robert Hendrie, in 1847.* The date is not exactly known, but the work seems to have been written in the eleventh century. It is in three books. The first treats of the materials used in painting and illuminating; the second of the making and colouring of glass; the third of metal working, bell making, organ building, lapidary work, colours. It is, therefore, a very important and interesting work for the history both of the sciences and practical arts. It mentions a number of substances and the manner of making them, which involved chemical skill, and it treats of arts, the results of which remain to this day the admiration and the despair of connoisseurs.

One of the biggest, if it be not the biggest, book written in the middle ages and printed in the fifteenth century, was the work of a Dominican monk, called Vincent de Beauvais.† It is a vast compilation or encyclopædia, a mirror of human knowledge as he called it—*Speculum quadruplex*—divided into four main parts, of which science and art form one. Of this huge work I have never encountered a copy, and have only seen a fragment about alchemy reprinted in a collection of such pieces. The author was born about 1190, and died about 1264. His labours, like those of his contemporaries, were chiefly devoted to philosophy—moral, metaphysical, and theological—and he engaged in the conflict then raging between the realists and nominalists, but he was able to turn from discussions on words and definitions, to the contemplation of external objects. The *Speculum Naturale* or history of nature, is a commentary in thirty-two books, the text being the narrative of the creation as given in Genesis. This treatise deals less with arts than with cosmogony and natural history.

* A French translation had appeared previously in 1843, edited by Count de l'Escalopier.

† For information—not much—about the author, an abstract of the bibliography of his work, and an outline of the contents of it, reference may be made to the article “Vincent de Beauvais” by Daunou, in *Histoire Littéraire de la France*, Paris, 1835, 4to, T. xviii., pp. 449-519, and the numerous authorities there quoted. Through some oversight, Hain, while giving a cross reference, has omitted Vincent's name in the right alphabetical place in his *Repertorium Bibliographicum*. The *Speculum* appears to have been printed by Johann Mentelin at Strasburg, and finished by 1476. It is in 9 volumes folio: *Speculum naturale*, 2; *morale*, 2; *doctrinale*, 1; *historiale*, 4.

In this respect it differs, therefore, from the writings of two of his contemporaries, viz., Roger Bacon (1214-1292-4), and Albertus Magnus (1193 (?)-1280).

In his *Opus Majus*, Bacon has given an encyclopædia of human knowledge, and especially of physical science, but it is another work of his which falls to be mentioned in this place, namely, his "*Epistola de secretis operibus nature et artis, et de nullitate magie.*" This is a short report on the very wonderful effects that can be produced by natural means, and it is in this tract that occurs the often-quoted allusion to the composition and power of gunpowder. This letter was intended as a reply to the persistent attacks of malignant ecclesiastics who accused him of practising "black magic"*—by showing that the apparent mystery was due to the ignorance of his accusers and not to any compact of his with the infernal powers.

Albertus Magnus is credited with a treatise of secrets, but the authorship has been disputed and has been assigned to Henricus de Saxonia, one of his pupils, but whether this be correct or not the work usually, if not invariably, bears the name of Albertus. It deals with physiological secrets only, and that in a very brief manner; so that, both in range and in bulk, it is quite the reverse of an encyclopædia. Notwithstanding, if we may judge by the number of editions, it was one of the most popular treatises from the 15th to the 17th century. † Albertus was the author likewise of a treatise on the secrets of plants, animals, and stones, in which he described their occult virtues.

* The black magician, or necromancer, was believed to have carried on a correspondence with the fiend and entered into a compact by which, on the liberation of the latter from his "prison-house," he would assist the magician in carrying out schemes which, in their expected results, could be called nothing else than supernatural. The correspondence, with the magician's name at it, was usually brought up in evidence against him—very much to his annoyance—when he had to implement his share of the bargain.

