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THE HISTORY OF THE
ACUTE EXANTHEMATA

BY
J. D. ROBBINSON



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**THE HISTORY OF THE
ACUTE EXANTHEMATA**

SECOND EDITION

ACUTE INFECTIOUS DISEASES

A Handbook for Practitioners and Students

By J. D. ROLLESTON, M.A., M.D.

*Demy 8vo. Price 15s. net. Weight 1½ lbs.
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The present work is based on the writer's personal experience during the last twenty-five years, and a study of the literature of some of the commoner acute infectious diseases. The work is mainly clinical in character.

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THE HISTORY OF THE ACUTE EXANTHEMATA

THE FITZPATRICK LECTURES FOR 1935 & 1936

Delivered before the Royal College of Physicians of London

BY

J. D. ROLLESTON

M.A., M.D., F.R.C.P., F.S.A.

**MEDICAL SUPERINTENDENT, WESTERN FEVER HOSPITAL,
LONDON**



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PREFACE

THIS little book, which serves to some extent as a companion volume to the writer's work on "Acute Infectious Diseases," will, it is hoped, appeal to the increasing number of readers interested in the history of medicine.

A special effort has been made to give the book an international outlook by an impartial survey of the contributions to our knowledge of the various diseases by representatives of different countries.

J. D. R.

February, 1937.

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THE HISTORY OF THE ACUTE EXANTHEMATA

INTRODUCTION

WHEN I received the high honour of an invitation to deliver the Fitzpatrick lectures, I felt that I could not choose a more suitable theme than the history of those diseases with which I have been closely associated for the last thirty-five years. I have selected, therefore, the history of the acute exanthemata, but shall deal only with small-pox, chicken-pox, scarlet fever, measles and German measles, without including enteric or typhus fevers which are sometimes placed in the group of the acute exanthemata, but are more suitably ranked by themselves in the class of continued fevers.

It is now generally agreed among medical historians that the acute exanthemata were not regarded as autonomous diseases or distinguished from one another until a comparatively late period of their history.

The ancient Greek physicians in particular laid most emphasis on general symptoms as the cause of fever, and paid little attention to local manifestations such as an eruption as a guide to the differentiation of the fevers.

It is true that the existence of the acute exanthemata in ancient Greece and Rome was for a long time a hotly disputed subject of controversy, as I shall show later in dealing with the individual diseases, but qualified opinion is now fairly unanimous that the eruptive fevers cannot be traced farther back than the Middle Ages. Even in the Middle Ages, according to Haeser, epidemics of the acute exanthemata were generally regarded as of spontaneous development from unknown causes and as forerunners of

some universal pestilence, only a subordinate importance being attached to contagion. As late as the sixteenth century, Haeser points out, very little information is available as to the epidemic prevalence of acute exanthemata, while in the following century, especially in the first half, the records are far too scanty to enable one to obtain a clear idea as to their relative frequency. Reference, however, should be made to the little known work mentioned by Haeser published by Gregorius Horst in 1624, of which the lengthy title shows that at least some of the acute exanthemata were distinguished from one another in the early part of the seventeenth century.¹

As Hektoen has shown, Thomas Fuller (1654-1734), a physician in practice at Sevenoaks, was a pioneer exponent of the specificity of the individual acute exanthemata. His claim to this distinction is amply justified by the following extracts from his principal work published in 1730, dedicated to Sir Hans Sloane, the President, and the Fellows of this College, and entitled "Exanthematologia, or an Attempt to give a Rational Account of Eruptive Fevers, especially of the Measles and the Small-Pox": "The Particles which constitute the material and efficient Cause of the Small-Pox, Measles and other venomous Fevers are of specific and peculiar Kinds; and as essentially different from one another, as Vegetables, Animals and Minerals of different Kinds are from one another.

"And since it is most certain that no Effect can be produced but by its own proper Cause, I am hard to believe that the Small-Pox or Measles can be produc'd by such Things as have no manner of Affinity with them; such are Fevers of any other Sort; cadaverous Steams from them that dy'd of other Diseases; from putrefy'd Carrion; Exhalations from fermenting Minerals: Vapours

¹ "Kurtze nothwendige Berict, Erstens von den Vrschlechten oder Kinds-Blattern, wie auch Masern, Röteln, Rotesucht oder Kindsflecken, Zum Andern von der Röten Ruhr, Zum Dritten von den in anno 1622, etc., einreissenden neuen Hauptschwachheit, Zum Vierdter, wie man sich in einreissenden Pestzeiten verhalten habe."



THOMAS FULLER, 1654-1734

[To face p. 2.]

out of deep Vaults that had long been shut up, from Tempest, Thunder, Earthquakes, nor from foul Ways of Living, Nastiness, corrupt Meats and Drinks ” (pp. 95–6).

“ Nobody ever yet saw a Miliary Fever or Measles or any of the Under Species beget a true Small-Pox, or any of its Sorts, nor on the contrary : and nobody was ever defended from the Infection of anyone Sort, by having had another Sort ” (p. 174).

“ The Pestilence can never breed the Small-Pox, nor the Small-Pox the Measles nor they the Crystals or Chicken Pox, any more than a Hen can breed a Duck, or a Wolf a Sheep, or a Thistle Figs and consequently one Sort cannot be a Preservative against any other Sort ” (p. 176).

Hektoen points out that while Fuller does not speak of the causes of infectious diseases as living organisms, he does expound their specifickness of action with surprising clearness and unfaltering consistency.

Among the eighteenth-century writers special mention should be made of Giambattista Borsieri de Kanilfeld (1725–1785), otherwise known as Burserius, who devoted the second volume of his “ *Institutiones Medicinae Practicae* ” (1798) to the description of febrile exanthematous diseases, in which are included erysipelas, purpura scarlatina, morbilli, variola, morbus petechialis and exanthema miliare.

In the second half of the eighteenth century the acute exanthemata occupy an important place in the principal nosologies of the time, namely, those of Linné, Vogel, Sauvages, Sagar and Cullen.

In Linné's classification (1763) morbi exanthematici form the first of his eleven classes of diseases and are subdivided into I. Contagiosi, consisting of *morta* (urticaria) *pestis*, *variola*, *rubeola*, *petechia* and *siphylis* (*sic*). II. Sporadici, consisting of *miliaria*, *uredo*, and *aphta* (*sic*). III. Solitarii, consisting of erysipelas only.

In Vogel's nosology (1764) febres exanthematicae form the first sub-group of the order entitled febres compositae

of the Class Febres, and consist of febris variolosa, morbillosa, miliaris, petechialis, scarlatina, urticata, bullosa, varicella, pemphingodes (*sic*) and aphthosa.

In the nosology of Sauvages (1768) the eruptive fevers, which are named phlegmasiae exanthematicae, form Ordo primus of Classis tertia (Phlegmasiae) and comprise pestis, variola, pemphigus, rubeola, miliaris, purpura, erysipelas, scarlatina, essera and aphtha.

In Sagar's classification (1776) exanthemata, which form Classis X., are divided into two orders: the first, denominated exanthemata contagiosa, contains pestis, variola, pemphigus, purpura, rubeola and scarlatina, while the second order, denominated exanthemata non-contagiosa, contains miliaris, erysipelas, essera and aphtha.

In Cullen's nosology (1783) exanthemata form Ordo III. of Classis I., entitled Pyrexiae, and consist of variola, varicella, rubeola, scarlatina, pestis, erysipelas, miliaris, urticaria, pemphigus and aphtha.

The following description of the acute exanthemata appears in Cullen's "First Lines of the Practice of Physic" (1784): "The diseases comprehended under the title of exanthemata or eruptive fevers . . . are in general such as do not arise but upon occasion of a specific contagium applied, which first produces fever, and afterwards an eruption upon the surface of the body, and which diseases for the most part, affect persons but once in the course of their lives."

At a somewhat later date (1817) Mason Good, whose Nosology bristles with neologisms, places the eruptive fevers (Exanthematica) in the third order of Class III. (Hæmatica), and subdivides them into the following four genera: (1) enanthesis, comprising rosalia (scarlet fever), rubeola and urticaria; (2) emphyxis, comprising miliaria, aphtha, vaccinia, varicella, pemphigus and erysipelas; (3) empyesis, consisting of variola only; and (4) anthracia, comprising plague and rubula (yaws and pian). Finally, Pinel, in the sixth edition of his "Nosographie Philoso-

phique," published in the year following the appearance of Mason Good's *Nosology*, ranks the acute exanthemata (variola, varicella, measles, scarlet fever and erysipelas) in the same group (Ordre I.) entitled *Phlegmasies Cutanées* of Classe II. (*Phlegmasies*), with nine other skin affections, viz., zoster, miliaria, urticaria, tinea, plica, dartres, scabies, pemphigus and psydracia.

Influenced doubtless by contemporary philosophical doctrine, several German physicians in the early years of the nineteenth century held fantastic views as to the origin of the acute exanthemata.

According to Kiesser, Pfeufer, Goeden, Steimmig and others, the exanthemata in general and scarlet fever in particular were the means adopted by Providence to bring man to perfection and spiritualise him. "Is there not something providential," they asked, "in these exanthematous disorders from which no one escapes, which attack the same individual only once, which are peculiar to that period of life when man is still susceptible of improvement, and which are always followed by the physical and intellectual improvement of the patient?" Noirot, from whom this passage is taken, truly remarks that these opinions cannot withstand examination when stripped of their poetic colours and abstract form.

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CHAPTER I

SMALL-POX

Nomenclature. The term "small-pox," which may be spelt as one word or as a hyphenated word, or as two distinct words, was introduced, like its French equivalent *petite vérole*, towards the end of the fifteenth century to distinguish it from the great pox or syphilis (*grande vérole*). According to the "New English Dictionary," the first use of the word in the form of "small pokkes" is to be found in the literature in the year 1518. Among the foreign names for the disease other than the French, mention may be made of the euphemistic modern Greek terms *εὐφλογία* (kindly inflammation) or *εὐλογία* (blessing), which recall the ancient Greek denomination of Eumenides applied to the Furies.

According to Goodall, the word "variola" is derived from the Latin *varius* (speckled) and not from *varus*, a pimple, as Fracastor, Mason Good and others maintain.

Earliest History. Of all the acute exanthemata by far the most important and the earliest to be described is unquestionably small-pox. Although the view advanced by the Jesuit prior Cibot that the disease had been known in China for 3,000 years is generally discredited, China is undoubtedly one of the earliest homes of small-pox. According to Wong and Wu, its first appearance in China took place in the reign of Chien Wu, when he was at war with the Huns (A.D. 49), who introduced the disease from the West. More than 200 years later the following description, suggestive of small-pox, was given in the "Handbook of Prescriptions for Emergencies" by the alchemist Ko Hung, who lived in the Chin dynasty (265-313), and thus anticipated Rhazes by about seven cen-

turies (Morse): "Recently there have been persons suffering from epidemic sores which have attacked the head, face and trunk. In a short time the sores spread all over the body. They have the appearance of hot boils containing some white matter. While some of the pustules are drying up, a fresh crop appears. If it is not treated early the patients usually die. Those who recover are disfigured by purplish scars which do not fade until after a year. This is due to the poisonous air."

According to Hirsch, the native foci of small-pox were in India and Central Africa. In India, Holwell relates that immemorial traditions have existed in the Brahmin caste concerning the prevalence of the disease in that country, where, since the earliest times, there has been a temple worship of a deity whose protection and help were invoked on the outbreak of an epidemic. Moore suggests that the contagious disease described by Quintus Curtius which attacked Alexander the Great's army in the fourth century B.C., when it was encamped near the mouth of the Indus, was small-pox (*Quippe scabies corporis invasit et contagium morbi etiam in alios vulgatum est. Q. Curtii Rufi, De rebus gestis Alexandri regis Macedonium IX., X., 1).* This suggestion, however, is improbable, especially as Curtius adds that the outbreak was simply cured by oil (*oleum remedio fuit*).

Classical Antiquity. Few questions in the history of medicine have been the subject of more prolonged discussion than that of the existence of small-pox in ancient Greece and Rome, the difference of opinion on this subject being comparable to that in connection with the presence of syphilis in classical antiquity. "In the sixteenth century," says Haeser, "a keen discussion had already begun as to whether the disease had been known to the physicians of antiquity, and in the two following centuries, and down to the most recent times, the same question has been the subject of numerous controversies without anything better than guess work resulting from all these enquiries."

One of the first upholders of the view that small-pox existed in ancient Greece and Rome was Johann Gottfried Hahn, a learned Dutchman, who, in his work entitled "*Variolarum antiquitates nunc primum a Graecis erutae*," published in 1733, maintained that small-pox was described by Hippocrates,¹ Aretaeus, Galen and Aetius under the name of *ἀνθρακες*, as well as by Thucydides in his account of the pestilence of Athens, and that the corresponding Latin word "*carbunculi*," used by Pliny and Celsus, also applied to small-pox.

Hahn's principal opponent was Paul Gottlieb Werlhof, physician to the court of Hanover, who, in 1735, had no difficulty in refuting the contentions of his Dutch contemporary.

It is noteworthy that two of the best known Fellows of this College in the eighteenth century, John Freind and Richard Mead, expressed their opinion on this subject with no uncertain voice. Thus Freind says of small-pox : "This was a distemper without dispute unknown to the Greeks, whatever some of the moderns have said to the contrary, and first observ'd in this nation and describ'd by Mahometans." Similar language is used by Mead, who says : "It seems to be undoubted that the disease is a new one, *i.e.*, unknown to the ancient Greek and Roman medical men. In vain do those maintain that *ἀνθρακες ἐπιπυκτιδας* and similar *ἐξανθηματα* on the skin are variola. For it must be believed that the first masters of our art who are so careful in describing and distinguishing the signs of all diseases would not have briefly mentioned them but would have described them at length if they had but known of these at once terrible and contagious diseases."

The statement made by Rhazes that Galen had mentioned small-pox in several of his works is attributed by

¹ None of the passages in Hippocrates supposed to refer to small-pox can withstand criticism. The word *ἀνθρακες*, for example ("*Epidem.*" II., 1, 1), which is interpreted also by Krause and Willan as indicating small-pox, is shown by Littré to mean the occurrence of anthrax in several persons.



RICHARD MEAD, 1673-1754

[To face p. 8.]

Paulet to the fact that Rhazes was entirely ignorant of Greek and had been misled by a bad translation of Galen's work. On the other hand, in his treatise on small-pox and measles, published in the second half of the seventeenth century, Diemerbroeck writes as follows : " As to the Original of these Diseases there is a great Variety of Opinions among the Physitians. For some will have them to have been as ancient as the Original of the World, and that they were well known to Hippocrates, Galen and others of the ancient Greeks. But Mercurialis, Liddellus and others affirm that they were altogether unknown to Greeks in former Times and were first discovered in the Age of the Arabians and that therefore the first Description is set forth by them ; whereas the Greeks have left behind them nothing in particular written about the Distempers. But the later Opinion appears less probable, seeing that the Descriptions of the Greek Ecthymata and Exanthemata differ very little from the Variolæ or Smallpox as it appears in Hippocrates (" Epid." Lib. 3) in his Cure of Silenus, and because the Arabians also do not describe these Diseases as new ones, which they would have done, had they either known or thought them to be unknown to the Greeks."

Of the subsequent writers who took part in the discussion Violante (1750), Plenciz (1762) and Scuderi (1789) were in favour of the existence of the disease in ancient Greece and Rome, while Paulet (1763), Sarcone (1770), Dimsdale (1779), Gruner (1781) and Woodville (1796) maintained the opposite view.

Perhaps the most notable of those who believed that small-pox as well as measles and scarlet fever existed in classical antiquity was Robert Willan, the father of British dermatology, who, in his posthumous work entitled " An Inquiry into the Antiquity of the Small Pox, Measles and Scarlet Fever " (1821), endeavoured to prove that small-pox was the disease called *ἀνθράκες* by Hippocrates, *λοιμός* or *λοιμική* by Herodotus (VI. 27) and Dionysius of Halicarnassus (IV. 69), pestilentia by Livy

(X. 47), and *ignis sacer* by Lucretius (VI. 660) and Virgil (Georg. III. 566). Willan's views were of course shared by his faithful disciple Bateman, as well as by Ashby Smith, who edited his posthumous work.

Of the more modern authorities who hold the same view the most important is Haeser, who states that as most of the Greek medical literature was lost at a very early date little importance can be attributed to the omission of any mention of small-pox in the works which have come down to us.

It may be added that the celebrated pestilence of Athens in 430 B.C., described by Thucydides (II. 47-54), who himself contracted the disease and recovered, was regarded by Daremberg and Littré as small-pox, and the same interpretation has recently been maintained by Dr. Angélique Panayotatou of Alexandria, the only member of her sex in active practice who is also a medical historian, supported by the high authority of the late Professor Jeanselme and by Dr. Hans Zinsser. This suggestion, however, is not generally accepted, the view held by our Registrar, Sir Raymond Crawford, Colonel MacArthur and many others that the pestilence was typhus, being a much more probable explanation.

It may be noted that Thomas Fuller, to whom I have already alluded, is conspicuous in assuming an attitude of indifference on the matter of the existence of small-pox in the ancient world, as is shown by the following quotation: "Whether Hippocrates or Galen or any of the Greeks or Latins knew anything of this Distemper, I care not to enquire, it being a matter of more Curiosity than Consequence" (p. 167).

Kübler, the author of the latest monograph on the history of small-pox, regards the absence of any attempt to portray pock-marked faces in ancient statues or of any allusion to such disfigurement in contemporary lay authors such as philosophers, historians, satirists or writers on cosmetics as confirmatory evidence of the non-existence of small-pox in ancient Greece and Rome.

Middle Ages. Of the numerous medical and lay writers who flourished between the classical era and the time of Rhazes, and were regarded by Willan or Krause on very slender evidence as having described small-pox, may be mentioned Philo, the Jewish philosopher (first century A.D.), Rufus of Ephesus (second century A.D.), Galen (A.D. 131-201), Herodotus, a physician of Asia Minor who settled in Rome under Domitian or Nerva, and Eusebius, the ecclesiastical historian (A.D. 260-340).

Marius, bishop of Avenches, is usually credited with having first used the word "variola" in an account of an epidemic that was prevalent in France and Italy in A.D. 570 (*Hoc anno 570 morbus validus cum profluvio ventris et variola Italiam Galliamque afflixit*). Moore, however, has suggested that the term "variola" was interpolated by a modern transcriber to supply a word which he could not decipher. The subsequent passage, moreover, is more applicable to plague than small-pox.¹

On the other hand, as Kübler points out, the description given by Gregory of Tours, in A.D. 580, of a pestilence particularly fatal in children, preceded by fever, vomiting and pain in the back, followed by a decline of the fever as a rash appeared consisting of vesicles which became purulent, with death in unfavourable cases on the twelfth to the fourteenth day, exactly corresponds to the clinical picture of small-pox. The first undoubted description therefore of small-pox extant is that of a layman.

According to McVail (1913), the Irish monastic chronicles record various outbreaks suggestive of small-pox in the seventh and eighth centuries as well as subsequently, while in England an Anglo-Saxon leech book of the tenth century contains six prescriptions for the "pock disease" and local treatment, including the evacuation of the pustules with a thorn.

It is generally agreed that the first detailed unambiguous

¹ The earliest authority given for the term variola in Du Cange's glossary is Constantinus Africanus, who flourished in the eleventh century (Moore).

description of small-pox by a medical writer is that given by the Arabian physician Rhazes, of Bagdad (860-932), in his special treatise on small-pox and measles, "*Liber ad Almansorem*," "*Divisio Morborum*" and "*Liber Continens*." He alludes, however, to several of his predecessors who had described the disease, notably Ahron of Alexandria, who wrote on small-pox in A.D. 622, Isaac Israeli (ben Solomon) or Isaac Judaeus (855-955), who described small-pox as a children's disease, Mesuë (777-857) and Serapion (ninth century, A.D.), as well as a number of other writers whose works have not come down to us even in the fragmentary form of the authors just mentioned.