† It is entitled "*De Secretis Mulierum,*" and a list of the early editions is given by Hain (*Repert. Bibliogr.*, Nos. 549-568). In character it closely resembles the "*De phisionomia*" of Michael Scot, and the two tracts were frequently printed together during the 17th century. It was translated into French and German. An edition of the French, (Cologne, 1722) entitled "*Les admirables secrets d'Albert le Grand,*" contains, besides the two tracts of Albertus, a third consisting of practical receipts, and a fourth on physiognomy.

In the following century flourished Bartholomew Granville, a Cornishman, author of a ponderous work on the Properties of Things, divided into nineteen books. As it deals chiefly with natural history it hardly falls within consideration at present, but it gives incidentally technical descriptions. It was first printed in the fifteenth century, the earliest edition being of date 1478, and it was often re-issued, besides being translated into French, Dutch, and Spanish. It was also translated by John Trevisa in 1398 into English, and published by Wynkyn de Worde a century later.*

In the fifteenth century another book which had a considerable share of popularity was printed. It is entitled "*Lucidarius*," and was written by a monk called Honorius of Strasburg. It first appeared in 1479, but the edition which I have here and which is worth examination for its uncommon type and curious woodcuts, was printed at Strasburg in 1499, by Mathijs Hupfuff. It is very rare, and though Hain mentions it (*Repert. Bibliogr.*, No. 8814), he had no actual copy for collation. He consequently says that the book has twenty-nine leaves, whereas this copy has thirty, the last containing a woodcut of the carrying of the cross. This work is a sort of catechism of natural and supernatural things. The questions are asked by the scholar, and the answers are given by the master, who thus imparts the required instruction in the secrets of creation.

All these works are of a general character, and, except the first, deal with the physical and natural sciences, as these were understood from the twelfth to the fifteenth century—they are examples chiefly of the first class. That some of them were among the books first printed in the fifteenth century and went through several editions and translations, notwithstanding their bulk in certain cases and their frequently absurd contents, shows that even then there were many people anxious to know something about nature and external objects.

The sixteenth century produced no great encyclopædia like some of those I have mentioned. Either the breed of encyclopedists had become extinct, or else knowledge had grown too

* Johnson's *Typographia*, London, 1824, I., p. 354. There is a copy of the Latin edition printed in 1480, in the Euing Collection, Glasgow University Library. It is in folio, in double columns, printed in fine Gothic character.

great to be gathered by one man in his lifetime and put in a book, but we find several less ambitious authors dealing with different kinds of secrets, some of nature, others of arts.

First among those whose works I have here comes Levinus Lemnius, who was born at Zirickzee in Holland, in the year 1505, and after studying at various places became a physician in his native town. Between the years 1559-64 he published a work entitled "*De Miraculis Occultis Naturæ, Libri IV.*" Of this book several editions appeared, of which I have here two, Frankfurt 1604, and 1611, both in 16mo. It was translated into English under the title of "*The Secret Miracles of Nature, in four books,*" London, 1658, in small folio, of which there is a copy here. It was translated into French by the alchemist Gohorry, and published at Paris in 1568, and it was translated also into Italian.

It is a most heterogeneous collection, heterogeneously piled together, of notions on physiological, physical, medical, religious, and moral topics, with attempts to explain phenomena in nature which subsequent enquiry has shown do not exist at all. The collection is a very curious one, notwithstanding, and furnishes good instances of popular ideas about natural things current three hundred years ago. It would be difficult to bring this collection under any of the classes above mentioned—the only thing tolerably certain is that it contains hardly any practical receipts.

Contemporary with Lemnius, but ten years his junior, was Conrad Gesner, who flourished from 1516 to 1565. One might spend much time over the works of this really distinguished man, who was called the German Pliny, on account of his comprehensive learning. Besides his writings on animals, plants, and minerals, on languages, pharmacy, natural philosophy, and so on, he was one of the first bibliographers and book cataloguers, his "*Bibliotheca Universalis*" being the best and most complete catalogue which appeared in the sixteenth century, and being still a valuable book of reference.

Under the pseudonym of Evonymus Philiatros, he published a book entitled "*Thesaurus de remediis secretis*"—a treasury of secret remedies. It appeared at Zurich in 1554, and in the course of a few years went through numerous editions, and was translated into English, French, and German.

I have here examples of all these :—

1. Latin.—An edition in 16mo, Lyons 1555, by Balthazar Arnollet, and another without date, printer's name, or place, but as the device on the title page is a tree with five frogs,* doubtless this edition was printed by Froschover at Zurich. Neither of these editions is mentioned by the bibliographers.

2. German.—The German translation appeared at Zurich in 1555, and other editions were published in 1582, 1583, and 1608. Of this last there is a copy here.

3. French.—Like the German, the French translation was executed immediately after the Latin appeared. It was published at Lyons in 1555 in 4to, again in 1557 in 8vo, and in 1559, in 8vo, by Antoine Vineent. I have not observed any reference to the 1559 Lyons edition. As will be seen by the copy here, it is a very prettily printed book with nice woodcuts of herbs and chemical apparatus.

4. English.—It was translated into English by Peter Morwyng, and published by John Day, at London, in 1559. Another edition appeared in 1565, which corresponds page for page with the earlier one, and ten years later, in 1575, a third edition came out. The copy here is of the 1565 edition. It is handsomely printed in bold black letter, and is illustrated by woodcuts of plants and apparatus for distillation. The main purpose indeed of the book is to describe the way of preparing remedies from plants by that method.

In 1569, after Gesner's death, a second part of the treasure was edited by Caspar Wolff or Wulfius. It became nearly as popular as the previous part, and was translated into French and English.

1. Latin. It was first printed at Zurich in 1569, but I have no copy to exhibit.

2. The French version was executed by Jean Liebaut, and appeared under his name at Lyons in 1593, in 8vo. Thereafter at Rouen in 1628, and 1643, of which edition a copy is here. I have here also another published at Rouen with the date MVIC, which would appear to mean 1600, and it would therefore be much earlier than the other, but against this date is the fact that it has not the look of a book printed in 1600. Besides it is called on the title page *Derniere Edition*, so that one would suppose it to be subsequent to those above mentioned.

* A more elaborate form of this device will be found on the title page of Gesner's "*Bibliotheca*," ed. Simler, 1582, printed by Froschover. The device is a punning one.

3. The second part was Englished by George Baker, surgeon to Queen Elizabeth, and two editions of it were published, of both of which copies are before us. The first bears date 1576 and is entitled the "*Neve Jewell of Health.*" It was published in London by Henry Denman, in small 4to, and printed in black letter. It is illustrated with numerous woodcuts of apparatus and operations. The second edition appeared in 1599 under the title of "*The Practise of the New and Old Phisicke.*" It was published at London by Peter Short, and is also in black letter.

It will be noticed that this work in particular contains the pharmaceutical and to some extent the chemical knowledge of the time of Shakespeare. The copy of the first part which is here was printed the year after he was born, and it is very likely that the pictures of plants and chemical operations which it contains would not escape his notice even while still a child. The examination of these books gives one some insight into the references which occur in the plays to the physician's art and the works of the apothecary, who was not always then, or for long after, distinguished with sufficient accuracy from the poisoner.

Gesner's work is specially concerned with medical and pharmaceutical secrets, and does not take up either natural history and physical, or trade and technical secrets.

A work more representative of technical art than any of the preceding was the "*Pirotechnia*" of Biringuccio, which was published at Venice in 1540. It deals particularly with the extracting of metals from their ores, their fusion, casting, calcining, and conversion into various compounds, the preparation of salts, the distilling of acids, the founding of cannon, the manufacture of gunpowder and of fire works. Of the several editions which appeared I have here the first edition of 1540, in small quarto, and the 8vo edition of 1559, also printed at Venice.* The work was translated into French and published at Paris in 1572, of which translation there is a copy here. Copies both of the 1540 Italian and the 1572 French editions are uncommon.

In the compilation of books of secrets the Italians in the sixteenth century showed considerable activity, and the examples of them that are here may be taken together in chronological order.