After dealing in the special treatise with the passages in Galen which he regards as referring to small-pox Rhazes discusses the causation, symptoms, prophylaxis and treatment of the disease. As regards causation, he attributed small-pox to effervescence of the blood and the discharge of superfluous vapours. The seasons of the year in which small-pox was most likely to occur were stated to be the end of the summer and beginning of spring. The prodromal symptoms are well described, Rhazes being the first to point out that pain in the back with fever is characteristic of small-pox. In the early stage removal of a large quantity of blood is recommended, but not later. The importance of attention to the throat, nose, ears and joints is particularly emphasised (Chap. VII.) The chapters dealing with small-pox in the "*Liber ad Almansorem*," "*Divisio Morborum*" and "*Liber Continens*" contain a repetition of much of that written in the special treatise as well as numerous references in the "*Liber Continens*" to the work of the Arabian predecessors of Rhazes, and remarks on the prognostic value of difficulty of breathing and hoarseness of voice ("*Liber Continens*," 55). According to Rhazes and the Arabian writers generally, small-pox and measles were closely related to each other, as both arose from the impure condition of the menstrual blood retained during pregnancy. Rhazes, therefore, does not draw a sharp distinction



RHAZES, 850-923

[To face p. 12.]

between small-pox and measles, but merely notes the following differences. In measles, restlessness, nausea and anxiety are frequent, whereas pain in the back is more characteristic of small-pox than of measles. Rhazes was inclined to regard measles as a more formidable disease than small-pox except as regards ocular complications ("Divis. Morb.," Chap. XIV., 9, 6).

Of the Arabian successors of Rhazes, Avicenna (b. 992) deserves special mention. He attributed small-pox to the putrefying remains of the menstrual blood with which the child had been nourished in utero, and its malignancy to too frequent use of mares' and camels' milk. He ranked the disease in the group of pestilences and regarded it as an accidental and contagious disorder. His treatment chiefly consisted in bleeding and sweating and opening the ripe pocks on the seventh day with a gold needle (Kübler).

A rich collection of abstracts of the subsequent Arabist writers will be found in C. G. Gruner's work (1780), which contains passages from sixteen writers on small-pox, of whom the most important are Constantinus Africanus (1020-1087), Bernard de Gordon (1305), John of Gaddesden, author of "*Rosa Anglica*" (1280-1361), and Guy de Chauliac (1300-1370). As Kübler remarks, Gruner's collection contains the most valuable documentary evidence of the existence of small-pox and its complications, especially blindness, in the later Middle Ages, when the medical profession still held the view that small-pox and measles were a purifying process occurring in most persons during childhood. The early association of Arabia with small-pox is further illustrated by the disaster recorded by Arabian historians which overtook the Abyssinian army of Abraha at the siege of Mecca during the Elephant War in 569 or 579, when more than 60,000 men died from a disease which is regarded by Creighton and others as small-pox.

Apart from the Arabian physicians, medical descriptions of small-pox were practically non-existent in the early Middle Ages, and though numerous epidemics

occurred they were described by lay writers only. An exception must be made in the case of Japan, where small-pox was prevalent as early as the tenth century. According to Garrison, the oldest Japanese medical book, the "Isinho," by Yasuhori Tambu in 982, mentions the existence of small-pox hospitals, and red hangings as treatment for the disease were known in Japan long before the time of John of Gaddesden.

Inoculation against small-pox was introduced into China between 1000 and 1010, the method consisting in grinding up the scales and introducing them into the nostrils (Wong and Wu). Introduction of inoculation into China therefore took place about seven centuries before its introduction into Europe by the Greek physicians Timoni and Pylarini and Lady Mary Wortley Montagu.

In the course of the next few centuries, in part, no doubt, owing to the movements of large bodies of men in connection with the Crusades, small-pox spread throughout Europe, while the Northern countries such as Russia, Scandinavia and Greenland were not attacked until considerably later.

In the eleventh century Constantinus Africanus (c. 1020-1087), a native of Carthage, occupies a not unimportant position in the history of small-pox as having been one of the first to translate the Arabian works into Latin, as well as to be the first to use the term *variola*, as already stated.

In the thirteenth century Bernard de Gordon, a professor of medicine at Montpellier, spoke of small-pox being a frequent disease in France.

In the fourteenth century small-pox had become well known in Germany under the name of "pocken," in Spain as "las viruelas," in Italy as "vaiola" and in France as "la verolle" or "les verolles," as well as by the colloquial name of "picote" (Paulet). In the later part of this century John of Gaddesden, in his "Rosa Anglica," relates how he treated John, son of Edward II,

in his attack of small-pox by putting him in a bed with red hangings, covering him with red blankets and a red counterpane, making him gargle his throat with red mulberry wine and suck the red juice of a pomegranate. Creighton, however, does not believe that the disease described by John of Gaddesden was really small-pox, the first use of which term in a systematic medical work is, according to him, to be found in "The Castelle of Helthe" (1544) by Sir Thomas Elyot, who was not a physician, but a clerk of the King's Council. The words "pocques," "variola" and "petite verole," however, are stated by Creighton to be found in letters of 1514 and 1515 as applied to particular cases of illness. It was not until 1593 that the first systematic English essay on small-pox appeared, being the work of Simon Kellwaye and appended to his treatise on plague. In this essay he gives a brief description of the prodromal fever, eruption and complications, taken almost entirely from the Arabian writers (Creighton).

Sixteenth Century. Although small-pox, like measles, was known in the sixteenth century in England, it had not then assumed the importance which it did in the subsequent century. Copeman has exemplified the generally mild character of small-pox in the Tudor epoch by quoting from John Stow the dying words of Master Richard Alington: "Maisters, seinge that I must needes die, whiche I assure you I nevar thought wolde cum to passe by this desease, consyderinge that it is but the small pockes."

The lack of any clear distinction between small-pox and measles, to which I alluded, is exaggerated into an actual confusion between the two in the following passage from the work entitled "The Boke of Children" (1546) by Thomas Phaer, whom Ruhräh calls "the father of English paediatrics."

"This disease is common in families, called of ye grekes by the name of exanthemata and of plinie, papule et pituite erupciones, notwithstanding ye cōsent of writers,

has obtained a distinctiō of it in II kindes, that is to say varioli the measils, and morbilli called of us small pockes. They be bothe of one nature, and procede of one cause, saving that the measils are ingendred of the inflamacion of bloude, and the small pockes of the inflamacion of bloude mingled with cholere.”¹

Creighton points out that Phaer was not singular among Tudor writers in taking measles as the equivalent of small-pox, as the same was done by William Clowes, surgeon to St. Bartholomew's Hospital (1540-1604), who, in an English translation of Latin aphorisms appended to his “Proved Practice for all Young Chirurgions,” translates variolæ by measles, and also by Levins (1570), who, in his English-Latin glossary, renders “ye maysilles” by variola.

There was thus the same confusion between variola and morbilli in early times as later existed between the colloquial terms “clap” and “pox,” which, as I have shown elsewhere (1934), were used indifferently in belletristic literature for syphilis and gonorrhœa.

In this connection I may state that in his excellent “Lectures on the Eruptive Fevers” (1843), Dr. George Gregory, a Fellow of this College, wittily remarks that “if America (discovered in 1492) gave us, as people confidently said it did, the great pox, we more than returned the compliment by introducing to her acquaintance the small-pox.”

In 1520 small-pox was first introduced into Mexico by a negro slave in the fleet of Narvaez and then spread rapidly over the country causing the death of nearly half the population (Woodville). According to Prescott, it does not appear to have been fatal to the Spaniards, as they had probably already had the disease and knew

¹ Phaer deserves further mention for the following prophylactic treatment of ocular complications in small-pox and measles:

“It is good to droppe in the pacientes eyes V or VI tymes a daye a little rose water or fennell water to comforte the syghte, leste it be hurte by continall renning of matter. This water must be ministred in the summer colde, and in the winter ye ought to apply it luke warme.”

the proper method of treating it. Negro slaves were also responsible for the introduction of small-pox into South America, especially Guiana and Brazil, about the middle of the sixteenth century, while the disease was introduced into the States of La Plata and Chili by the Spaniards at about the same time (Hirsch).

The influence of the Arabian doctrines on small-pox still continued among the medical writers of the Renaissance. Fracastor, for example, one of the most enlightened men of that brilliant period, in the chapter on small-pox and measles in his work on contagion, upheld the old view that these diseases were due to a fermentation of the blood.¹

He applied the term "salubris" to both variolæ and morbilli, as he considered that an attack of these diseases, which had not yet been clearly separated from each other, purified the blood by a sort of crisis produced by nature.

Jean Fernel (1497-1558), on the other hand, combated the Arabian view of the origin of small-pox from the menstrual blood, and was the first to propose a miasmatic theory, attributing small-pox and other pestilential fevers to the influence of bad air and the exhalations from swamps and decaying matter. His treatment consisted in venesection during the febrile period only, moderate use of purgatives, administration of cooling drinks, ventilation of the sick room, light covering for patients with high fever and cold applications (Kübler). Fernel's views regarding the origin and treatment of small-pox were

¹ This doctrine was still prevalent towards the end of the seventeenth century, as we find it controverted in 1688, as follows, by Mauriceau, who attributes small-pox to contagion :

"We daily see men and women advanced in age, who have never had this disease, which they would never have escaped if it came from the remains of the maternal blood by which all infants are nourished in utero. To which those holding this opinion rejoin that if some appear to be immune to this disease, that is because their excellent and strong constitution can consume the superfluous humours and expel them by other paths such as an intestinal discharge or other ways, but they ought to admit that the maternal blood cannot be hidden in the body for forty or fifty years without producing its effects, as we sometimes see men and women who are not attacked by small-pox until this age."

supported by van Forest (Forestus), who described an epidemic at Alkmaar in 1551, when scarcely any of the children in the town escaped, while adults were hardly at all attacked, and another big epidemic at Delft in 1562-1563.

Jean Baptiste Van Helmont (1577-1644) next deserves mention among the medical writers of this period. Unlike most of his contemporaries, he was firmly convinced of the transmissibility of small-pox due to a specific poison, but not derived from the menstrual blood (Kübler).

"I am convinced," he wrote, "that small-pox is due to a poison and can affect those in the neighbourhood of the patient, and as the essence of the poison is not demonstrable, we must estimate its qualities by its effects as a tree by its fruit."

Seventeenth Century. Van Helmont's view were further developed by Athanasius Kircher (1601-1680), who tried to determine the real nature of this poison by examination with his primitive microscope of the pus in the small-pox lesions in which he found "animalcules and vermicules." He was thus the first to attribute small-pox to the action of micro-organisms (Kübler).

In marked contrast with the benign character of small-pox in the Tudor period were the severity and fatality of the disease in the seventeenth century, particularly among royal families, both in this country and abroad, as is well illustrated in Schamberg's essay in the case of William III. and Mary II., Queen Anne, the Bourbon dynasty and Maria Theresa. It may be remarked, in passing, that the complete absence, since the introduction of vaccination, of small-pox in royal families, who presumably enjoy the best medical advice in the kingdom, is one of the many arguments in favour of Jenner's discovery.

From 1629, when the causes of death in London were first published by the Parish Clerks' Hall, small-pox appears as a regular item from year to year (Creighton). The first great epidemic was in 1634, when there were 1,354 deaths from "flox" (dysentery), small-pox and

measles. From 1647 to 1666 inclusive, the deaths from small-pox and measles ranged from a maximum of 1,523 in 1659 to a minimum of thirty-eight in 1666 (Creighton).

Reference should next be made to Sydenham's classical description of small-pox as seen by him in London in the years 1677-1679, as it holds a foremost place in the history of the disease. The frequency of small-pox in Sydenham's time is illustrated by his statement that the occurrence of fits in an infant who had just finished teething always made him suspect small-pox ("Proc. Integ.," CXV.). In addition to an account of the confluent and discrete types he points out the distinguishing features between small-pox and measles, and alludes to the bad prognosis of skin hæmorrhages ("Med. Obs.," III., 2; "Epist. Diss.," 19). He is best known, however, for the fundamental change which he introduced in the treatment. Until the time of Sydenham, in the second half of the seventeenth century and even later, it was the custom to treat small-pox and fevers generally by the hot or sweating system, with the object of driving out "peccant humours," as is well shown by the following quotation from the celebrated Dutch physician and anatomist, Diemerbroeck :—

"Let the Patient lye in a little Chamber, close shut, and free from any Wind, to the end he may more easily breath, and that the stinking Vapours being the more easily discussed, may the less offend him. Let the Air be tepid and as little of Cold come in as may be, if it be Winter of a cold Season, the Air is to be corrected with lofty Fires. More especially take care that no Cold get into the Patient's bed. For should the least Cold come to him while he is in a Sweat or a moist Breathing, or if the Patient himself by tossing and tumbling should throw off the Cloathes and check his Sweat it frequently happens that the Pox fall in again and vanish or sink into the Skin, to the great Hazard of Life. For which Reason the Patient must not be shifted until after the fourteenth Day, for fear of striking in the Pox again, to the irrecover-

able Ruin of the Patient. For better is it to suffer the Shifts of the Patient, moist with Sweat, to dry of themselves with the heat of the bed and for the Patient for some Days to bear with the Stench of the Sweat and the Pustles coming forth then to change his Linnen and to be the Cause of his own Death. But if there be urgent necessity for the Patient to Change his Linnen, then let him have the same fowl Linnen that he put off just before he fell sick or that had been worn before by some other sound Body. For I have often observed clean and newly washed Linnen to have been very prejudicial to sick People, which I am apt to believe proceeds from the Smell of the Soap, which the Linnen in some measure retains. Moreover, great Care is to be taken that the Shift be well warmed by the Fire and that no Cold come to the Patient while he puts it on. However, this is certain, tis better not to change Linnen at all, but to change before the fourteenth day is a thing not to be done without extream Hazard. Nor is there is any reason for any man to be afraid of any bad Smell which the Linnen contracts from the Sweat and broken Pustles, for that we never found it to be prejudicial to any that were sick of the Distemper."

It was not the least of Sydenham's achievements to have introduced a cooling regimen.

"From an over hot regimen," he wrote, "good never came any more than from over hasty fruit any profit. On the contrary, it often happens that the patient runs headlong into a brain fever or that (worse still) violent sweats arise. Such sweats eliminate particles that are unfit for secretion, and which have none of the characters of true pus, pus being the proper product of this secretion. Finally, from the use of your vaunted cordials, and from your hot treatment the pustules may be crowded together and rendered confluent. Here we have a sad sight, if not the signs of an un auspicious upshot." ("Med. Obs.," III., C. 2, 34).

Sydenham attributed the higher death rate from

small-pox among the rich to the lack of opportunity on the part of the poor man to injure himself "by a nice and delicate regimen." (*Ib.* 48).

Sydenham's treatment met with the powerful support of Boerhaave (1668-1773), whose importance in the history of small-pox lies in the fact that he was one of the first to maintain that small-pox is a specific disease spread exclusively by contagion, as is shown by the following quotation (*Aph.*, 1785):

"This disease, though epidemical, yet is caught from another, who had it first by a contagion, which at first seems to be in the Air, and to be transferred into the Lungs, Mouth, Nostrils, Gullet, Stomach and Intestines, and consequently has yet but a small share of poisonous quality."

At the beginning of the seventeenth century, Mexico and some of the islands were the only parts of America visited by small-pox, but the disease subsequently became introduced by English settlers in Maryland, whence it spread to Virginia, Carolina and New England. Outbreaks of small-pox were also reported in the seventeenth century in China, Japan and Persia, but all these countries had been the seat of the disease at a much earlier period.

Eighteenth Century. In the north of Europe the Faroe Islands were first attacked in 1651, but it was not until the first half of the eighteenth century that the other northern countries were invaded, Iceland being first attacked in 1707, and Greenland, which was the last country in Europe to be infected, in 1732.

According to Hirsch, Australia remained absolutely exempt from small-pox until 1838, but in his more recent work Cumptson has shown that an extensive and highly fatal epidemic, probably associated with the arrival of a large number of Europeans, occurred among the aborigines in New South Wales, Victoria and South Australia in 1789, followed by a second epidemic, in which the white population were also attacked, in 1829 and 1830.

Prior to the introduction of inoculation into Europe, in the early part of the eighteenth century, there was no specific prophylaxis against small-pox, although elaborate recommendations were given by some writers for protection against the disease. Fuller, for example, recommends that in time of epidemics one should avoid all irregular and unusual ways of living, such as drunkenness and gluttony on the one hand and fasting on the other, take moderate exercise and keep to the same hours of sleep and waking, going to bed and rising, as in ordinary times. "As for Antidotes," he continues, "that are properly such, and have Power specifically and directly to oppose, correct and conquer variolous Venom, I know of none." He recommended, however, inhalation of the vapour of vinegar and washing out the mouth with vinegar or rue with the addition of Venice treacle, mithridate or tincture of myrrh. Smoking, especially morning and evening, is also advised for those used to tobacco.

Mention may here be made of the high standard required by Fuller for the small-pox nurse (pp. 208-9). "Though it is impossible," he says, "to meet with a Nurse every way so qualify'd for the Business as to have no Faults or Failings yet the more she cometh up to the following Particulars, the more she is to be liked. It is therefore desirable that she be—

"(1) Of a middle Age, fit and able to do through the necessary Fatigue of her Undertaking.

"(2) Healthy, especially free from Vapours, and Cough.

"(3) A good Watcher, that can hold sitting up the whole Course of the Sickness.

"(4) Quick of Hearing, and always ready at the first Call.

"(5) Quiet and still, so as to talk low and but little, and tread softly.

"(6) Of good Sight, to observe the Pocks, their Colour, Manner and Growth, and all Alterations that may happen.

" (7) Handy to do everything the best way without Blundering and Noise.

" (8) Nimble and Quick a going, coming and doing everything.

" (9) Cleanly, to make all she dresseth acceptable.

" (10) Well tempered, to humour and please the Sick as much as she can.

" (11) Chearful and Pleasant, to make the best of everything, without being at any time Cross, Melancholy or Timorous.

" (12) Constantly careful and diligent by Night and Day.

" (13) Sober and Temperate, not given to Gluttony, Drinking or Smoaking.

" (14) Observant to follow the Physicians Orders duly, and not to be so conceited of her own Skill, so as to give her own Medicines privately.

" (15) To have no Children, or others to come much after her."

Inoculation. Lady Mary Wortley Montagu, the wife of the British Ambassador at Constantinople, usually gets the credit of having introduced into England and the West of Europe the practice of inoculation, of which she gives a well-known description in a letter from Adrianople to her friend Mrs. Sarah Chiswell, on April 1, 1717. She had, however, been preceded by two Greek physicians, viz., Timoni of Constantinople, and Pylarini of Smyrna, whose essays on the subject were printed in the *Philosophical Transactions* of 1714. On the other hand there is little doubt that the influence of this remarkable woman was much greater in making inoculation popular than that of the comparatively obscure Greek doctors. Inoculation received the support of the leading London physicians, such as Sir Hans Sloane, Mead, Arbuthnot and Jurin, while Freind was conspicuous as an opponent. On the Continent the principal medical supporters were Tronchin and Tenon in France, Werlhof and Wrisberg in Germany, and Tissot and Haller in Switzerland. In

Holland Boerhaave maintained an expectant attitude, while in Austria van Swieten was reserved, and De Haen was one of the most vigorous opponents of inoculation (Klebs).

According to Creighton inoculation, which was first performed in London in 1721, fell into disuse in 1728, owing to the death from the inoculated disease of children and adults, but it was revived with great enthusiasm in 1740, especially in France, where Voltaire in particular was one of its most ardent defenders. It was mainly due to his influence that Catherine the Great allowed herself and her son to be inoculated in 1766 by Thomas Dimsdale, who received the truly royal fee of £10,000, £2,000 for expenses, an annuity of £500, to be paid him in England, and miniatures set with diamonds of the Empress and Grand Duke, in addition to being made a Baron of the Russian Empire (Bishop).