The earliest of them is ascribed to Don Alessio Ruscelli, a

* I have since got a copy of the second (?) edition, printed at Venice in 1550, 4to.

Piedmontese, whose reputed work was first printed at Basel in 1536, in 8vo. It went through a very great number of editions, but although it was one of the most popular of the collections of receipts or secrets, copies of it are now quite unusual in catalogues. The editions were in all likelihood actually worn out by use. The copy here is a comparatively early one, having been printed at Venice in 1568. This collection was translated into English, and the four different parts appeared in succession, the first in 1562, the last in 1578. According to Watt, who gives the titles at length and enumerates different editions,* the secrets appeared in every European language. He adds that an abridgement of it was long a popular book at the foreign fairs, and Nisard mentions a book which consists of extracts from Albertus Parvus, Cornelius Agrippa and others, but which he thinks is chiefly a rehabilitation of the work of Alexis.† This collection, therefore, is still publishing and selling in France by the pedlars, and flying stationers, as they used to be called. The editions Nisard mentions are of 1837 and 1839. It is hardly necessary to say that however creditable the Don's compilation may have been to the sixteenth century, it gives one but a poor idea of the progress of true physical and medical knowledge among the mass of the people in the nineteenth, that such books can be sold for actual perusal and reference.

A similar collection to the preceding was made by Gabriello Falloppio, celebrated as an anatomist, who lived between 1523 and 1563. The work is entitled "*Secreti Diversi*," and it appeared after his death in 1566. There is a copy of it here. It contains receipts for preparing different bodies to be used in medicine, for the production of wines, alcoholic extracts of plants, cosmetics and waters. It also explains the chemical treatment of the metals, their alloys, the way of changing their colours, converting them into different kinds of salts and so on. There is no English version of this, so far as I know, but there was a Latin edition, and one in German, Franckfurt, 1641, of which there is a copy here.

Two years later, in 1568, there appeared at Venice another

* An edition of 1595, London, Peter Short, is not mentioned by Watt. It is in small quarto, black letter, and resembles the 1599 edition of the second part of Gesner's work. There is a copy in the Euing Collection, Glasgow University Library.

† Ch. Nisard, "*Histoire des Livres Populaires*," Paris, 1854, I., p. 225.

collection of secrets. The author or compiler was Leonardo Fioravanti, a physician of Bologna, who died in 1588. His collection is arranged very much in the same way as Falloppio's, and it contains not only secrets of medicine and surgery with the necessary preparation of drugs and remedies, but receipts for several technical purposes as well. Besides the Italian edition of 1571, Venice, 8vo, I have here the German translation of Darmstadt, 1624. Of this work an English translation was made by John Hester, which was first published at London in 1582, in 16mo. It was afterwards reprinted with some other translations by the same hand, and appeared in small quarto in 1652. Of this edition I possess a copy. The translation differs in several details from the Italian, and it embraces only the medical section of the original.

A much better known man than any of these published a collection of curious arts at Naples in 1558. This was the Neapolitan, Giambattista Porta, who lived between 1538 and 1615, made long journeys in search of natural knowledge, and formed an Academy of the Secrets of Nature in his house at Rome, which was suppressed of course.

His work is entitled "*Magia Naturalis*," and it is divided into twenty books, according to subjects. This is a more comprehensive work than some of its predecessors, but I cannot say that in its contents it is much more sensible. It had its share of popularity, however, passed through many Latin editions, and was translated into all the languages. Besides three of the Latin editions (Frankfurt, 1591, Leyden, 1644, and Amsterdam, 1664), I have here a copy of the scarce English translation of 1658, with the still scarcer frontispiece, which contains a portrait of the author, and a representation of the four elements, and of Art and Nature, disposed in compartments. Among the curiosities contained in the first edition of this book, 1558, is an account of the camera obscura as it was known—without the lens—to Leonardo da Vinci. In the 1589 edition it is described with the lens, but there is no proof of what has been stated, that the instrument was either invented or improved by Porta. On the whole, the optical division is one of the best in the *Magia Naturalis*.

The last of the Italian collections I have to show is that of Leonardo Locatelli, a physician, like most of the older naturalists. The work is entitled "*Theatro d'Arcani*," and it deals chiefly

with chemical and alchemical changes and products. I have here the edition of Milan, 1644, and that of Venice, 1667. So far as I know there was no translation published.

The preceding are almost all mixed collections, but in the sixteenth century there appeared a series of small books, of purely technical character, about which I have failed in getting any information. The only thing to be done therefore is to enumerate and describe the books themselves, which are now before us.

The oldest is entitled "*Künstbüchlin*," and it was printed at Augsburg in 1537.* This is a collection of receipts, pure and simple, intended for practical workpeople. The topics are the working of metals, the making of colours, the dyeing and colouring of various objects, the calcining of the metals, and such like.

In 1549 there was published at Amsterdam a small volume, entitled "*Kunst Boeck*," which I have not seen referred to in the bibliographies. It is said to be compiled and in part translated—*ghecolligeert ende eensdeels getruslateert*—by Symon Andree. The translated sections are from the "*Künstbüchlin*." In 1581 the translated part of the preceding was republished, with a second tract containing different receipts from those in the earlier one, and in 1600 there appeared at Amsterdam an edition of all the parts together in Dutch. In 1687 finally a modernized reprint of the "*Künstbüchlin*" appeared at Franckfurt, in 12mo. These collections represent fairly the kind of receipts for practical purposes current in the sixteenth and seventeenth centuries.

Johann Jakob Wecker, a physician at Basle, added another compilation to the preceding. It appeared in 1582, and several editions were published. That which I have here was printed at Basle so late as 1701, and is entitled "*De Secretis Libri xvii.*" It is arranged in a most systematic manner, and in this respect is superior to all the others; but one cannot give much praise to the information which the book contains. An English version was printed in folio, in 1660.

The seventeenth century produced a large number of books of secrets, of which there are one or two here.

A work somewhat similar to Wecker's, but of a more philosophical cast, was written by Heinrich Nollius, and published at

* Graesse, *Trésor de Livres Rares*, Dresden, 1863, iv, p. 53, quotes this same book, but gives the date, 1538. Other later editions are mentioned.

Franckfurt in 1619. It is entitled "*Natura Sanctuarium: quod est Physica Hermetica . . . methodo perspicua et admirandorum secretorum in Naturæ abyssu latentium philosophica explicatione decenter in undecim libris tractata.*" This work contains a discussion on general physical ideas and principles from the standpoint of the alchemical or hermetical philosophy then in vogue, and, as is said on the title, deals with the hid secrets of nature rather than of practical science and art.

Works treating more strictly of natural phenomena and practical physics were compiled by Casper Schott, a Jesuit, and Professor at Würzburg. Reference may be made to two of his works. "*Physica Curiosa, sive Mirabilia Naturæ et Artis Libris xii. Comprehensa,*" printed at Würzburg in 1667, in 4to. This treatise is chiefly on Natural History, and contains a great many drawings, of which those depicting different monsters, both of animals and human beings, show the greatest amount of ingenuity and originality on the part of the artist. The boy with the elephant's head, *puer capite elephantino*; the monstrous cock, with hoppers, and a tail like a cow, set apparently in a metal socket; the *infans cum promuscule et capitibus animalium*; the *vitulomonachus*, or bull-calf monk; the *equus cute lacerâ*, or horse with the slashed doublet, and numerous others, surpass anything in the way of development devised by recent naturalists.

Ten years later, in 1677, there appeared at Bamberg, Schott's "*Magia Universalis Naturæ et Artis,*" in four volumes, 4to. This is a treatise on old Natural Philosophy, and of the arts thereon depending, for instance, under acoustics the author describes organ-building. This work is very copiously illustrated, and the general excellence of the drawings of apparatus and experiments is noticeable. The artist has been a much more matter of fact person than the other.