It is noteworthy that in 1754 this College published a strong approbation of inoculation in which it declared that "experience had refuted the arguments that had been urged against the practice, which was now held in greater esteem and was more extensively employed by the English than ever, and the College considered it highly beneficial to mankind." (Moore).

Creighton has pointed out that inoculation was by no means so simple an operation as might be thought, requiring as it did the co-operation of a physician, surgeon and apothecary. Nor, indeed, was it without risk. In addition to its multiplying the foci of infection the artificial ingrafting of the disease was by no means invariably followed by a mild attack. According to Moore the number of deaths from inoculated small-pox was estimated at from 1 in 100 to 1 in 200. Creighton, who has as little to say in favour of inoculation as he has of Jenner's discovery, remarks that the usual estimates of saving life by inoculation were extravagant and fallacious. According to him the operation made but little difference on the epidemiological history of small-pox owing to its

being confined to a comparatively small proportion of the population, the majority of whom contracted the disease before seven years, which was the age of admission to the inoculation hospital.

Throughout the eighteenth century, and indeed until the general adoption of vaccination, small-pox, both in this country and abroad, was mainly a disease of infancy and early childhood as measles is to-day, and, with the exception of London, where infantile diarrhoea and convulsions were responsible for a larger proportion of deaths, destroyed more children than any other single disease. The relatively high fatality from small-pox in the early years of life in the second half of the eighteenth century is well exemplified in the cases of Manchester and Berlin respectively by the following table :—

MANCHESTER 1769–1774 (CREIGHTON).

All deaths from small-pox.	Under 1 year.	1–2.	2–3.	3–5.	5–10.	10–20.
589	140	216	110	93	29	1

BERLIN, 1758–1774 (GINS).

Small-pox percentage fatality.

Below 12 years.	12–39 years.	40 years and over.
98–70	1.25	0.07

Nineteenth Century. It is not necessary to dwell in any detail, before such an audience as this, on the history of vaccination, which is well told in Dr. Monckton Copeman's Milroy lectures in 1898, and much more recently by Professor Major Greenwood in his "Epidemics and Crowd Diseases." I need only remind you that in 1807, or nine years after the publication of Jenner's "Inquiry

into the Causes and Effects of the Variolæ Vaccinæ," this College, at the command of George III., presented a report to the House of Commons on the subject of vaccination. The College were of opinion that though in some instances vaccination failed to protect, it afforded greater security than inoculation against small-pox, while the illness produced by it was milder and less dangerous. It was further observed that in almost every case where small-pox had succeeded vaccination, whether by inoculated or accidental infection, the disease had varied much from its ordinary course, and with few exceptions had been remarkably mild. Moreover, it was pointed out that vaccinated persons did not spread infection and that cow-pox could only be communicated by inoculation. In conclusion, the College felt it to be their duty to strongly recommend the practice of vaccination (Report on Vaccination and its Results).

In 1840 inoculation was made illegal by an Act which provided gratuitous vaccination. In 1853 vaccination was made compulsory in England, and in 1863 in Scotland and Ireland. In 1898 exemption on the ground of conscientious objection was granted, and in 1907 the means for obtaining exemption were facilitated.

As I showed in my presidential address in 1933 before the Section of Epidemiology and State Medicine of the Royal Society of Medicine, many writers have emphasised the shifting of the incidence and mortality of small-pox from childhood to adult life in the first half of the nineteenth century, the epidemic of 1837-1841 being the last to show a preponderance of deaths among infants and young children. While, however, the generally accepted view is that the change in age incidence is due to a better enforcement of vaccination in early life, Creighton attributed it to an epidemiological obsolescence of the disease. In other words, he explained the comparative immunity of children to small-pox by the fact that other diseases more appropriate to modern conditions of the population such as measles, whooping cough, scarlet

fever, diphtheria, infantile diarrhoea and their sequelæ were attacking them instead. Creighton's suggestion, however, is disproved by the fact that in those countries where vaccination was not compulsory in the early seventies of last century, such as Holland and Prussia, the infantile mortality from small-pox in the 1870-1874 pandemic was much higher than in those countries in which vaccination was more or less strictly enforced.

Although a considerable decline took place in the prevalence of small-pox after the introduction and general adoption of vaccination throughout the world, epidemics broke out in various countries in the course of the nineteenth century, the most important being those of 1824-1829, 1837-1840, 1870-1874 and 1901-1902. The pandemic of the 'twenties began in Sweden in 1824, reached England in 1825, spread to France in 1826-1827, where it attacked Marseilles with special severity, and came to an end in Italy, where Turin suffered most, in 1829. This pandemic of the 'twenties, as Gregory has shown, was remarkable in that in its last year the governments of the German States, alarmed by the advance of the disease, began the practice of re-vaccination in the armies of Würtemberg and later in the armies of Prussia and Baden. The epidemic of 1827-1840, when the total small-pox deaths in England and Wales averaged 12,200 per annum, with a fatality rate of about 20-25 per cent., was chiefly fatal to infants and young children in striking contrast to the epidemic of the 'seventies.

The pandemic of 1870-1874, which severely affected the principal European countries, is undoubtedly the most interesting of all the epidemics of small-pox in the nineteenth century for the following reasons. In the first place it was the most malignant and extensive outbreak of small-pox since the introduction of vaccination. Secondly, although the United Kingdom suffered severely the incidence and fatality would have been considerably higher had it not been for the first compulsory Vaccination Act for England and Wales, passed in 1853, which enacted

that vaccination should be performed at an earlier age, viz., within three or four months of birth, than that required in any foreign country. The small-pox deaths under four years of age, which had hitherto formed 75 per cent. of the small-pox deaths at all ages, fell to 55 per cent., while the proportion of deaths remained at 75 per cent. in Scotland and Ireland until these countries had compulsory vaccination introduced in 1863. On the other hand in France where, on the outbreak of the Franco-Prussian war, about one-third of the population was unvaccinated and in many departments as much as four-fifths, the infantile small-pox mortality was very high, 1,185 out of a total of 10,331 small-pox deaths in France during the years 1870-1871 being in children under one year (Vacher).

In Germany the deaths from small-pox among the civilian population were high compared with the well-vaccinated army, although the protection afforded by primary vaccination in the southern states resulted in the small-pox fatality among them being much less than in North Germany. The severity of the losses sustained by Germany led to the passing of a law in 1874 which enacted that every child must be vaccinated within two years of birth and that re-vaccination should be performed in the twelfth year.

In Holland, where vaccination of children was not compulsory until admission to the communal schools, 9,396 out of 19,518 small-pox deaths in 1871-1872 were in children under five years of age.

Twentieth Century. In his Milroy lectures before this College in 1919, McVail showed that since the beginning of the present century two distinct forms of small-pox had been recognised, the one being the European or African type, which originated in North Africa, whence it was transmitted to Spain, France and Italy, and attended with the relatively high fatality rate of 16-24 per cent., and the other the American type, which originated in the United States and was a much modified form of the

disease with a fatality of under 1 per cent. and prevalent in the United States, Canada, New South Wales and England. The epidemic which occurred in Switzerland from 1921-26 was another example of this kind.

When this type first came to this country it was confined to the provinces, while the form of small-pox prevalent in London was of the African type, but for many years now the mild type only has occurred in London. Occasionally, however, small outbreaks with a high mortality occur, as at Willesden in 1926, Hendon in 1927, in various parts of Britain after importation of a malignant form from India in the steamship *Tuscania*, in 1903, and at Blackburn in the spring of 1934.

At the present time, according to the recent reports issued by the Health Section of the League of Nations, the chief foci of small-pox in Europe are Soviet Russia, where the type of disease is severe, the Iberian peninsula, where it is mild in Spain, but severe in Portugal, and in England and Wales, where for many years the disease has been extremely mild. Since 1922, indeed, the mild type (*variola minor*) has been prevalent in this country which, apart from a small outbreak at Hove in March, 1936 (*Lancet*, 1936, i., 1209), has now been entirely free from the disease for nearly two years. In Asia the incidence and fatality of small-pox still remain high. In all other parts of the world small-pox is either on the decline or has been non-existent for a varying number of years.

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CHAPTER II

CHICKEN-POX

Nomenclature. Like German measles, as will be shown later, chicken-pox has received a multitude of names which is out of all proportion to its real significance. Described first by Ingrassias in 1552, under the name of *crystalli*, it has also been called *varicella* (Vogel), *pseudovariola* (Chesneau), *variolaë crystallinaë*, *nothæ*, *spuriæ*, *illegitimæ*, *volaticæ*, *benignæ* (Morton), *lymphaticæ* (Sauvages, Sagar), *alituosæ* (Brendel), *simplices*, *pusillæ*, *ichorosæ atque fatuæ* (Merindol), *pemphigus variolodes vesiculosus* (J. P. Frank), *water-pox*, *water jags* (provincial), *the crystals* (Fuller), *nerls* or *blibes* (Sims).

In France, where its present name is *varicelle*, it has been known as *variole volante*, *petite vérole volante*, *fausse variole*, *variole bâtarde*, *vérette*, *vérolette*, *variolette*, *petite vérole séreuse*, *crystalline*, *lymphatique*, etc., and in Southern France *fourmentole* (Duval).

In Germany it is called *Wasserpocken*, *Windpocken*, *Spitzpochen*, or *Spitze Blattern*, its former names in that country being *Guldne Pocken*, *Schaffsblattern*, *Steinpocken*, *Hundspocken* and *Hühnerpocken*. In Holland it has been named *De Pocken*, *De Steen Pocken* (Diemberoeck), and in Italy *ravaglione*, *vajuolo selvatico* and *schiopetti*.

Uncertainty still prevails as to the etymology of the English name. While according to the Oxford Dictionary the term is generally supposed to be due to the mildness of the disease, Fagge and Pye-Smith conjecture that the word is a corruption of *chick-pease* (French *chiche*, Latin *cicer*) in allusion to the size of the vesicles.

In his paragraph on "Ritteln or Chicken-pox"

Fuller, after giving a rather vague description of the disease, suggests the following two unlikely explanations of the term : " I have adventur'd to think that this is that which among our Women goeth by the Name of Chicken Pox and might be so called from the Smallness of the Specks, which they might fancy looked as though a Child had been pick'd with the Bills of Chickens. But it is said that Poultry and Turkeys are subject to a disease, coming out with red Pimples, tho' not many, that soon dry up into Scabs, but are not apt to leave Scars or Marks."

Early History. No definite description of chicken-pox can be found before the sixteenth century. Whatever views may be held as to the existence of small-pox in ancient Greece and Rome, no serious attempt has been made to demonstrate the occurrence of varicella in classical antiquity. It is true that Werlhof, whose view is accepted by Joseph Frank, admits the possibility of " spurious variola " having been known in ancient Greece and Rome, though he strongly combats the view that small-pox existed in those times.

The word " chicken-pox " is used by Greenhill, the translator of Rhazes' work on small-pox and measles, in a passage referring to small-pox attacking young men and others who have had " Chicken-pox " in their childhood. In a footnote, however, he states that the word translated " chicken-pox " means literally a mild or slight small-pox.

Sixteenth Century. The first undoubted description of chicken-pox is given in his work entitled " De tumoribus præter naturam," in 1552, by Giovanni Filippo Ingrassias, sometimes known as the Sicilian Hippocrates, who was also the first to describe scarlet fever under the name of *rossania* or *rossalia*. After dealing with small-pox and measles he says that " there are two other kinds of eruption, one of which is commonly called *rossania* or *rossalia* and the other *crystalli*, as in the latter the pustules are scattered all over the body more or less of the size of a lupine, white in colour and shining like crystal ; when

they are opened a watery fluid is seen to escape." Forty years later Guido Guidi (Vidus Vidius), physician to François I. and professor of medicine at the Collège de France, wrote as follows: "Some there are who to the two species (morbilli and variola) which we have mentioned, add *crystalli*, for such is the name they give to vesicles full of water, shining like crystal, by which the skin is marked in various places. These the vulgar now call *ravaglione*. All men are not so subject to them as to small-pox and measles, nor are they so severely affected thereby."

Seventeenth Century. In the following century Lazare Rivière (Riverius), after mentioning small-pox and measles, stated that there was "a third form of pustules, common in children, like small-pox as regards size and shape, but distinguished from it in that small-pox has a red inflammatory appearance, while this eruption is white and like vesicles filled with serous fluid which break and dry up in three days' time, are usually not dangerous, and break out without fever." He then quotes the description of Guidi, which I have already given.

In 1650 Sennert, who was the first German writer to describe chicken-pox, said that the spots, more or less the size of a lupine, were scattered all over the body, white in colour, shining like crystal, from which flowed forth a watery fluid. He added that the disease was less dangerous than small-pox and often attacked infants without much fever.

It is noteworthy, as Cross points out, that no reference to varicella is to be found in Sydenham beyond a brief mention of a spurious kind of small-pox which occurred during the London epidemics of variola in 1667-1669 and did not prevent those whom it attacked subsequently having small-pox.

In Holland, Diemerbroeck, like his contemporary Morton, described in 1694 what was obviously chicken-pox, though he never uses either that word or varicella in the following account of the varieties of small-pox: "The

others (forms of small-pox) are clear and large, transparent like Water or Chrystal, and containing a certain watry kind of Liquor, which the Dutch call Wint-Pocken and some Water-Pocken."

In a work with a punning title, published at the end of the seventeenth century, J. F. Löw, professor of medicine and rector of the University of Prague, differentiated *crystalli* from *variola* as follows :

(1) *Variola* appears with redness and inflammation and suppuration is late, whereas in *crystalli* the lesions are white and vesicular, filled with serous fluid, burst and dry up in a few days. (2) Small-pox is always accompanied by fever and *crystalli* is not. (3) *Crystalli* are generally not accompanied by fever or danger.

As regards the first use of the term "chicken-pox," Richard Morton, who was censor of this College in 1690, 1691 and 1697, is generally credited with its introduction in his "*Pyretologia*" of 1694, in his account of "*variolae mites et benignae*." "The typical features of this form of small-pox," he says, "called in the vernacular the Chicken-Pocks are the rapidity with which the lesions grow and reach maturity and then spontaneously dry up without a return of fever or any other troublesome symptoms apart from some pain in the affected parts."

Two years later Gideon Harvey the Elder, who is better known for his scurrilous attack on this College than for his other works, in his "*Treatise of the Small-Pox and Measles*" of 1696, in which he describes himself as "His Majesties Physician and not of the College of Physicians," states that "the small-pox may appear in a greater number or lesser, of which latter the bigger are called by the doctrices the swinepox and the lesser the chicken-pox."

Eighteenth Century. Owing to the rarity of second attacks of small-pox, which, when they do occur, are almost invariably milder than the first, the epidemic which took place in the Basle district in 1712 was in all probability one of chicken-pox. Zwinger, who records it,

states that children were attacked by an eruption of large vesicles accompanied by fever, and six months later by malignant and fatal small-pox.

Early in the eighteenth century (1719) Chesneau described various forms of spurious variola which differed from variola vera by their much more rapid course, lack of danger and absence of scarring. He stated that they were the cause of many persons being supposed to have had two attacks of small-pox.

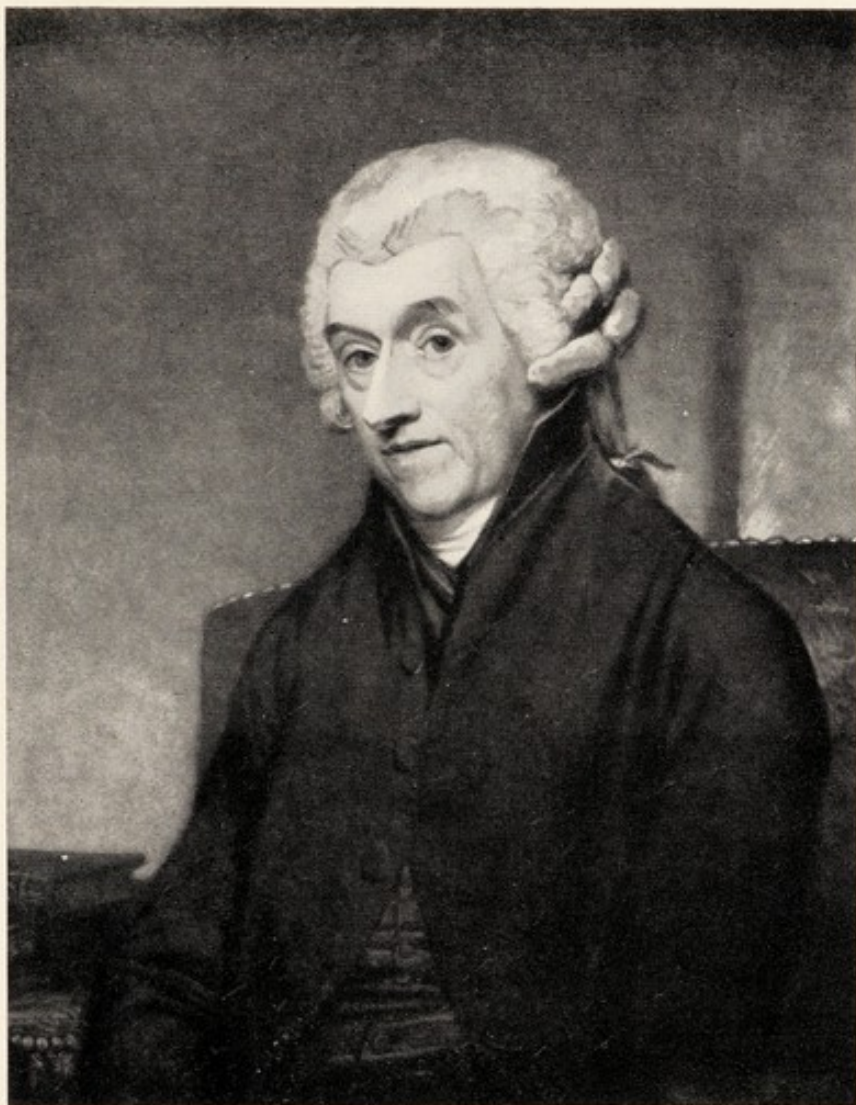
Prior to Heberden, the best English account of chicken-pox is that given by Fuller. It is to be found, however, not in the paragraph on "Rittelen or Chicken-Pox," the identity of which it is difficult to determine, but in that on "The Crystals," of which he gives the following description :

"These come with the very same Head-ach, Back-ach, Vomiting and Fever and other symptoms usual in a true Small Pox : But sometimes they seize Children without any foregoing Illness at all. They break out the third or fourth day in certain distinct bladdery Pustules dispersedly all over the Body, commonly as big as Pease, plump and shining like Crystals from which the Name, which if pricked send forth clear Water and no Pus."

In his description of the diseases prevalent in December, 1745, Huxham states that the chicken-pox and swine-pox were very frequent in children and were mistaken by the women folk (*mulierculæ*) for small-pox. Their error, however, was proved by such patients subsequently developing severe attacks of small-pox.

It is generally agreed that the merit of recognising and describing in detail the characteristic features of chicken-pox belongs to William Heberden, the Elder, whose paper, from which I quote the following passages, was read before this College on August 11th, 1767 :

"The chicken-pox and swine-pox differ, I believe, only in name ; they occasion so little danger or trouble to the patients that physicians are seldom sent for to them, and



WILLIAM HEBERDEN, 1710–1801

[To face p. 36.]

have therefore very few opportunities of seeing this distemper. . . .

“ But though it be so insignificant an illness that an acquaintance with it is not of much use for its own sake, yet it is of importance on account of the small-pox, with which it may be otherwise thus confounded, and so deceive the persons, who never had it, into a false security, which may prevent them either of keeping out of the way of the small-pox, or from being inoculated. . . .

“ These pocks break out in many without any illness or previous sign, in others they are preceded by a little degree of chillness, lassitude, cough, broken sleep, wandering pains, loss of appetite and feverishness for three days. . . .