About the same time, but without place or date, there appeared a volume in 4to, entitled "*Joco-Seriorum Naturæ Centuriæ 4.*" It bears the name of Caramuelius as the author, but in all probability this is a pseudonym, and the real author was Schott.* It

* Some ascribe it to Athanasius Kircher, but that may be because a tract by him is added at the end. Internal evidence is in favour of Schott. For example, on page 272, reference is made to "our cryptography in the first book of part four of the *Magia*," and this reference corresponds with the Bamberg edition, iv. p. 1. As to the date, the chronogram with which the preface concludes would seem to point to 1661.

is a collection of curious things to be effected by physical causes, merely for the sake of amusement, and without any practical purpose in view.

In English two technical books were published that had some reputation. Gabriel Plattes' "*Discovery of Subterranean Treasure, viz., of all manner of mines and minerals, from the gold to the coal,*" appeared at London in 1639. This, as its name indicates, is concerned chiefly with mining and metallurgy, but there is a section at the end devoted to the colours that can be extracted from vegetables and the way of dyeing in fast colours. The other treatise is Sir Hugh Plat's: "*The Jewel House of Art and Nature,*" London 1653. This is a very mixed collection, as it includes receipts and descriptions from all the sciences. Though not entitled "secrets," these two tracts belong to the category.

In France a certain Mdlle. Marie Meurdrac published a little work with the quaint title, "*Compassionate and Simple Chemistry written for meritorious ladies.*" Of this there is a German translation by Johann Lange, Franckfurt, 1676. The collection consists chiefly of pharmaceutical and, as was to be expected, cosmetical receipts. The subject is arranged in six books, and the last is devoted specially to the preparation of those substances with which ladies at that time were wont to preserve their beauty.*

During the course of the seventeenth century some arts had so far advanced that treatises dealing with them alone began to appear. This is notably the case with metallurgy, an art which has always occupied a prominent place and has a considerable literature. Glass-making also in the seventeenth century can boast of a special literature. The German chemist Kunckel published a book on the subject at Franckfurt in 1679; a Florentine, Antonio Neri, another, of which I have the late 1686 Amsterdam edition. Of this book Christopher Merrett issued an English translation in 1662; lastly, Blancourt wrote a treatise in French of which an English translation was published in 1699 at London, under the title:—"The Art of Glass. Shewing how to make all

* In books of receipts cosmetics occupy sometimes a considerable space, but there are, besides, works specially devoted to the subject. Amongst these I may mention an exceedingly scarce work by Jean Liebant, to whom as translator of Gesner's *Thesaurus* reference has been made above. It is entitled "*Trois Livres de l'Embellissement et Ornement du corps humain.*" Paris, 1582. Svo., pp. 16—164—16.

*sorts of Glass Crystal and Enamel. . . . A work containing many Secrets and Curiosities never before discovered.**

Another special technical treatise was that of Pietro Maria Caneparo—“*De Atramentis*,” which, though dealing professedly with ink and black colours, is much more comprehensive than its name denotes, as it includes the technology of pyrites, of vitriol, of the oil of vitriol, and of different colours. I have here two editions, the first published at Venice in 1619, and the second at London in 1660.

It must not be forgotten, however, that parallel with these empirical books, progress was making, though slowly, in those sciences on which the successful and sound development of their applications to the arts depends. In chemistry, and especially in pharmaceutical chemistry, that is in the preparation of natural substances for use in medicine, which occupies so large a place in some of these receipt books, there was considerable advance; and, in addition, a very great impulse to technical and applied chemistry was given towards the end of the seventeenth century by Glauber and by Becher.

But, notwithstanding, the books of secrets in the eighteenth century in many cases showed a retrogression towards credulity and absurdity, for this century has a broad shadow of ignorance and superstition athwart its vaunted enlightenment. It was this ultra-rational age which encouraged such books as the “*Secrets Merveilleux de la Magie Naturelle et Cabalistique du Petit Albert*,” and a host of similar would-be magical and cabalistical books. They are of interest only as studies in the aberration of the human mind. But even in the works of men who ought to have known better we encounter the most ridiculous and gross ideas. The French chemist Lemery made a collection of receipts which was translated into English and published at London in 1711. Its title is “*New Curiosities in Art and Nature: or a Collection of the most valuable secrets in all Arts and Sciences*.” If any one is desirous of seeing the puerile credulity which, in the same age and country, may run parallel with an equally contemptible

* The most recent book on the subject which I have seen is by the French chemist Peligot. “*Le Verre. Son Histoire, sa Fabrication*.” Paris, 1877. Svo. A popular work, also from the French, was published at London in 1870, “*Marvels of Glass-making in all ages*,” by A. Sauzay. Svo.

scepticism let him turn to the pages of this precious compilation. Some of the collections, however, are a little more practical and more rational than the preceding, but in all of them there is a conspicuous empiricism.

A few years later, in 1723, Dr. William Salmon, a great compiler of books, issued a work containing "*Choice experiments and observations on Building, Husbandry, Gardening, Mechanics, Chemistry, Painting, &c.*" London, 8vo. Of this I have no copy, but I have here another similar and earlier work by the same author. It is entitled "*Polygraphice, or the Arts of Drawing, Engraving, Etching, Limning, Painting, Varnishing, Japanning, Gilding, &c. . . . Eighth edition.*" London, 1701. Though professing to deal with the arts of design it is far more comprehensive and includes the arts of dyeing and staining, alchemy, chemistry, chiromancy, arts of beautifying and perfuming, and so on.

I possess also two small treatises; one is without date but belongs obviously to the last century. It is entitled "*Arts Treasury of Rarities: and choice Inventions. . . . The fifth edition. London . . . G. Conyers. . . . Price 1s.*" This is really a book of practical receipts, including such subjects as the dyeing of cloth, silk, hair, bone, leather; gilding, lacquering; removing spots of tar, grease, oil; preserving from moths; cementing broken glass, and so on. The other is entitled "*La Magie des Artistes . . . ou collection complete des secrets utiles. . . . Harlem. . . 1783.*" 12mo. This work is similar in contents to the preceding and both are free from the absurdities already spoken of.

With the progress of the sciences and with insight into the causes of chemical and physical change, books of secrets like the preceding can no longer show any reason for existence. If, therefore, they circulate at all it is as chap books, the hawkers' reprints of Aristotle, Albertus Magnus, &c., already referred to, which have little interest from a bibliographical, and none from a scientific point of view, or else as collections of trivial receipts which are of no practical use. Any one wishing sound information on a practical matter will now go to such a work as Cooley's *Cyclopaedia of Practical Receipts*, or Ure's *Dictionary of the Arts*, or to some of the numerous works on applied science and technology in which the rationale of the processes, or at least

rational processes are given.* Arts and manufactures are passing more and more from the empirical to the scientific state, and to appreciate the immeasurable improvement that takes place when a manufacture is based on a rational foundation and not on mere empiricism and what is called familiarly "rule of thumb," a comparison may be made, say of Canepario's account of sulphuric acid making with the treatise by Lunge on the same subject, or the tiny chapters on iron smelting in Agricola or Ercker, with Lowthian-Bell's *Studies of Blast Furnace Phenomena* or Percy's *Treatise on Iron*.

On another occasion I hope to communicate to the Society extracts from some of the books now exhibited, and to supplement the list with notes on other works of a similar kind, which I have not in the meantime at hand.

Postscript.—I have just become aware of the existence of a "*History of Inventions*," by F. S. White; but of the book I, as yet, know nothing.

* One still more recent is now to be had. Its title is "*Spou's Encyclopaedia of Industrial Arts, Manufactures, and Raw Commercial Products*," and it has just been published in London in two volumes. The author, editor, publisher, or whoever is responsible for the advertisement of it, makes a special merit of its containing a minimum of scientific and historical details.

UNIVERSITY OF CALIFORNIA LIBRARY

Los Angeles

This book is DUE on the last date stamped below.

BIOMED MAR 4 '84

BIOMED LIB.

FEB 21 RECD



3 1158 00913 1623