“ The patients scarce suffer anything throughout the whole progress of the illness except some languidness of strength and spirits and appetite, all which is probably owing to confining of themselves to their chamber. . . .

“ Remedies are not likely to be much wanted in a disease attended with hardly any inconvenience, and which in so short a time is certainly cured of itself. The principal marks by which the chicken-pox may be distinguished from the small-pox are : 1. The appearance on the second or third day from the eruption of that vesicle full of serum upon the top of the pock. 2. The crust, which covers the pocks on the fifth day ; at which time those of the small-pox are not at the height of their suppuration.

“ Foreign medical writers hardly ever mention the name of this distemper ; and the writers of our own country scarce mention anything more of it than its name. Morton speaks of it as if he supposed it to be a very mild genuine small-pox. But these two distempers are surely totally different from one another, not only on account of their different appearances above mentioned, but because those, who have had the small-pox, are capable of being infected with the chicken-pox ; but those, who have once had the chicken-pox are not capable of having

it again, though to such as have had this distemper it seems as infectious as the small-pox. I wetted a thread in the most concocted, pus-like liquor of the chicken-pox, which I could find, and after making a slight incision it was confined upon the one who had formerly had it ; the little wound healed up immediately and showed no signs of any infection.

“ From the great similitude between these two distempers, it is probable, that, instead of the small-pox some persons have been inoculated from the chicken-pox, and that the distemper, which has succeeded has been mistaken for the small-pox by hasty or inexperienced observers.”

This long quotation from one of the most eminent of our Fellows is justified not only by the admirably clear distinction which is made between small-pox and chicken-pox, but also by the first account of an attempt to inoculate the disease and the explanation given of the not infrequent failure of what was supposed to be variolation but was really varicellization.

It is noteworthy that in his account of the inoculation of the Grand Duke of Russia at St. Petersburg in 1768, the year following the reading of Heberden's paper, Thomas Dimsdale relates that the operation was temporarily postponed owing to his Highness being indisposed with the chicken-pox. Heberden's views were also adopted by his contemporary William Cullen, as will be seen from the following quotation from his famous “ First Lines of the Practice of Physic ” (1781) :

“ This disease seems to depend upon a specific contagion and to affect persons but once in their lives. It is hardly ever attended with any danger ; but as it seems frequently to have given occasion to the supposition of a person's having the small-pox twice, it is proper to study the disease and to distinguish it from the genuine small-pox.”

According to Cullen the distinctive features of chicken-pox were as follows :

“ 1. The eruption comes on with very little fever preceding it or with fever of no determined duration.

“ 2. The pimples of the chicken-pox more quickly than those of the small-pox are formed into little vesicles or pustules.

“ 3. The matter in these pustules remains fluid and never acquires the colour or consistence of the pus which appears in the pustules of small-pox.

“ 4. The pustules of the chicken-pox are always in 3 or 4 days from their first appearance formed into crusts.”

I have suggested elsewhere (1925) that Voltaire, owing to his interest in medical literature, may have read Heberden's paper, as in his account of the death from small-pox of Louis XV. in 1774 (“ De la mort de Louis XV et de la fatalité ”), he remarks that an alleged attack fifty years previously was really only “ *petite vérole volante qui n'est pas la petite vérole proprement dite.*”

The use of the term *varicella*, which was obviously intended as a diminutive of *variola*, was introduced in 1772 by R. A. Vogel,¹ who classified the disease among the spurious forms of small-pox, and described as its characteristic features an absence of central depression and the formation of vesicles containing a white mucous fluid on the first day, followed by their desiccation on the third. Vogel distinguished three varieties, the first being known as chicken-pox among the English, *petite vérole* among the French and *Wasser- and Windpocken* among the Germans, the second being a warty variety containing no fluid, the *Steinpocken*, *Spitzpocken* or *Hundpocken* of the Germans, and the third hard oval lesions surrounded by a red halo, which ulcerated in two or three days and gradually dried up. Each of these varieties, according to Vogel, might occur in epidemic form and follow or precede true small-pox or measles. They were most likely to be mistaken for true small-pox when they left a scar. The fever, however, attending them only lasted a day and was

¹ Superest ut de variolis spuriis quas alibi simplici *Varicella* nomine insignivi.

mild in character, and the disease as a whole was unattended with danger.

In France, Desoteux and Valentin in 1799 maintained the distinction between the two diseases and were followed by a large number of observers in their country, including Grisolle, Picot and Bricheteau, Guersant and Blache.

As Lüders and Picot, among others, have shown, varicella first came into prominence as an independent disease in the eighteenth century, after the introduction of inoculation, when it was proved that a large proportion if not all of the varioliform eruptions following inoculation were really chicken-pox.

Nineteenth Century. Varicella attained still more importance in the early part of the nineteenth century after the introduction of vaccination.

Although, doubtless owing to the use of defective lymph or to vaccination during the incubation stage a certain proportion of these post-vaccinal eruptions were really small-pox, the majority of them were probably examples of varicella.

In 1806 Willan described three varieties of chicken-pox which he named lenticular, conoidal and globate respectively. He stated that in the northern part of England, and in some counties of Scotland, these varieties were denominated the Chicken-pox, the Swine-pox and the Hives. In the South both the latter varieties were called Swine-pox.

As I pointed out nearly thirty years ago (1907), and more recently at the Annual Meeting of the British Association of Dermatology and Syphilology in 1933, Willan is also to be credited with the first description of a prodromal rash in chicken-pox, which had formerly been attributed to Gintrac of Bordeaux, as will be seen from the following passage from Willan's Report on Diseases in London: "August-September 1797. The varicella, or chicken-pox has been very prevalent during the summer. The eruption was generally preceded by a strong fever,

and in three cases by a vivid universal rash, similar to that which often attends the eruption of the small-pox."

In spite of the teaching of Heberden, Cullen, Willan and others there were not lacking during the nineteenth century writers, including some of high distinction, who maintained the identity of small-pox and chicken-pox. At the beginning of the century one of the principal upholders of the unicist doctrine was John Thomson, of Edinburgh. His position was all the more remarkable as at first he had held that chicken-pox was distinct from small-pox and afterwards changed his opinion. He maintained that varicella and variola were caused by the same contagion, the former being merely a mild form due to the individuality of the patient and identical with varioloid. According to Eichhorn, writing in 1831, this view became deeply rooted among practitioners in Germany, where varioloid was very frequently mistaken for varicella.

The unicist doctrine was also taught by Thomson's contemporary, John Cross, an eminent Norwich practitioner, who, in his work on an epidemic of small-pox at Norwich in 1819, described two forms of varicella, viz., *varicella cellulosa* and *varicella bullosa*. The former, of which the synonyms were stone pock, horn pock, modified small-pox, etc., he described as follows :

"It is produced by the variolous contagion, occurs sometimes after natural and inoculated small-pox, but more frequently after cow-pox. Its contagion may give rise to small-pox in those liable to that disease, and is capable of being inoculated, producing sometimes regular small-pox and at others an incomplete and non-protecting disease."

On the other hand, as regards *varicella bullosa*, of which the synonyms were crystals, water-pox, chicken-pox, pemphigus variolodes, vesicularis, etc., "it is doubtful," says Cross, "if this eruption proceeds from the variolous eruption ; certain that it does not give rise to small-pox, and that it maintains the same character in all classes, whether occurring before or after cow-pox and small-pox,

very contagious and affecting a majority of people once during life, probably not communicable by inoculation."

The doctrine of the identity of modified variola or varioloid and varicella was still held widely by the profession even as late as the sixties of last century, as Trousseau found it necessary to declare that the two diseases were as distinct from one another as small-pox from measles, and that physicians who held the contrary opinion could never have taken the trouble to study cases of varicella. The error appears to have been particularly prevalent among the dermatologists of the early and middle part of the century. In France, Rayer, in 1836, gave the name of "varicelles" or modifications of small-pox to contagious papular, vesicular or pustular eruptions without secondary fever, which may arise from small-pox or in turn produce it, and whose duration is from one to three weeks. Rayer's views were incorporated without protest by Bouillaud in his treatise on medical nosography published in 1846. The principal upholder of the unicist doctrine in the nineteenth century was the eminent dermatologist, Ferdinand Hebra, of Vienna, who expressed himself on the subject in the following unambiguous terms :

"I apply the term *variola vera* to the most severe form of the disease, that in which the eruption is abundant and the fever intense and in which a fatal result is often observed. On the other hand I use the term *varicella* for cases in which the rash is very scanty, and which run a favourable course, and always terminate in recovery. Between these two extremes lies the varioloid as a middle term, presenting an eruption moderate in amount, a course which is generally mild and a successful issue." Hebra's pupil and associate, Kaposi, held identical views. "Like Hebra," he wrote, "I know only one variola due to a single form of contagion which sometimes appears with more or less severe symptoms and sometimes as a mild disease."

In England, Erasmus Wilson, under the heading of varicella, described the different varieties which small-

pox in its modified form was capable of assuming. According to him, "the contagion may excite either varicella or true small-pox. The result of inoculation is similar, in one instance varicella may be developed, in another true variola." Erasmus Wilson, I may add, seems to have been one of the first to have described varicella sine varicellis or non-eruptive chicken-pox, in which the constitutional affection is present without the eruption.

Generally speaking, as Kassowitz pointed out, the independence of varicella was maintained by the pædiatrists, with the exception of Rilliet and Barthez, and by none more emphatically than by one of the leading authorities on children's diseases in the nineteenth century, Eduard Hensch, who uses the following emphatic language :

"In my opinion every unprejudiced observer must certainly take the side of the dualists, *i.e.*, those who do not recognise the existence of any such relationship but regard varicella as a quite independent infectious disease having nothing whatever to do with variola."

Long after its distinction from small-pox by Heberden, chicken-pox was regarded by some writers as not contagious, a view once held with regard to many other acute infectious diseases. Duval, for example, in 1813, though he regarded it as distinct from small-pox, stated that chicken-pox could not be communicated by direct contact, while more than fifty years later Grisolles stated that its contagiousness was a matter of doubt.

Inoculation. In striking contrast with small-pox the results of inoculation of chicken-pox have been remarkably inconstant. In his work on vaccine inoculation Willan gives an account of his unsuccessful attempts at the beginning of the nineteenth century. Steiner, however, seventy years later, was more fortunate, and since then occasional successes have been reported by other observers.

Twentieth Century. Apart from the dermatologists mentioned, the distinction between varicella and variola

has until recently been universally held since the middle of the last century. Within the last ten years, however, the doctrine of the identity of varicella and small-pox has been resuscitated by Professor H. Sahli, of Bern, who maintains that the distinction of mild cases of variola from varicella is illusory, and that in many cases the differential diagnosis is impossible. His view in short, to which the name of neo-unitarianism (*Neuunitarismus*) has been given, is that variola, varicella and vaccinia, are merely modifications of a single fixed virus. Professor Sahli's contention has been ably criticised by Professor Jaksch-Wartenhorst, of Prague, who declares that the supposed epidemics of varicella in Switzerland described by Sahli were really examples of that mild form of variola to which the term "alastrim" has been applied.

Prognosis. Until comparatively recently chicken-pox was regarded as "the very mildest form in which disease may show itself." Gregory, indeed, writing in 1843, who so described it, has almost to apologise for mentioning it at all. "Some might consider it," he wrote, "unworthy of occupying attention in a course of lectures when there is hardly time for investigating fully the more serious disorders of the body." Trousseau, many years later, was also wholly optimistic. "No physician," he said, "has ever seen a patient die of chicken-pox." Numerous examples, however, of undoubted chicken-pox with fatal issue have since been reported by good observers, particularly in the gangrenous, hæmorrhagic, confluent or bullous forms or from complications such as nephritis, pneumonia, periostitis or encephalitis. Personally, as I have reported elsewhere (1929), I have met with five deaths from varicella.

Until the beginning of the present century, as I have shown elsewhere (1932), varicella was regarded almost exclusively as a disease of childhood. Subsequent writers, however, including myself, have recorded numerous examples of its occurrence in adult life, and a few instances in extreme old age.

No history of chicken-pox would be complete without some reference to what has been called the Herpes-Varicella Problem. In 1892 Johann von Bokay, professor of children's diseases in the University of Budapest, first drew attention to an etiological connection between herpes zoster and varicella, and in 1928 collected 128 cases in support of his claim that the virus of herpes zoster is the same as that of varicella. His views have been confirmed by a large number of other observers, although the question is not likely to be finally settled until the identity of the causal agent of chicken-pox has been established.

In addition to its relations with herpes zoster, the chief work on varicella in recent years has been the study of its nervous complications, particularly encephalitis, of which an exhaustive critical review has recently been published by Underwood, and other serious complications or fatal cases, attempts at inoculation and the use of convalescent serum for prophylactic purposes.

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CHAPTER III

SCARLET FEVER

Nomenclature. Although the term "scarlet fever" is generally supposed to have been introduced into medical literature by Sydenham towards the end of the seventeenth century, Hirsch is doubtful as to whether Sydenham really was the first to use this term, as Lancellotti (*Monum. stor. Moden.*, 208, 382) in the year 1527 refers to persons dying of "male de scarlatina." The term "scarlatina," euphonious as it is, provoked protests from several writers in the eighteenth and nineteenth centuries. De Haen, for example, mentions the "barbarous term of scarlatina" as one of the "erroneous and silly names" (*nomina morbi varia, erronea saepe ineptaque*) given to the disease, and Bateman in his "Synopsis" also calls scarlatina a barbarous term. Heberden, in the Latin version of his "Commentaries," substituted the term "febris rubra," and Mason Good, a somewhat pedantic writer of the early part of the nineteenth century, attempted to resuscitate the term "rosalia" used by Ingrassias. Willan, on the other hand, appeared to be resigned to its use, if one may judge from the following footnote in his text-book: "The denomination scarlatina was first applied to this disease by British writers; however offensive the term may be to a classical ear, it cannot well be displaced, having found admission into all the systems of nosology. Another age will correct and refine the language now used on subjects untouched by the Fathers of Physic."

The error still prevalent among the laity of regarding the term "scarlatina" as meaning a mild form of the disease was noted nearly a hundred years ago by Sir

Thomas Watson in the following passage of his celebrated text-book : " I need scarcely remind you of a sort of mystification which prevails among the public about this complaint, and which many practitioners, for no good reason that I can see, seem disposed to encourage. Mistaking the Latin and scientific name of the disease for a mere *diminutive* you will hear mammas say, ' Oh, my children have not got the *scarlet fever*, but only the *scarlatina*.' I always disabuse them of this absurd error, when the opportunity of doing so occurs. It can produce nothing but confusion and a disregard of requisite precautions."

The earliest use of the English name for the disease, according to Goodall (1928), occurs in Pepys' diary under the date November 10th, 1664, where he writes : " My little girl Susan is fallen sick with the meazles, or at least of a scarlett feavour."

According to the " New Oxford Dictionary," the earliest medical writer to have used the term " scarlet fever " appears to have been James Cooke, a well-known practitioner of Warwick, in the middle of the seventeenth century, in the 1676 edition of his popular text-book entitled " Melleficium Chirurgiae," or the " Marrow of Chirurgery." The passage, which is to be found in the chapter entitled " of smal-pox, measles, etc.," runs as follows :

" Rossalia, red fiery spots, which break out at the beginning of Diseases all over the Body, as if it were a small Erysipelas, though the Tumor is hardly discernable. They sometimes break not forth till the fifth or sixth day : in the progress of the Disease they possess the whole Body, so that it looks as if it were all on a red fire, which colour is again changed into spots, which vanisheth upon the seventh or eighth day ; the *Cuticula* falling off in Scales or in great Fleakes. The first and last of these were in *Warwick* at the writing hereof ; the last going under the name of the Scarlet Fever."

This seems to be the first passage in medical as distinct from belletristic literature in which the term " scarlet

fever" is used, as Sydenham's account of scarlet fever was not published until nine years later.

Classical Antiquity. The existence in ancient Greece and Rome of the acute exanthemata in general, and of scarlet fever in particular, as I remarked in the opening part of my first lecture, was for a long time a hotly disputed subject of controversy, in which Willan and Bateman, to mention only our own countrymen, took a prominent part in maintaining the existence of these diseases in classical antiquity. Dr. Charles Collier, a distinguished Fellow of this College, in 1857 boldly asserted, but without a shred of evidence, that the pestilence of Athens in 430 B.C., described by Thucydides, was malignant scarlet fever, and this interpretation was also held by Sir Benjamin Ward Richardson, and received some measure of approval from Sir Thomas Clifford Allbutt in his Fitzpatrick Lectures. The same groundless interpretation of the pestilence of Athens as scarlet fever had been given by Malfatti, physician to the General Hospital at Vienna, at the beginning of the nineteenth century.

In a recent paper on "Infectious Diseases and Epidemiology in the Hippocratic Collection," E. W. Goodall (1933) has revived the old suggestion that the cases of acute and serious inflammation of the fauces and neck described by Hippocrates may possibly have been examples of scarlet fever with cervical cellulitis and secondary involvement of the larynx. As Sanné pointed out, however, nearly sixty years ago, the mere occurrence of faucial inflammation does not justify the diagnosis of non-eruptive scarlet fever. The same objection may be brought against writers such as Willan and Bateman, who imagined that they found allusions to scarlet fever in certain passages in Celsus, Caelius Aurelianus and Aretaeus of Cappadocia.

Middle Ages. Haeser is inclined to the view that scarlet fever existed in the Middle Ages, and maintained that the description of the disease called *morbilli* by the Arabian physicians and *sofersa*, *sturola* and *rosagia* by the

laity, was more applicable to scarlet fever than to measles.

The account given by Avicenna (A.D. 1000) of a special kind of exanthem under the name of *alhamica*, signifying beet-root, has also been thought to refer to scarlet fever, and an eruption named *rubeola* by Hali Abbas (tenth century), and quoted almost word for word by Constantinus Africanus (A.D. 1050), has also been interpreted as scarlet fever, but these descriptions are too vague to be conclusive evidence of the existence of this disease at that date.

Sixteenth Century. It is now generally agreed that the first undoubted description of scarlet fever under the popular name of *rossania* or *rossalia* was given by Ingrassias in the work published at Naples in 1553 entitled "De tumoribus praeter naturam," which I previously mentioned in my lecture on varicella as containing the first account of that disease. Ingrassias speaks of *rossalia* "consisting of numerous spots, large and small, fiery and red, of universal distribution, so that the whole body seems on fire." According to Ingrassias, some persons thought that measles was the same as scarlet fever, but he himself had often seen that the two affections were distinct, trusting to his own observations and not merely to the descriptions of others.

Before the isolation of diphtheria from other forms of sore throat, medical historians at the beginning of the nineteenth century, such as Willan and Most, were inclined to identify the epidemics of sore throat in the sixteenth and seventeenth centuries in Spain and Italy with scarlet fever, but the epoch-making work of Bretonneau in 1821 definitely proved that these epidemics were really diphtheria.

In the absence of any account of a rash, it is probable that the contagious sore throat described by a Dutch physician named M. J. Tyengius (quoted by Willan) in the Amsterdam district in 1517, and the pestilential sore throat recorded by Weyer (Wierus) which spread through Lower Germany in 1564 and 1565, were not examples of



INGRASSIAS, 1510-1580

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scarlet fever, as Willan maintained, but of diphtheria or streptococcal angina.

Opinions differ as to the nature of the epidemic disease described by Baillou under the name of *rubiolae*, which was prevalent in Paris in the winter of 1574-1575. Willan has no hesitation in identifying it with scarlatina anginosa owing to the generalised eruption, inflammation of the uvula, difficulty in swallowing and faucial ulceration. The same view is held by Most, who draws attention, however, to the fact that no mention is made of desquamation. Noirot, on the other hand, considers that Baillou's description applies to rubella, while more recently Goodall maintains that the term *rubiolae*, as used by Baillou, means sometimes scarlet fever and sometimes measles.

A contemporary of Baillou, Jean Cottiar of Poitiers, has been credited with having written the oldest monograph on scarlet fever in France, entitled "De febre purpura epidemiae et contagiosa," published in 1578. Noirot, however, asserts that his description is far from possessing the historical importance assigned to it by some persons who had probably never seen it. The symptoms most applicable to scarlet fever in Cottiar's account are the headache, redness of the eye, sore throat, fever, delirium and appearance of a rash on the second or third day, but no mention is made of desquamation or anasarca.

Seventeenth Century. While diphtheria was prevalent in Spain and Italy in the sixteenth and seventeenth centuries under the name of *garrotillo* and *morbis strangulatorius*, the works of Sennert and Doering, show that a mild form of scarlet fever was present in different parts of Germany and Poland, where it was known by the name of *morbilli ignei*, *rossalia*, *erysipelata*, and universal *erysipelas*. Daniel Sennert (1572-1637), who described an epidemic at Wittenberg in 1619, comes next in importance in the history of scarlet fever to Ingrassias among the writers who preceded Sydenham. Sennert identified the disease with the *rossalia* of Ingrassias, and described the

rash in similar terms to those used by the Sicilian writer (in statu vivo universum corpus rubrum et quasi apparet ac si universali erysipelate laboraret). Sennert appears to have been the first writer to describe desquamation in scarlet fever (epidermide instar squamarum decidente) and the early arthritis (in declinatione materia ad articulos transfertur ac dolorem et ruborem ut in arthriticis excitat). The epidemic reported by Sennert was severe and attended by a high mortality (malum hoc grave et saepe lethale est), and convalescence was protracted (aegrique non sine magno labore et post longum tempus pristinae saluti restituuntur).

Sennert's son-in-law, Michael Doering, who described an epidemic at Warsaw in 1625, has given a more accurate account of scarlatina anginosa than any previous writer, and was one of the first to notice the joint complications and dropsical swellings of the abdomen and lower extremities (Terminatur ad plurimum translatione materiae ad articulos extremorum, cum tam dolorifico tumore ac robore qualis apud arthriticos esse solet; hinc cutis reliqua corporis squamatim detrahitur; mox pedes ad talos et suras usque intumescunt; urinae crassescunt, et rubescunt. Hypochondria tenduntur primum, et respiratio difficilis redditur; paulo post abdomen ipsum in tumorem attollitur; iste autem non nisi magno labore, et post multas demum septumanas, ceu hydropici incipientes ad pristinam sanitatem deducuntur)."

The presence of scarlet fever in Rome in the early part of the seventeenth century is shown by a passage in a work by Prosper Martianus, published in 1627, where he states that the disease which the common people call rossalia was said to be so frequent in children that, like small-pox, nobody could escape it. "They are at first attacked," he said, "by an acute and burning fever, and then on the third or fourth day small red macules begin to break out which become gradually raised and make the skin rough, and the fever lasts till the fifth day, when the roughness of the skin begins to subside . . . experience teaches that

hardly any one dies of rossalia, except by a miracle or great errors committed by the patient or doctor especially by bloodletting."

In 1665 the disease broke out again in Poland where it had previously occurred in 1625, as related by Doering, and was described as follows by Simon Schultz under the name of *purpura epidemica maligna*: "The winter was mild and rainy, the disease appeared early in the spring, and continued to rage through the whole summer and autumn, even to the winter following. It proved fatal to a great number of children of each sex, but hardly affected any that were beyond twelve years of age." The severity of the disease was shown by the following account given by Schultz: "They mostly died upon the second day, some upon the first. Those only survived who had no inflammation in the throat and no œdematous tumour. In those who recovered, after a copious sweat, the redness of the skin vanished, and a desquamation followed. In some a diarrhœa of one or two days proved critical. After some time, especially in the older patients, the whole body was affected with a swelling like the leucophlegmacy, the belly likewise swelled. These symptoms continued very troublesome for several weeks; they were carried off by sweating, and sometimes by a plentiful flow of urine." These quotations from Sennert, Doering and Schultz clearly show that not only desquamation, but also nephritis and dropsy as scarlatinal manifestations were well known before the disease received its present name.

The *febris miliaria rubra* which appeared at Leipzig about the middle of the seventeenth century, and was known in Germany as *Der Friesel*, is identified as scarlet fever by Willan, who finds fault with Godofred Welsch for regarding it as a distinct disease peculiar to puerperal women. C. J. Lange of Leipzig, who called it *purpura* or *febris purpurea*, said that it attacked persons of all ages and sexes, and proved fatal to many. Similar observations were made by Ettmüller, professor of physic at

Leipzig, about twenty years after the first appearance of the epidemic (Willan).

The occurrence of an epidemic miliary fever resembling that at Leipzig, was reported at Pressburg in 1672 by Rayger, who, after describing it as a generalised erysipelas, declared that the term *rossalia* was more applicable (Willan).

An epidemic at Copenhagen in 1677, which was described by Ole Borch under the name of *rossalia squamosa*, is identified by Lützhof with scarlet fever, and was probably the first appearance of the disease in Denmark. It was not, however, until 1760 that the first Danish monograph on the disease, entitled "De febre scarlatina," was published by Wernicke.

In spite of its incompleteness, by far the most important account of scarlet fever in the course of the seventeenth century is that given by Sydenham in 1683, six years before his death, in the first complete edition of his works (Richter). His description of the disease is as follows: "Scarlet fever may appear at any season. Nevertheless it oftenest breaks out towards the end of the summer, when it attacks whole families at once, and more especially the infant part of them. The patients feel rigors and shivering just as they do in other fevers. The symptoms, however, are moderate. Afterwards, however, the whole skin becomes covered with small red maculae thicker than those of measles, as well as broader, and redder and less uniform. These last for two or three days and then disappear. The cuticle peels off and branny scales remain lying on the surface like meal. They appear and disappear two or three times."

The disease in Sydenham's opinion was merely a moderate effervescence of the blood, arising from the heat of the preceding summer or from some other exciting cause. As regards treatment, Sydenham was chary both of bloodletting and of clysters on the one hand, as they might check the proper movement of Nature, and on the other of cordials which might over-agitate the blood and



THOMAS SYDENHAM, 1624–1689

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act as fuel to fever. Complete abstention from animal food and fermented liquors he regarded as sufficient treatment. The ordinary drink should be warm milk with three parts water. Although the patient should always keep indoors, it was not necessary for him to keep always to his bed. "By treatment thus simple and natural," he continues, "this ailment—we can hardly call it more—is dispelled without either trouble or danger; whereas, if on the other hand we overtreat the patient by confining him to his bed, or by throwing in cordials and other superfluous and overlearned medicines, the disease is aggravated and the sick man dies of his doctor."

In conclusion, Sydenham refers to the possibility of fits or coma occurring at the onset of the eruption, for which he recommends the application of a large blister at the back of the neck and the immediate administration of a paregoric draught of syrup of poppies, which should be repeated every night until recovery takes place.

The mild character of scarlet fever in Sydenham's experience is shown not only by what he expressly says in the words "*hoc morbi nomen, vix enim altius adsurgit*," translated as "this ailment, we can hardly call it more," but also by his making no mention of the sore throat and the complications of rheumatism and dropsy previously described by Sennert, Doering and Schultz. Haeser attributes his under-estimate of scarlet fever to the fact that Sydenham's practice was almost entirely confined to the upper classes of Society, in which he would be likely to encounter only mild forms of the disease, whereas Morton and other contemporary physicians became acquainted with its dangerous character by their practice among the poor. J. F. Payne remarks that in spite of the inadequacy of Sydenham's description of scarlet fever, which was largely responsible for the misunderstanding of scarlet fever and sore throats in the eighteenth century, he must be accredited with having established the autonomy of the disease and given it a name to distinguish it from the other acute exanthemata, especially measles.

It is therefore regrettable that a retrograde step was taken by Sydenham's contemporary, Richard Morton, who maintained that scarlet fever was exactly the same as measles, and differed from it only in the character of the eruption. The difference, he declared, was not sufficiently great to constitute another disease, unless confluent was to be distinguished from discrete small-pox in the same way. "Let this fever, therefore," he continued, "be expunged from the roll of diseases, unless anyone please to call it *confluent measles*." Morton is, nevertheless, as Willan points out, "the first English author who has given an enlarged account of the scarlatina." Unlike Sydenham, Morton described a malignant as well as a mild form (*febris scarlatina symptomatis dirissimis et pestilentialibus comitata*), and reported several cases from his own practice, including one in his daughter, Marcia, aged seven years. Like Sennert and Doering, and again unlike Sydenham, Morton expressly mentions inflammation of the fauces in the acute stage, and dropsy and ascites as sequelæ. As I have pointed out elsewhere (1928), he also seems to be the first writer to have noted the occurrence of scarlatinal otitis in his description of a case (*Pus acre et corrosivum per Nares, Aures et Fauces copiose egerebatur*).

Fortunately, Morton's erroneous doctrine of the identity of scarlet fever and measles did not meet with any support, as did the unicist doctrine, to which I have previously alluded, relating to small-pox and chicken-pox and measles and German measles. The autonomy of scarlet fever established by Sydenham was generally accepted by subsequent writers, apart from the now forgotten worthies, Jahn and Piorry and Lhéritier, at the beginning of the nineteenth century, who introduced the term "*hémio-dermite morbilleuse*" to include both scarlet fever and measles. Their views, however, did not meet with any acceptance.

The first account of the disease in Scotland is given by Sir Robert Sibbald, physician to Charles II. and president

of the College of Physicians of Edinburgh, in his work "*Scotia illustrata*," published in 1684. He describes it as one of the new diseases which, if not unknown to the ancients, was at least not discussed by them, and is inclined to attribute it to the "depravity of the humours arising from the growth of luxury and animal food."

According to Sibbald, who relates a case in the daughter of a judge in the High Court, the rash in adults was "followed by desquamation." In his experience the disease was uncommon and very rarely fatal.

Other writers on scarlet fever towards the end of the seventeenth century were Ramazzini, at Modena, in 1692, and Schroeck, at Augsburg, in 1696 (Sanné).

Eighteenth Century. In the early part of the eighteenth century scarlet fever received somewhat step-motherly treatment from Fuller, who has given such a detailed account of small-pox and measles, but has devoted little more than a page to scarlet fever, of which he speaks in the following terms: "Because it chiefly seizeth children, and comes with a Cough, it sometimes imitates the Measles; but forasmuch as it is not contagious, and seems to have nothing virulent in it, I rather chuse to allow it a Place among benign Fevers.

"The Party at first shakes and shivers, but is not very sick; the Skin is filled all over with red flat Spots (yet something roughish to feel to) which are much thicker set together, broader and redder than the Measles.

"They make the Body all over of a Scarlet Colour, continue two or three Days and then vanish; so the Cuticle breaking and peeling off, there remains for a Time a little Scurfiness, which looks whitish as tho' Meal had been sprinkled all over the Body.

"At this time of shedding the Cuticula, there is sometimes great Itching. Dr. Sydenham saith it is the Name of a Disease, and scarce deserves to be accounted any more."

It may be noted that the term *rossalia*, as well as that of scarlet fever, appears in Fuller's "*Exanthematologia*,"

where it is described as rife at Vienna and "as it were fiery Spots like Erysipelases flushed all together over the whole skin" and followed by branny desquamation. Lastly, the description of the disease which Fuller calls *Erythremata* or *Rubores Sennerti*, is also applicable to scarlet fever, complicated by early arthritis and subsequent dropsy, as is shown by the following quotations: "They begin with most violent burning Heat, intolerable Headach, want of Sleep, unquenchable Thirst; dry parched and rough Skin; Cough, Difficulty of Breathing, sometimes Tumour of the Tonsils. About the fourth Day break out over the whole Body, from Head to Foot, both great and little Spots, which are red and as firey as an Erysipelas; but are perfectly flat. In the State and Height of it the Body appears all over red, which obscureth the Spots which were distinct before. As the Redness goeth off, broad red Spots come to Sight again, as at first; which vanish quite away about the ninth Day, the Skin peeling off in little Scales . . . Commonly in the Declination, at length the Matter is translated to the Joints and extreame Parts, causing a Redness and Pain like the Gout. The Feet swell up to the Ancles, the Hypochondria grow tense, the Face is tumefy'd. Breath grows short and difficult, the Belly and Scrotum are swell'd. The Sick lie a long Time ill, and with much ado are at length recover'd, the Skin peeling off, but very often they die of it."

During the eighteenth century scarlet fever was present in epidemic form throughout Europe and the United States, and was described by numerous authors, including Huxham, Fothergill and Withering in this country, Navier and Sauvages in France, Storch and Zimmermann in Germany, Borsieri in Italy, Plenciz in Austria, Tissot in Switzerland, Rosen von Rosenstein in Sweden, and Benjamin Rush in the United States, where the disease first appeared in 1735.

The outbreak described by Borsieri at Florence in 1717, is particularly remarkable as it contains an account of cases of secondary cervical adenitis, dropsy, dyspnoea

and suppression of urine occurring in the third week of the disease, in which the post-mortem examination showed that the lungs, pleuræ, intercostal muscles, kidneys and intestines were more or less inflamed. This appears to be the first occasion in the history of scarlet fever in which the association of post-scarlatinal dropsy with inflammation of the kidneys discovered post mortem has been recorded.

There is no doubt that until the epoch-making work of Bretonneau, who disentangled diphtheria from all the other forms of sore throat, and even later, diphtheria was often mistaken for scarlet fever. The profession, at that time, were not agreed as to whether the condition known as angina or cynanche maligna or angina gangrænosa, was an autonomous disease or merely a non-eruptive form of scarlet fever. Withering, for example, in the first edition of his work on scarlet fever and sore throat, published in 1779, expressed the firm opinion that scarlet fever was quite distinct from angina gangrænosa or ulcerated sore throat, and drew up in tabular form a series of distinctions between the two for which he expressed his indebtedness to Fothergill. In the edition of 1793, however, he declared that the two conditions constituted but one species of disease and attributed their existence to the same specific contagion.

Cullen, on the other hand, maintained that scarlet fever was a disease specifically different from cynanche maligna for the following reasons :—

(1) There was a scarlet fever entirely free from any affection of the throat which sometimes prevailed in epidemics, and therefore was a specific contagion, producing a scarlet eruption without any determination to the throat.

(2) The scarlatina which, from its matter being generally determined to the throat, might be properly termed anginosa, had in many cases of the same epidemic been without any affection of the throat, and therefore contagion might be supposed to be more especially determined to produce the eruption only.

(3) Though in all epidemics of scarlatina anginosa Cullen had seen there were some which resembled cynanche maligna, such cases were not more than 1 or 2 per cent.

(4) In the two or three epidemics of cynanche maligna he had seen, the mild cases were not one fifth of the whole, while the rest were of the malignant kind.

(5) Most of the cases of cynanche maligna ended fatally, while that was the event of very few cases of scarlatina anginosa.

The severity of the disease in Withering's time is illustrated by his account of the anxiety shown by the public to obtain some efficient prophylactic. "Some smoked, some chewed, and others snuffed tobacco; some daubed their hands and faces with *thieves vinegar*; many wore camphor at the pit of their stomach, and still more swallowed bark and port wine. But those who were much conversant with the disease, had too ample occasion to observe that none of these methods were effectual."

It is now generally agreed that the epidemics of sore throat described in the first half of the eighteenth century, notably by Fothergill in London and Huxham in Plymouth, included scarlet fever as well as diphtheria. Fothergill, for instance, in his "Account of the Sore Throat attended with Ulcers" (1748) says: "Generally on the second Day of the Disease the Face, Neck, Breast and Hands to the Finger ends are become of a deep erysipelatous Colour, with a sensible Tumefaction . . . A great number of small Pimples appear on the Arms and other Parts. . . . The Redness of the Skin in the Face, Neck, Breast and Hands is another obvious and distinguishing Characteristic, which in children and Young People especially, seldom fails to accompany this Disease." At the same time Fothergill identifies the sore throat present in his cases with the Angina Maligna or "Strangulatory Affection," described by the Spanish and Italian writers, which was undoubtedly diphtheria.

An important contribution to our knowledge of the disease was furnished by Nils Rosen von Rosenstein,

professor of medicine at Upsala, who, in 1744, communicated a valuable paper to the Swedish Academy of Sciences on the first epidemic of scarlet fever in Sweden. Like some of his predecessors, such as Sennert and Doering, he not only mentions the occurrence of dropsy and blood in the urine as sequelæ but he also describes the appearance of secondary cervical adenitis on the eighth or ninth day. The disease in his experience varied considerably in severity. "The scarlet fever," he says, "is sometimes and in some persons so favourable and gentle that the patient only requires good nursing, whereas sometimes it is so lethiferous that it will carry off the patient in a day or two."

The experience of De Haen was similar. After speaking of the mild form, such as Sydenham described, which was only fatal through some gross error committed by the patient or doctor, he alludes to a naturally malignant form such as had been described by Lange and Morton in the seventeenth century, and later in Etruria, and at the Hague in 1748-1749. Other epidemics of scarlet fever occurring in the eighteenth century were those in Champagne in 1751, described by Navier, in the island of Cephalonia by Zulatti in 1763, and at Heidelberg by Zimmermann in 1765 (Sanné).

The character of the epidemics of the last quarter of the eighteenth century was generally mild, but outbreaks which took place in Denmark and Finland in 1776-1778, and in Central Germany, especially Göttingen and Wittenberg from 1795 to 1805, were accompanied by an unusually high fatality.

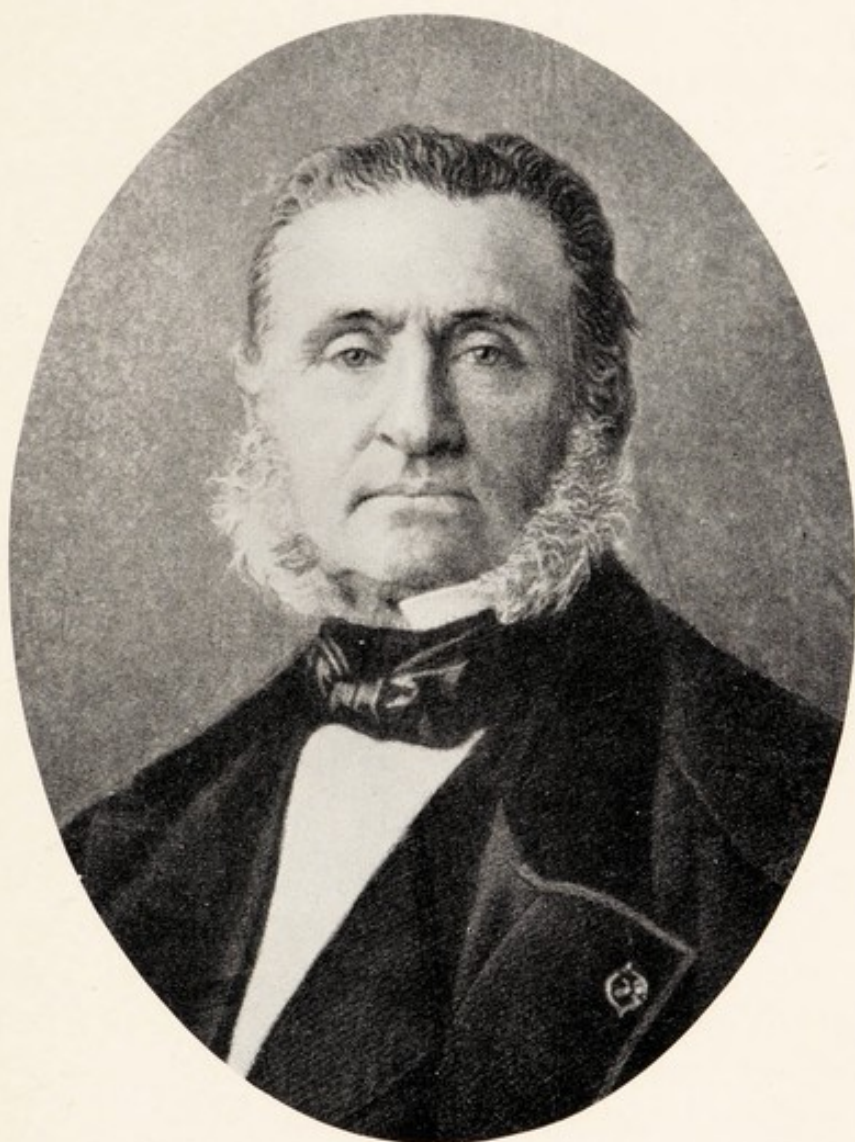
The doctrine of non-eruptive scarlet fever, which reaches its fullest development in Trousseau's celebrated description of *formes frustes*, was already known in the last part of the eighteenth century. Rosen von Rosenstein, for instance, says: "I have some reason to think that of three children in the same house one was cured of the disease without its coming to an eruption. For two of these had the scarlet fever in a high degree, one after the other ;

and the third was likewise affected, having a disorder in the throat, nausea, pukings, shiverings, heat, and after that, within twenty four hours, a very proper sweating, by which all the evil was finished."

Some years later Stoll remarks that scarlet fever is often manifested only by a sore throat (*inter adultos saepe sola angina comparet*). Kortum, in a description of an epidemic of scarlet fever at Stolberg, in March, 1798, states that the eruption was present in barely one-third of the cases during the first half of the epidemic. The absence of rash by no means indicated a mild form of the disease, but often those who had no rash had the severest attacks, so that scarlet fever was not, in Kortum's opinion, the most suitable name for the disease.

Nineteenth Century. In the beginning of the nineteenth century the tendency of malignant and extensive epidemics of scarlet fever to be followed by periods of lesser prevalence and low mortality is shown by the experience of Graves in Dublin and Bretonneau in Tours. Graves relates that in 1801 scarlet fever committed great ravages in Dublin during September, October, November and December, and continued its destructive progress in the spring of 1802. It ceased in the summer but returned at intervals during 1803-1804, when the disease changed its character, and for the next twenty-seven years, though epidemics were frequent, they were always mild. The epidemic of 1801-1804, on the other hand, was extremely fatal, death sometimes occurring as early as the second day. Many families of the middle and upper classes were attacked and not a few parents were left childless. After 1804 scarlet fever was of a very mild type until 1831, when numerous cases proved rapidly fatal, though it was not until 1834 that the disease assumed the form of a destructive epidemic.

The experience of Bretonneau at Tours was similar. During the period 1799-1822 he never saw a single death from the disease which he had always found a very mild complaint. In 1824, however, an epidemic broke out in



ARMAND TROUSSEAU, 1801-1867

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Tours and the surrounding district, and proved so deadly and refractory to treatment that he came to regard scarlet fever as formidable a disease as plague, typhus or cholera (Trousseau). In his second memoir on diphtheria Bretonneau clearly distinguished scarlatinal from diphtheritic angina by pointing out first that in scarlet fever the inflammation was widely diffused over the tonsils, palate and pharynx, instead of being, as in diphtheria, at first limited to one spot, and secondly by the scarlatinal inflammation having no tendency to attack the respiratory passages.

Trousseau, who was constantly acknowledging his debt to his old master, emphasised the last distinguishing feature by the aphorism "La scarlatine n'aime pas le larynx" in opposition to Graves, who did not recognise that the laryngeal symptoms in his cases of scarlet fever were due to the supervention of diphtheria. Trousseau's clinical lecture on scarlet fever contains a classical description of the disease, in which he not only develops the teaching of Bretonneau, but also draws attention to the characteristic tachycardia, fall of temperature by lysis, and frequent occurrence of miliaria, and gives his celebrated account of *formes frustes*, or defaced types of the disease, which he compares to the half-obliterated inscriptions of the archæologist.

In this country, as I have shown elsewhere (1933), Robert Willan, at the beginning of the nineteenth century, gave an admirable clinical and historical account of scarlet fever, the importance of which he emphasised by devoting to it 143 pages of his work on cutaneous diseases, or considerably more space than that given to any other disease described in the book. It is true that, like many of his predecessors, contemporaries and successors, he committed at that time the almost inevitable error of denying the autonomy of "pestilential sore throat," called by the Spanish "garrotillo" and the Italians "morbus strangulatorius," and of identifying it with scarlet fever. It was not, indeed, until 1821, when

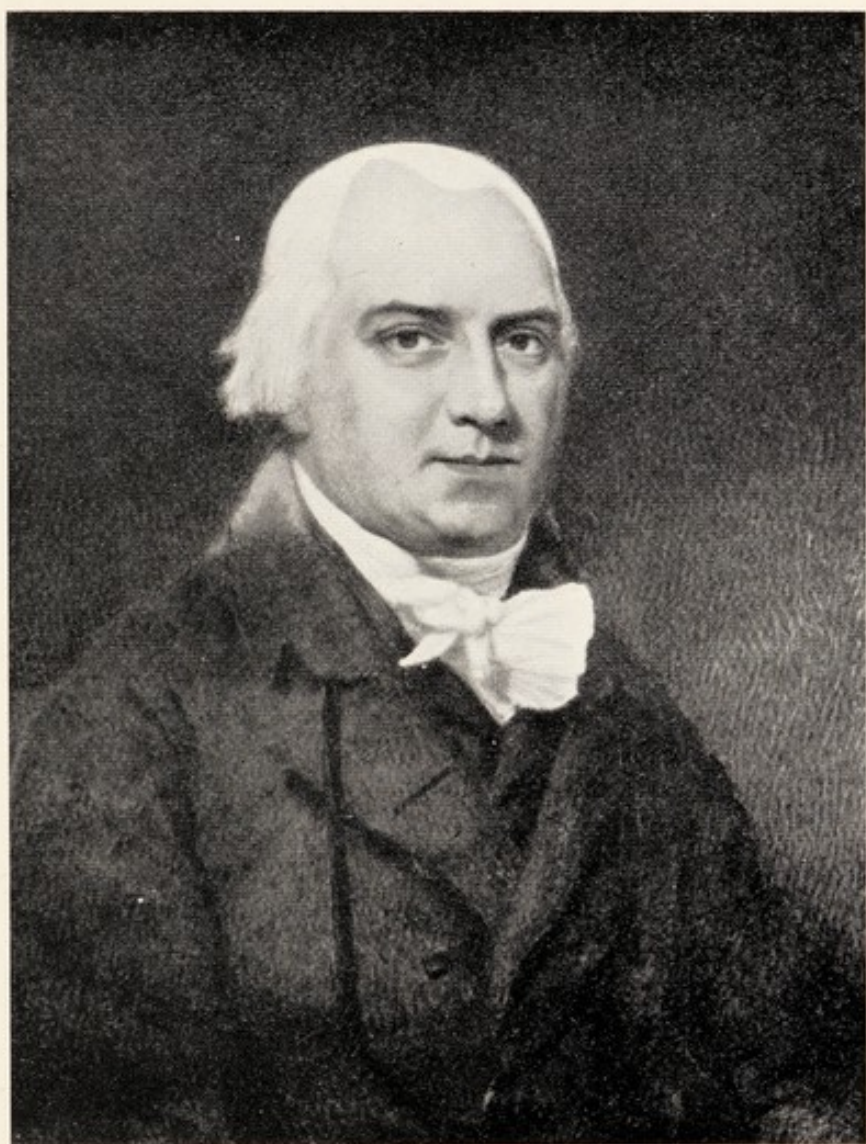
Bretonneau, in a paper read before the Académie de Médecine of Paris, isolated diphtheria from scarlatinal angina and other forms of sore throat, that the error was recognised.

Willan illustrates the severity of scarlet fever in London at the commencement of the nineteenth century by the following eloquent passage, with which his article on the disease closes : "Scarlet fever, a disease which has so long been the bane of schools and academies, which has blasted the hope of many noble houses, and which in thousands of families, by suddenly destroying a numerous progeny, has consigned the destitute parents to anguish and despair."

In this connection reference should be made to the account of scarlet fever, including a historical outline given in Rees's "Cyclopedia," by Willan's friend and associate, Bateman, who also identifies scarlet fever with the garrotillo and morbus strangulatorius of the Spanish and Italian writers.

Another contemporary of Willan, Erasmus Darwin, testifies to the severity of the disease at this period. "The scarlet fever," he says, "exists in all degrees of virulence from a flea-bite to the plague." In speaking of the scarlatina maligna he remarks that "no one could do an act more beneficial to society, or glorious to himself than by teaching mankind how to inoculate this fatal disease and thus to deprive it of its malignity." He suggests that matter might be taken from the ulcers in the throat which would prevent conveying the contagion, or that warm water might be put on the eruption and scraped off again by the edge of a lancet.

Among other causes assigned for the greater severity of scarlet fever in the early part of the nineteenth century was the introduction of an educational scheme which demanded a premature development of the intellectual faculties, and thereby produced a state of over-excitement of the brain and nervous system which favoured the production of ataxic symptoms. This suggestion, which



ROBERT WILLAN, 1757-1812

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emanates from Fischer, is rightly regarded by Noirot as too absolute, as malignant attacks of scarlet fever were by no means confined to individuals of precocious intelligence. Hirsch is nearer the truth in his statement that "we are completely in the dark as to the conditions which cause epidemics of scarlet fever to assume a good or a bad type."

During the first half of the nineteenth century several countries which had hitherto escaped, received their first visitation of the disease, viz., Madeira in 1806, several states in South America in 1829, Greenland in 1847, Australia and New Zealand in 1848, and California in 1849.

I have previously shown that the occurrence of post-scarlatinal dropsy was observed long before scarlet fever received its present name. In this connection it is noteworthy that in the early years of the nineteenth century many of the cases recorded by Wells (1806) and Blackhall (1813), who were the first to establish a correlation between albuminuria and dropsy, were connected with scarlet fever, while Bright some years later (1836), in discussing the causes of the disease which bears his name, states that "scarlatina has apparently laid the foundation for the future mischief."

In view of the fact that the possibility of the transmission of scarlet fever to animals has not yet been proved, it may be mentioned that as early as the first half of the nineteenth century Noirot maintained that scarlet fever was not a disease peculiar to the human race, and alluded to cases reported by Heim (1817) and Most (1826) which had occurred in dogs as the result of accidental exposure or experimental inoculation. Most also referred to a case of scarlet fever in a cat which had not only a generalised rash but a severe angina, described at a meeting of the St. Petersburg Medical Society.

In my lecture on measles I shall allude to the importance attached by Heim at the commencement of the nineteenth century to a peculiar odour emitted by patients suffering

from that disease. Scarlet fever was also regarded by him as possessing a specific odour which was manifested in the prodromal stage before the rash appeared. Heim declared that he had often been able to foretell the presence of scarlet fever from this sign alone, in the absence of an epidemic, before any trace of eruption had appeared. He believed that the fainter the odour was before and during the eruption the more malignant was the disease, probably because such patients hardly sweated at all. He compared the smell to that found in cellars in which old herrings and cheese had been kept, or to that exhaled by carnivorous animals such as lions and tigers.

Surgical Scarlet Fever. In the second half of the century numerous investigators in this country made important contributions to our knowledge of scarlet fever. In 1864 Sir James Paget gave a description of scarlet fever occurring after operations, of which he recorded ten cases.

Puerperal scarlet fever, of which the first exact description had been given in 1800 by Malfatti, in his account of an outbreak at the Vienna Maternity Hospital, formed the subject of important discussions at the Dublin Obstetrical Society in 1886, in which the president, A. H. McClintock, maintained that the earlier the invasion of scarlet fever in the puerperium the greater was the danger; and at the Obstetrical Society of London in 1875, in which Braxton Hicks and Spencer Wells, among others, took part.

In 1882 the first epidemic of **scarlet fever attributable to milk**, of which Kober has collected ninety-nine examples, was recorded by W. H. Power of the Local Government Board. In a subsequent communication in 1885 he reported another epidemic, which was practically limited to the consumers of milk from a dairy at Hendon, where several cows with an eruption on their udders were regarded by him as being the source of infection. This epidemic is also noteworthy owing to the pioneer work on the bacteriology of scarlet fever carried

out by Professor E. Klein, who isolated from the lesions on the cows and also from human cases an organism which he named *Micrococcus* or *Streptococcus scarlatinae*, and believed to be the causal agent of the disease.

Return cases of scarlet fever, the occurrence of which, as I have shown elsewhere (1932), was first investigated by English observers over forty years ago, came into prominence in the nineties of last century, when six large isolation hospitals were opened in the Metropolitan area, in addition to numerous fever hospitals in the Provinces.

For at least fifty years after the introduction of the registration of births in 1838, the mortality of scarlet fever in this country remained high, the maximum being reached in 1863. A classical example of the severity of scarlet fever at this time is furnished by the family of the Archbishop of Canterbury, Archibald Campbell Tait, who, when Dean of Carlisle, lost five of his six daughters from this disease in March and April, 1856 (Davidson and Benham).

For the last fifty years, however, scarlet fever has shown a steady decline in its mortality in contrast with the high death rates in Soviet Russia, Poland and the Balkan countries.

As was to be expected during a century in which scarlet fever was so severe a disease, many suggestions as to treatment were made. Of these the most important method, and indeed the only one which has continued down to our own time, is the use of affusions of cold and tepid water recommended by James Currie of Liverpool. "In all the cases," said he, "which I have seen amounting to about 150, I have uniformly followed this practice with a degree of success so nearly invariable, that I cannot contemplate it without emotions of surprise as well as of satisfaction."

The success of inoculation against small-pox in preventing or attenuating the disease induced a number of physicians to try a similar method in scarlet fever. According to Sanné, Stoll succeeded by subcutaneous injection of a

patient's epidermal scales, but the experiment failed in the hands of Petit-Radel.

In a series of letters addressed to Trousseau, his fellow student and disciple of Bretonneau, Miquel of Amboise related that he had carried out inoculation against scarlet fever by collecting blood during the eruptive period and injecting it into the arms and legs of children who had been exposed to the disease. Miquel's results were successful, but were not confirmed by subsequent observers, so that the method was soon abandoned.

Much greater vogue as a prophylactic was attained by belladonna, which was recommended particularly by Hahnemann, the founder of homœopathy, and was extensively used in Germany, Sweden, Holland and France between the years 1820 and 1843. Owing to its failure, however, in the hands of subsequent observers, this method also fell into disuse.

A method of treatment which enjoyed some vogue during the nineteenth century and has been revived in this, was that introduced in 1848 by Schneemann, who recommended inunction with bacon fat of the whole skin except that of the face and scalp every morning and evening, his theory being that the application hastened the disappearance of desquamation, which, like his contemporaries, he regarded as the chief danger in scarlet fever. This method met with the approval, among others, of so eminent a physician as William Budd, who included the scalp in the treatment.

Inunction seems to have fallen into disuse for about thirty years, but was revived again by Curgenvén as a prophylactic measure in 1893, and by Milne in the following century. Milne's method, which has been abandoned generally in this country, but is still recommended by some French writers, consisted in inunction of the skin from the crown of the head to the soles of the feet with eucalyptus oil, and in swabbing the throat with 1 in 20 carbolic every two hours for the first twenty-four hours of the disease. As competent authorities, such as

Armstrong and Goodall (1910), have pointed out, this treatment had nothing to do with the loss of infectiousness, its apparent success being due to the fact that within the last fifty years the virulence of scarlet fever had greatly decreased.

In the closing years of the nineteenth century an important posthumous paper was published by Stickler of Orange, New Jersey, containing an account of a series of ten children in whom the disease had been reproduced by subcutaneous injection of mucus from the throat and buccal cavity of scarlet fever patients soon after the appearance of the eruption. Stickler did not continue his experiments, the morality of which was questionable, owing to the severity of the attacks produced, some of which were complicated by nephritis.

The experiments, however, clearly proved that the buccal and faucial mucosæ contained the contagium of the disease, and that the early eruptive period was extremely infectious.

Twentieth Century. Although the disease still tends to be severe in Poland, Soviet Russia and the Balkan States, since the beginning of this century scarlet fever has declined considerably in severity in this country and in the west of Europe ; while its incidence has remained much the same. There has also been a striking diminution, not only in this country but also abroad, in the frequency of post-scarlatinal nephritis.

In the course of the present century a remarkable advance has been made in our knowledge of the etiology, diagnosis, prophylaxis and treatment of scarlet fever. Prior to the Great War the chief investigations consisted in attempts to transmit the disease to animals, as shown by the work of Bernhardt in Berlin, Cantacuzène in Bucharest, Grünbaum in Liverpool, Landsteiner and Levaditi in Paris, and Schleissner in Prague, as well as in efforts to obtain a specific method of prophylaxis and treatment, of which Gabritschewsky (with vaccine) and Moser (with antistreptococcal serum) were pioneers.

It was during the pre-war period also that a radical change was initiated in the diet by Dufour in Paris and Pospischill and Weiss in Vienna. Instead of confining the unfortunate patient to a more or less strict milk regimen for three or four weeks, they substituted an ordinary diet, including meat, as soon as the appetite returned. Not only did the patient's general condition considerably improve as the result, but the incidence of nephritis was not increased.

Undoubtedly the most notable monograph published on scarlet fever in the pre-war period was the work of Pospischill and Weiss of Vienna, who, in addition to showing that the incidence of nephritis was not affected by the character of the diet, as I have already remarked, and denying the existence of scarlet fever as a factor in chronic heart disease, gave the first description of the syndrome occurring between the second and sixth weeks, which they called the second illness (*zweites Kranksein*), of which the principal symptoms are fever, cervical adenitis and nephritis. Pospischill and Weiss were also among the first to emphasise the harmlessness of desquamation and the importance of discharges from the nose and throat in the dissemination of the disease.

The existence of endocarditis in scarlet fever, which is denied by Pospischill and Weiss, is one of considerable interest and importance. There is no doubt that the earlier observers considerably exaggerated its frequency, as they did not recognise the existence of extra-cardiac bruits which are so common in this disease, and their erroneous doctrine is still held by those who have little or no experience of scarlet fever. Its rarity, however, is shown by the fact that during the period 1910-1914 the annual incidence of this complication in the fever hospitals of the Metropolitan Asylums Board was always below 1 per cent. (0.32-0.92 per cent.).

During the last eighteen years the chief additions to our knowledge of scarlet fever have been connected with the bacteriology of the disease, the Dick and Schultz-

Charlton tests, active and passive immunisation and specific treatment.

As regards the bacteriology of scarlet fever a streptococcal origin for the disease was suggested, as I have stated, by Klein in 1887, but until about fifteen years ago there was a general tendency to regard streptococci merely as secondary invaders. The experiments, however, of George and Gladys Dick in 1920, conclusively proved that scarlet fever is primarily a local infection of the throat caused by a particular type of hæmolytic streptococcus which is capable of producing a soluble toxin, absorption of which causes the general manifestations of the disease.

In 1923 the Dicks successfully inoculated volunteers by swabbing their throats with four-day-old cultures of the hæmolytic streptococcus grown from the pus of the finger of a nurse who contracted mild scarlet fever. In 1924, by intracutaneous injections of the filtrates of the culture of the scarlatinal streptococcus they devised a test to which their name has been given which determines, according as it is positive or negative, whether the subject is susceptible or immune to the disease. The results obtained by the Dicks have received practically universal acceptance, especially in Anglo-Saxon countries, and have had important practical applications in the diagnosis, prophylaxis and treatment of scarlet fever. As regards diagnosis the absence of hæmolytic streptococci from the nose and throat in the acute stage of a suspected case excludes scarlet fever, while the conversion of a positive into a negative Dick reaction, in the course of one or more weeks, indicates the presence of that disease.

In 1919 Schultz and Charlton, of Charlottenburg, described under the name of "the extinction sign" a phenomenon which they claimed to be diagnostic of scarlet fever, consisting in the appearance of a pale area from four to thirty-six hours after injection of normal human serum or convalescent serum. Anti-scarlatinal serum was subsequently employed for the performance

of this test which, in the experience of many clinicians, as I have remarked elsewhere (1929), is not of much diagnostic value, being only well marked when there is no doubt as to the scarlatinal nature of the rash or angina.

Specific prophylaxis by passive immunisation with comparatively small doses of scarlatinal antitoxin confers an immediate though short lived immunity, while active immunisation with scarlatinal toxin or anatoxin, though taking longer to effect, gives a more persistent immunity. (G. F. and G. H. Dick, 1925.)

The use of antistreptococcal serum in the treatment of scarlet fever dates back to 1895, when Marmorek reported good results in some cases of scarlet fever complicated by streptococcal sore throat. It was not known until 1902 that antistreptococcal serum was first used extensively by Moser of Vienna, who reported a large series of cases treated by serum as well as control cases treated without it. Owing to the severity of the reaction following its use, however, serum was gradually abandoned. After their discovery of the *Streptococcus hæmolyticus scarlatinæ* the Dicks, in 1924, prepared a concentrated scarlet fever antitoxin by immunising a horse with scarlet fever toxin and subsequently reported satisfactory results obtained from its use as compared with a control series. Their results were confirmed by other observers, both in the United States and in Europe, though a few dissentients maintained that it was unnecessary in mild cases and useless in those of a malignant type. The great majority of clinicians, however, are now agreed that the chief value of the serum treatment of scarlet fever lies in its power to alleviate the toxic symptoms of the acute stage, while it has little if any action in preventing or curing complications.

In conclusion it may be noted, as I have shown elsewhere (1930), that in Roumania, where the type of scarlet fever tends to be unusually severe, much better results have been obtained by injections of convalescent serum than from the use of antitoxin.

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CHAPTER IV

MEASLES

Nomenclature. The almost inextricable confusion which was once prevalent in the nomenclature of the acute exanthemata is shown by the fact that the terms *rubeola*, *rubeoli*, *roseola*, *rossalia*, *rossania*, etc., were applied, as Bateman (1813) remarks, with little discrimination to measles, scarlet fever, eczema, etc., until Sauvages fixed the acceptation of the first of them. According to Creighton, the English word "measles" originally meant the leprous, first in the Latin form *miselli* or *misellæ* (diminutive of *miser*), and later in the Norman French form of "mesles." In this sense, for instances, we find these words used by Chaucer in the "Parson's Tale" (624) of "mesel" for leper and "meselrie" for leprosy (625), and by Langland in "Piers Plowman" (Pass. VII, 102; XVI, 108).

The term *morbilli*, according to Hebra, is derived from the Italian *morbillo*, the "little disease," in distinction from the plague, known as *il morbo*. This is a more probable explanation than that of Daniel Turner, who suggested that measles was called *morbilli* because it chiefly affected children.

Haeser points out that the term *morbilli* at first included several closely related acute exanthemata which were popularly described in the Middle Ages by various names such as *sturola*, *scurolo*, *sofersa* and *rosagia*.

Subsequently, up to the time of Sauvages, whose nosology was published in 1763, the term *morbilli* was used to designate measles. Sauvages, however, applied to it the term *rubeola*, derived from the Spanish, the result being a good deal of confusion owing to this word being some-

times applied to measles, sometimes to scarlet fever, and in the nineteenth and twentieth centuries to German measles.

Middle Ages. Although several distinguished writers including Sennert, Saumaise, Willan and Bateman, have endeavoured to trace measles back to classical antiquity, Gruner's investigations have proved that the disease first appeared in France simultaneously with small-pox during the Saracen invasion. Both the Arabian authors and their imitators, the Arabists, regarded measles and small-pox as closely related, the usual distinction made between them being that measles came from the bile, while small-pox came from the blood, and that the lesions of measles were small and less likely to attack the eyes (Creighton).

The minor distinctions, according to Rhazes, were as follows :

(1) As regards predisposing factors, bodies that are lean, bilious and dry, are more disposed to measles than to small-pox.

(2) In the prodromal stage inquietude, nausea and anxiety are more frequent in measles, while pain in the back is more peculiar to small-pox.

(3) The measles eruption comes out all at once, whereas the eruption of small-pox comes out gradually.

(4) The eruption of measles is less elevated than that of small-pox.

(5) Measles is more to be dreaded than small-pox except in the eyes.

(6) Barley water is more suitable for measles than for small-pox patients.

The occurrence and frequently fatal issue of enteritis as a complication of measles was well recognised by Rhazes (*Divisio Morborum*), who warns the practitioner not to give the patient anything to open the bowels, especially towards the end of the disease, as a diarrhoea at this time might end fatally.

Sixteenth Century. The identification of measles and small-pox which was current among the Arabians and

Arabists persisted for some time after the Middle Ages, as I showed in my lecture on small-pox by the quotation from Thomas Phaer's "Booke of Children," in which the term *morbilli* is applied to small-pox and *varioli* to measles. The separation of measles from scarlet fever was first effected by Ingrassias in 1553 before the latter disease received its present name, but was known as *rossalia*. "There are some," says Ingrassias, "who regard *rossalia* as the same as *morbilli*, but we have often seen them as distinct affections with our own eyes, and not merely trusting to the report of others."

The confusion between scarlet fever and measles in the sixteenth century is shown by the fact mentioned by Goodall that Baillou, who flourished in the middle of the sixteenth century, applied the term *rubiolae* alike to scarlet fever and measles, while he used the term *morbilli* for any blotchy eruption.

Seventeenth Century. The influence of the Arabian doctrine of the close relationship of small-pox and measles is illustrated by Sennert (1650) proposing as a subject for enquiry the question why the disease in some constitutions assumed the form of small-pox and in others that of measles (Gregory).

Diemerbroeck (1687) maintained that small-pox and measles were only different degrees of the same malady. (Differunt morbilli a variolis accidentaliter, vel quoad majus et minus.) "The matter by which measles is generated," said he, "is not so thick as in the case of small-pox. It is dryer and somewhat choleric."

"The glory of having perfected," says Pinel, "that which Rhazes had only drawn in outline was reserved for the illustrious Sydenham." Sydenham's description of measles in 1670 ("Med. Obs.," IV., Ch. 5) and 1674 (*ibid.*, IV., 3) is remarkable for the account of the long prodromal period, the catarrh, the lack of relief on appearance of the eruption in contrast with what occurs in small-pox, the fatality of pneumonia, "which does more to fill Charon's boat than the small-pox itself," and his denun-

ciation of hot medicines and the hot regimen used by ignorant old women.

It is also noteworthy that in his account of the epidemic of 1674 ("Med. Obs.," V., 3) he described the sporadic appearance of a *febris morbillosa* or measly fever, which seems to have been a *forme fruste* of the disease, the eruption being confined to the back of the neck and shoulders. The fever, on the other hand, was much more serious, as it lasted fourteen days and often longer.

Similar incomplete forms of measles were reported at Philadelphia in the spring of 1789 by Benjamin Rush, who observed many children affected by all the symptoms of measles except a general eruption, though in some cases there was a trifling rash about the neck and chest. Rush adds that he had seen the same thing in 1773 and 1783.

Although Sydenham permanently separated small-pox from measles, a belief in the identity of measles and scarlet fever was held by Morton (1694), who maintained that they stood to each other in the same relation as discrete to confluent small-pox. I have already alluded to Morton's views on this subject in my lecture on the history of scarlet fever.

Eighteenth Century. The excellence of Sydenham's description was so fully realised by his successors that Fuller in 1730 wrote: "To go about to alter the Description Dr. Sydenham hath drawn up of this Distemper would be the same thing as attempting to alter one of Phidias's Statues."

Fuller, however, did more than any of his predecessors, Sydenham included, to distinguish small-pox from measles. "The Measles and Small-pox," he says, "differ not in Degree only (as many Authors have said), but in Essence also, as is manifest from hence, that one of them never breeds the other." Fuller also gives thirteen points of distinction between the two diseases, of which the chief are—pain in the back, which is not so violent in measles as in small-pox; pain in the chest and shortness of breath,

which are greater in measles than in small-pox ; the constant presence of cough before measles, the greater frequency of sore throat and hoarseness before measles, the greater frequency of ocular and nasal catarrh in measles ; the longer time for the eruption of small-pox to appear, and the relief of the symptoms on appearance of the eruption in small-pox, " if it be not a very bad Sort."

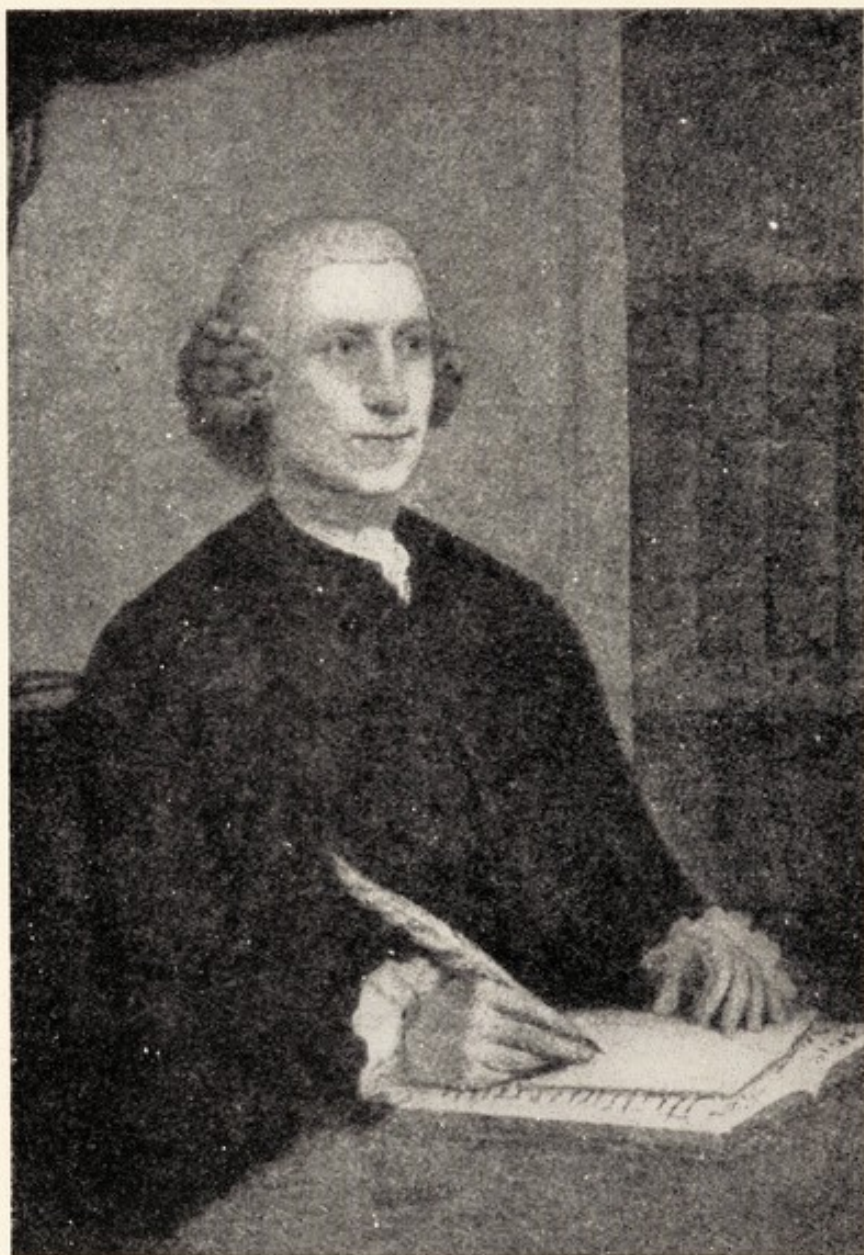
Epidemics of measles occurring among uncivilised races are apt to run a very severe course, partly owing to the complete absence of immunity in a virgin soil, and partly owing to the absence of any proper treatment. One of the earliest examples of this kind is the epidemic of measles which occurred in 1749 among the natives on the banks of the Amazon, 30,000 of whom died and whole tribes were destroyed (Hirsch).

The unusually high mortality from measles in England in 1718-1719 and in 1733 is attributed by Creighton to the sickly constitution of the children, due in great part to the widespread habit of spirit drinking among their parents.

According to Haeser, during the period 1720-1750, which was relatively free from typhoid and typhus fevers, measles, like the other acute exanthemata, was very prevalent, and several epidemics of measles, which were often associated with whooping cough, were reported after 1757, though probably some of the epidemics of typhus were described as morbilli.

Epidemics of measles were also reported towards the end of the century in Germany, Denmark, France, Holland and Great Britain, viz., at Erfurt in 1778 and 1779, in Denmark in 1781, Erlangen in 1783, the Leipzig district in 1785, the Hague in 1787, Göttingen in 1790, Jena in 1795, Erfurt in 1796, and France and Great Britain in 1796-1801 (Haeser).

A remarkable landmark in the history of measles is formed in the middle of the eighteenth century by the inoculation against the disease carried out by Francis Home, first professor of materia medica at Edinburgh University, and perhaps better known for his " Inquiry



FRANCIS HOME, 1719-1813

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into the Nature, Causes and Cure of the Croup." His account of the method was published in an article in his "Medical Facts and Experiments" (1759) entitled "Of the measles as they appeared 1758 and of their Inoculation," and runs as follows: "I thought that I should do no small service to mankind if I could render the disease more mild and safe in the same way as the Turks have taught us to mitigate the small-pox." A superficial incision was made where the eruption was thickest, and the blood was received on cotton-wool which was applied to incisions on both arms of the child to be protected, and allowed to remain on three days. Of twelve children, aged from seven months to thirteen years, in whom this method was employed, three had no rash at all and were considered by Home as failures, though we should probably regard them as examples of complete protection, while in nine the attack was much milder than usual.

Von Jürgensen, who is sceptical as to the success of Home's inoculations, quotes Thomassen à Thuessink, who, while attending Home's clinic in the Edinburgh Hospital in 1784-1785, very frequently failed to see the successful results claimed by Home, and stated that such eminent contemporary physicians as Cullen, Gregory, Black and Duncan had never heard of them.

Subsequently Percival, in 1789, after alluding to Home's method, stated that "the morbillous matter had since been ingrafted by means of lint wet with the tears from the eyes in the fresh stage of the disorder." He did not, however, give any information as to the success of this experiment.

In spite of Sydenham's teaching, the confusion between measles and scarlet fever persisted until almost the end of the eighteenth century. Willan, for instance, mentions Philip de Violante, "an author of great respectability," who regarded malignant scarlet fever as a malignant and putrid form of measles, and stated that the same opinion was held by Ludwig and many other German writers. Bateman (1819) declared that as late as 1769 Sir William

Watson did not distinguish measles from scarlet fever, and maintained that the disease described by Watson, which was prevalent at the Foundling Hospital in 1637 and 1768, was not measles but scarlet fever.

Withering, in 1779, spoke of measles being nearly allied to scarlet fever, but added that those who had had an attack of measles are equally subject with others to scarlet fever, and that the catarrhal symptoms so predominant in the early stage of measles were never found in scarlet fever.

Among the writers towards the close of the eighteenth century special mention must be made of Borsieri or Bursarius (1725-1785), who gives a detailed description of the varieties of measles, namely, the mild, the malignant and the non-eruptive form, or *morbilli sine morbillis*. The occurrence of congenital measles and the frequency of pneumonia and ophthalmia as complications, and pulmonary phthisis as a sequel, are also described by him.

As regards treatment, the value of bleeding was emphasised by Mead in 1748 in the following words: "Blood must be taken away in the beginning according to the age and strength of the patient. It is best to do this before the eruption of the pustules, but if they are already come out, it must, however, be taken away. For the greatest damage is the inflammation of the lungs which cannot be prevented too soon. Therefore in the height of the fever also, although bleeding was not neglected in the beginning, yet it is sometimes necessary to repeat it, and in the last place at the end of the disease. When the skin is now growing dry and the scales falling off it will be a great error not to open a vein again, that by this means a flux upon the heart and intestines, and the symptoms of a hectic fever and consumption may happily be prevented."

Another advocate of bleeding in measles was William Heberden the Elder, who, in a paper read before this college on August 6th, 1785, gave what he described as "a particular and minute description" of the disease.

"Bleeding," he said, "may be used at any time of the measles and is always beneficial when the symptoms are very distressing, particularly an oppression of the breath to which every stage of this distemper is liable; and bleeding, together with such medicines as the occasional symptoms would require is the whole of the medical care requisite in the measles."

A frequent matter of discussion in the eighteenth century was the possibility of more than one attack of measles in the same individual. While Cullen, Stoll and Rosen von Rosenstein maintained that the disease could not affect the same person twice, Home, van Swieten, De Haen, Vogel and Geoffroy declared that second attacks were frequent.

The attitude of Willan on the subject calls for special comment. There is little doubt that the disease which he called *rubeola sine catarrho*, or measles without fever or catarrhal symptoms, was really German measles, especially as it afforded no protection against a subsequent attack of measles. Although he had seen two instances of recurrence of what he regarded as measles in his own children when the first attack had been one of *rubeola sine catarrho*, he had never met with an individual who had twice had the febrile rubeola in the course of his twenty years' experience of eruptive fevers.

Bateman (1813) points out that the correctness of all the statements of writers regarding second attacks of measles before the close of the eighteenth century is very questionable, as down to that period (and, it might be added, much later) the eruption had been confounded with that of scarlet fever.

Nineteenth Century. During the nineteenth century, as Whitelegge remarks, certain facts about measles stand out clearly, viz., the tendency of the disease to biennial recurrence, and the alternation of high and low mortality. About the end of the eighteenth century the average annual mortality began to increase and reached its maximum in 1815. The incidence then began to decline

rapidly, reaching its minimum about the 'thirties. Another maximum was reached in the early 'forties, and yet another in the 'sixties. The 'seventies were comparatively free, though there was another wave in the 'eighties. The increasing ratio in London of measles among the deaths from all causes towards the last two decades of the eighteenth century and the first two decades of the nineteenth is shown by the following figures compiled by Creighton :

PERCENTAGE OF MEASLES IN ALL LONDON DEATHS.

1781-1790	.	.	.	.	.	1.10
1791-1800	.	.	.	.	.	1.34
1801-1810	.	.	.	.	.	3.11
1811-1820	.	.	.	.	.	3.52

In 1804 measles deaths in London for the first time equalled small-pox deaths and in 1808 exceeded them. A great epidemic of measles, which began in October, 1807 and continued into 1808, was remarkably fatal not only in London but also in Edinburgh, Glasgow and Aberdeen, while many of the survivors suffered from debility, cough, emaciation and œdema of the face and extremities (Creighton).

During the early part of the nineteenth century a great variety of prophylactic measures was recommended, such as Huxham's antimonial wine (Wildberg, 1826), flowers of sulphur (Siebergundi, 1827 ; Tourtual, 1832), belladonna (Mandt, 1828) and fumigations with chlorine (Berndt, 1834). None of these measures, however, which are enumerated by Sanné, have stood the test of time and have all been abandoned.

Apart from England and Scotland outbreaks of measles, as of the acute exanthemata generally, appear to have been relatively uncommon during the first two decades of the nineteenth century, only sporadic cases being reported in Vienna (1808) and Würtemberg (1814). The first considerable epidemic of measles on the continent of Europe did not take place until 1816, when it was

reported by Themmen at Groningen. After 1822 the disease spread throughout Italy, Germany, where Bonn suffered heavily, and the Netherlands, and was often associated, as still so frequently happens, with whooping cough.

In 1838 measles was introduced into Otago, New Zealand, but did not appear in the North Island until 1854, when it proved fatal to about 4,000 natives (Dobell).

According to Guersant and Blache, Home's method of inoculation was used at the Philadelphia Dispensary in 1801 but without success, although trials were made with blood, tears and nasal and bronchial mucus, and with a similar result by Locatelli. On the other hand, Katona, a Hungarian physician, who used a drop of blood or a tear during an epidemic of malignant measles inoculated 1,122 persons with successful results in all but 7 per cent. In all the others a very mild attack resulted.

As I have pointed out elsewhere (1936), an interval of nearly fifty years elapsed between the publication of Katona's paper and the appearance of another communication on the same subject. In a paper read before the Glasgow Medico-Chirurgical Society on March 21st, 1890, entitled "Inoculation, with suggestions for its further application in medicine, especially in mitigating the severity of measles," Dr. Hugh Thomson, vaccinator to the Faculty of Physicians and Surgeons, Glasgow, and to the Glasgow Royal Infirmary, after giving an account of Home's, Speranza's and Katona's experiments, recorded his personal experience of two cases in which he employed Home's method. As no eruption ensued, but only slight catarrhal symptoms, Thomson regarded his cases as failures, but, like the three cases of Home previously mentioned, they were probably examples of what would now be called an attenuated attack.

As bearing on the oosphresiology of the acute exanthemata at the beginning of the nineteenth century, it may be noted that Heim drew attention to a peculiar odour as one of the symptoms present during the first six days

of measles, and compared it to that of the feathers of a freshly plucked goose, while Home likened it to that of small-pox. Heyfelder maintained that the odour was stronger in the morning than in the evening and in places where patients were crowded together. Guersant and Blache, on the other hand, from whose article I have taken this curious information, had never observed anything of the kind.

The most important epidemic in the first half of the nineteenth century is that which occurred in the Faroe Islands in 1846. In his classical report on this epidemic Panum states that it lasted from April to October and attacked 6,000 of the 7,782 inhabitants. The outbreak was due to a workman who left Copenhagen during the incubation period on March 20th and landed on the 28th in the Faroe Islands, where he developed symptoms of measles on April 1st. Panum attributed the high incidence of the disease to the fact that measles had not visited these islands since 1781, so that almost all the natives were susceptible, irrespective of age. Of the ninety-eight individuals who had had measles in 1781 none had a second attack in 1846.

In the same year as the epidemic in the Faroe Islands a notable, though much less extensive, outbreak occurred in the Hudson Bay Territory among the Indian population. According to Smellie, who stated that "the epidemic assumed in a number of cases all the symptoms of rubeola maligna, alarm and despondency at seeing numbers dying around them in a great measure produced the rapid sinking observed in many cases." The epidemic lasted six weeks and of 145 cases 40 died.

The Fiji epidemic of 1875, which carried off from a fifth to a quarter of the population in little more than three months, was traced to an outbreak which visited South Africa in 1872. In 1873-1874 it spread to Mauritius and in 1874 to South Australia, whence it was brought to the Fiji Islands shortly after their annexation by the British Government early in 1875 as the result of some persons in

the acute stage of measles being allowed to land from H.M.S. *Dido*. The fatality rate was not less than 26 per cent. and at least 40,000 deaths ensued. According to Glanvill Corney by far the greatest number of deaths were due to dysentery or pneumonia or both together. Alike in South Australia, Fiji and Mauritius adults were attacked in large numbers. Squire attributes the high mortality in this epidemic to the natives' terror at the mysterious disease and the want of skilled attention. "Thousands," he said, "were carried off from want of nourishment and care as well as by dysentery and congestion of the lungs; the worst dangers from overcrowding were incurred in the small houses, and the worst dangers from cold by the sufferers rushing into the water where they would continue immersed. The epidemic only ceased when every person had been attacked."

Fortunately, such terrible epidemics as those which occurred in the Faroe and Fiji Islands are rare events, and can only be explained by a number of circumstances, which, according to Clemow, include the introduction of measles infection into an isolated community long free from it, or overcrowding, lack of nursing and medical treatment liable to occur during wars, as is shown by the following examples.

The National Army of Paraguay in the war with Brazil in 1864-1870 lost one-fifth of its numbers within three months, but this high fatality is attributed by Masterman not to the severity of the disease but to the lack of shelter and proper food.

Among the Confederate troops in the North American Civil War in 1866 there were 67,763 cases with 4,246 deaths among the white troops, and 8,555 cases with 931 deaths among the coloured troops. (Prinzing, 1916).

The severity of measles in the French army in Paris during the Franco-Prussian War in 1870-1871, is described by Colin, who emphasises the transient character of the eruption and the intensity of the thoracic symptoms

which might prove fatal in two or three days after the appearance of the eruption.

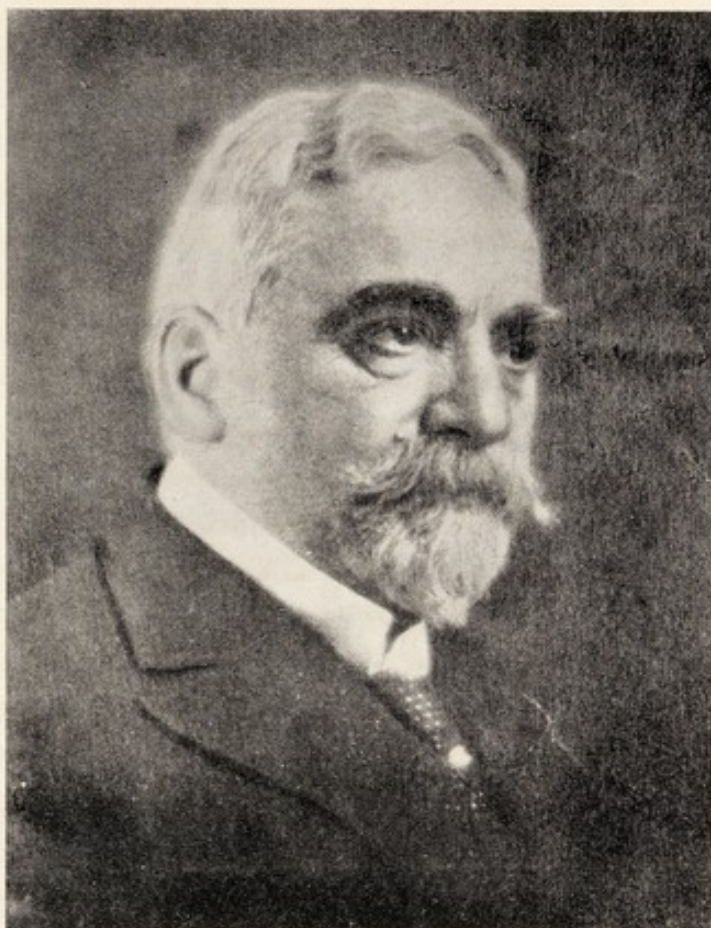
A similar experience had been gained in the French Army by Laveran, who ranked measles with cholera and typhoid fever as a disease likely to be aggravated by a hospital environment in contrast with malaria, which was obviously benefited by residence in hospital.

Measles of a particularly malignant type was also prevalent in the Concentration Camps in the Boer War, not only among the children but also among adults and even very old men who had never had an attack of measles in childhood. (Prinzing, 1916).

A more recent example of the severity of measles attacking virgin soil is furnished by the epidemic described by Kinnear, which occurred at Bedford in 1914-1915, in a Highland Division composed of a specially susceptible body of men brought together in unusually large numbers. Not only had these men never had measles themselves, but their forefathers had had no experience of it. From October, 1914, to March, 1915, there were 529 cases with 65 deaths—a mortality of 12·3 per cent., most of the deaths being due to septic broncho-pneumonia. The disease was most severe among the men from the remote Highlands.

The heavy mortality from measles in foundling hospitals, due to overcrowding and insufficient ventilation during the nineteenth century, is illustrated by the fact that in the Hospice des Enfants Assistés in Paris the average mortality for the four years, 1882-1885, was as high as 44 per cent. (Dawson Williams).

Undoubtedly the most important discovery in connection with measles in the nineteenth century was that made by Henry Koplik, of New York, regarding the presence of the pathognomonic spots on the buccal mucous membrane in the early stage of the disease. His first description of them was published in the *Archives of Pediatrics* in 1896, from which the following extract is taken: "If we look in the mouth at this (prodromal) period, we see a redness



HENRY KOPLIK, 1859-1927

By kind permission of Dr. W. R. Bett

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of the fauces ; perhaps, not in all cases, a few spots on the soft palate. On the buccal mucous membrane and the inside of the lips we invariably see a distinct eruption. It consists of small irregular spots of a bright red colour. In the centre of each spot there is noted in strong daylight a minute bluish white speck. These red spots, with accompanying specks of a bluish-white colour, are absolutely pathognomonic of beginning measles, and when seen can be relied upon as the forerunner of the skin eruption."

A second paper, entitled "A New Diagnostic Sign of Measles," describing sixteen cases in which the disease was diagnosed merely by this sign, was published in the *Medical Record* in 1898, and a third and final paper, "The New Diagnostic Spots of Measles on the Buccal and Labial Mucous Membrane," appeared in the *Medical News* in 1899.

W. R. Bett, who has written an excellent essay on Koplik's spots, draws attention to the following descriptions of the buccal enanthem which had preceded that of Koplik. In 1873, Monti of Vienna mentioned irregular, partly confluent red spots which he noted twelve to twenty-four hours before the appearance of the eruption of measles. Filatow, in 1895, drew attention to delicate whitish tags of desquamating mucous membrane which he observed twenty-four to forty-eight hours before the appearance of the rash. None of these descriptions, however, Bett truly remarks, compare with Koplik's classical account in fullness, accuracy or tone of conviction.

As regards its geographical distribution, measles is a world-wide disease. After long being prevalent in Europe in the Middle Ages, as we have seen, it appeared for the first time in Brazil in the sixteenth century simultaneously with small-pox. It reached North America soon after the arrival of the first British settlers. It was not, however, until 1854 that it invaded the Australian continent, whence it was introduced into Tasmania and New Zealand (Hirsch).

The greater prevalence of the disease in the colder months of the year has always been characteristic. Of 530 epidemics studied by Hirsch 339 occurred in the cold season as compared with 191 in the warmer months.

Twentieth Century. In 1910 measles, like whooping cough, became admissible to the Metropolitan Asylum Board fever hospitals with a view to saving life in severe cases occurring in households of the poorer classes rather than for the purpose of controlling infection. There is little doubt that the aim of saving life has been achieved. Only once during the period that measles has been admissible to these hospitals has the case mortality exceeded 13·9 per cent., viz., in the first year, 1910, when it was 15·8 per cent., and from 1920 onwards it has been under 10 per cent., being 7 per cent. in 1927–1928, 6·5 per cent. in 1929–1930, 5·6 per cent. in 1931–1932, and 5·5 per cent. in 1933–1934. It must be borne in mind, however, that the decline in the fatality must be in part attributed to the admissions in recent years being no longer confined to the most urgent and necessitous cases, there being a greater tendency to send all cases of measles to hospital. The decline in the fatality of measles, while its incidence among children still remains high, is characteristic of the disease in all civilised countries, and may be attributed, as Prinzing (1931) has pointed out, to general improvement in housing and education.

As regards the complications of measles, cancrum oris, which about fifty years ago was remarkably frequent, occurring as it did in 43 per cent. of the measles cases admitted to the Hospice des Enfants Assistés, Paris, is nowadays a rare event. Grancher, for example, saw only one case in the course of ten years, and only nine cases (0·08 per cent.) occurred among 11,749 measles patients admitted to the Metropolitan Asylums Board Hospitals during the period 1911–1914, since when no statistics as to the frequency of cancrum oris in the London Fever Hospitals have been published. Its disappearance is probably due to improvements in hospital

hygiene, its development being favoured by overcrowding, lack of ventilation and want of proper attention.

On the other hand, much more prominence has been given in recent years to the nervous complications, especially encephalitis, which, though still relatively uncommon, is found more frequently after measles than after any other acute exanthem. Although accounts of isolated cases of encephalitis can be traced back to the eighteenth century (M. T. Comby) the pathological anatomy was practically unknown until the recent publication of careful studies by Siegmund, Creutefeld, Guillery, Wohlwill and Sjövall (Ford).

Bacteriology. An immense amount of work has been done in connection with the bacteriology of measles without any final conclusion having yet been reached, as will be seen in the exhaustive survey carried out in 1931 by the brothers David and Robert Thomson. Suffice it to say that the following organisms, among many others, have been regarded by various observers as causal factors: Fungus spores (Salisbury, 1862), diplococci and streptococci (Babes, 1881), micrococcus (Keating, 1881-1882), diphtheroid bacillus (Zlatogoroff, 1904), green-producing diplococcus (Tunnicliff, 1917), spirochæte (Salimbeni and Kermorgant, 1923), Gram-negative filter-passing coccus (Caronia, 1924), streptococcus morbilli (Ferry and Fisher, 1926), and an invisible filter-passing virus (Degkwitz, 1927).

In a critical survey of the subject McCartney comes to the conclusion that the available evidence indicates that the causal agent is a filter-passer and not a recognisable organism, present in the naso-pharyngeal secretions and in the blood stream.

Prophylaxis. The most important event connected with measles in the twentieth century, and perhaps in its history, is the discovery of passive immunisation by injection of those exposed to the disease with the serum of convalescents. This, of course, was not the first attempt to modify measles, for, as we have already seen,

the credit for this is due to Francis Home in the middle of the eighteenth century, but his method, though it had many supporters, was presumably abandoned because it was by no means so uniformly successful as the subsequent use of convalescent serum proved to be. This latter method was first employed for passive immunisation by Cenci, who published his results in 1907, and was followed by Nicolle and Conseil (1918), Richardson and Connor (1919) and Park and Zingher (1919). In 1920 Degkwitz, in Pfaundler's Clinic at Munich, without making any allusion to the work of his predecessors, carried out the method in a very much larger number of cases, and with such brilliant results that it soon became adopted all over the continent of Europe, though it was not tried in this country until 1928 (Gunn).

As a rule convalescent serum has little effect after the onset of the disease, although its therapeutic use was recommended in 1896, or more than ten years before Cenci's paper, by Weisbecker, who reported good results in five cases, four of which were complicated by pneumonia. Owing to the difficulty in obtaining convalescent serum, the normal serum or whole blood of adults, especially the parents, brothers and sisters who have had measles at some time in their life, has also been used to protect children who have been exposed to the disease. The use of adult serum or whole blood, though it does not so frequently prevent an attack altogether, considerably attenuates its severity, and confers a much longer immunity than when the attack is entirely prevented.

The use of animal serum from monkeys and sheep injected with filtrates from the naso-pharyngeal secretion of measles patients, or with tissue cultures inoculated with the virus, was advocated by Degkwitz in 1926, but the severe reactions and even deaths resulting therefrom rapidly led to this method being abandoned.

More recently placental extract has been introduced for the protection of contacts on the grounds that the infants' immunity from measles during the first nine

months of life is due to the presence in the placenta of immune bodies contained in the globulin (McKhann, Green and Coady; Paschlau). Comparative trials of placental extract, which have yielded encouraging results in America, are now being carried out side by side with convalescent and human adult serum in the London County Council hospitals and laboratories to determine whether it can play a part in the control of measles. (Brincker.)

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CHAPTER V

GERMAN MEASLES

Nomenclature. Rubella, the least important of all the acute exanthemata, possesses a multitude of synonyms which is only exceeded by those of chicken-pox, viz., German measles, röteln, rubeola, rubeola notha, epidemic rose rash, epidemic roseola (Dukes), rubeola notha (Babington), bastard or hybrid measles or scarlatina, rosalia idiopathica (B. W. Richardson), and essera Vogeli (Borsieri). According to Goodall, the term "rubella," which was first applied in 1866 to the condition by Henry Veale of Calcutta, is not a new one, but was first used by Richard Russell in his *Æconomia Naturae* in 1755 of the "red gum" of infants.

Rubella was proposed as a substitute for all other terms by Veale on the following grounds: "Rötheln is harsh and foreign to our ears. Rubeola notha and rosalia idiopathica are too long for common use and are certainly expressive of conclusions which have yet to be proved." The terms rosalia idiopathica and rubeola notha to which Veale refers had been suggested by Benjamin Ward Richardson in 1862 and Babington in 1864 in papers read before the Epidemiological Society of London. The term "German measles" was used because the condition was first distinguished from scarlet fever and measles by German physicians. In his work on children's diseases published in 1821, Henke states that this distinction had taken place thirty or forty years previously, in other words in the last two decades of the eighteenth century. The term "rötheln" as used by the older writers did not mean rubella, but merely atypical measles or scarlet fever, and only later was employed to

designate a distinct disease. It appears to have first been introduced with such a meaning into English literature by Paterson of Leith in 1840.¹

The term "rubeola," according to Dirrigl, was first used in 1492 in a Latin translation published in Vienna of a work on the knowledge and cure of diseases by Ali Abn Abbas al Magiusi, commonly known as Hali Abbas, a Persian physician of the tenth century. Subsequent writers seem to have attached widely different meanings to the word. Baillou (Ballonius), for example, applied it in 1574 to scarlet fever, Plater (1643) to small-pox, and Sauvages (1649) to measles. At the present time *rubeola* is always used as the equivalent of the foreign term by continental writers, the term *rubella* being confined to Anglo-Saxon countries.

History. As regards the name and date of the first writer to describe the disease, there seems to have been almost as much dispute as concerning the birthplace of Homer. According to Gintrac, Kurt Sprengel traces the first mention of rubella back to Rhazes, who gave it the Arabian name Hhamikah, which the translators called "Blactiae." The Arabian physicians, however, did not present a precise account of the exanthemata to which they gave different names, the distinction not occurring until many years later. Most of the German writers are of opinion that rubella was first separated from scarlet fever and measles in the second half of the eighteenth century, *e.g.*, by De Bergen in 1752, Ludwig and Orloff in 1758, Fritsch in 1786 and Selle in 1789. Earlier writers, however, have been suggested. Garrison, for example, declares that Friedrich Hoffmann of Halle (1660-1741) was one of the first to describe rubella. Still, however, maintains that his meagre reference to it hardly merits the name of description. On the other hand, as Goodall has recently pointed out, Sennert of

¹ Although German writers have for the last thirty years at least spelt the word without the "h," like most other words in the language containing the combination "th," most British and American writers have ignored this change and continue the spelling "rötheln."

Wittenberg has a better claim to priority, having described the disease in 1619 under the name of ritteln or rotteln as belonging to the class of measles but less dangerous (*ad morbillos procul dubio pertinent Ritteln vel Rotteln, a rubore procul dubio sic dicta exanthemata . . . minus tamen quam vulgares morbilli periculosus*). An early reference to rubella also appears to be found in the following passage quoted by Fuller from Pechlin (1644–1706), who described “a small sort of Measles, called Rothel, which in his Travels he observ’d over-running the Palatinate and Swabia sparing no Sex nor Age. Most of them had Restlessness, Lassitude, intense Heat, Loss of Appetite. Some were confin’d two or three days to their Bed; some that were of foule Bodies longer, but some not at all. Upon taking a Sudorific generally all went off easily and few dy’d of it. It was so rife and contagious that in the City of Stutgard seven hundred lay ill of it at once.” During the eighteenth century opinion appears to have been divided as to whether there existed or not an acute exanthem named rubeola or rötheln resembling but distinct from scarlet fever and measles. Three different camps could be distinguished accordingly. The first consisted of those who, like Stoerk, Plenciz, Schmidt, Neufeld and Gruner, regarded scarlet fever and rubeola as identical. In this group special mention may be made of Heim (1812), who attributed considerable diagnostic importance to the odour emanating from the various acute exanthemata—a view apparently not shared by any other physician of note. Heim regarded rubella as a variety of scarlet fever on the ground that it exhaled the same odour as that disease and one quite distinct from that of measles (Klaatsch). The second group is represented by Sauvages and Selle, who regarded morbilli and rubeola as the same disease, while the third group, of whom De Bergen, Ludwig, Orloff, Ziegler, Fritsch and Vogel were the chief representatives, maintained that rubeola had an independent existence. At the beginning of the nineteenth

century yet another doctrine was promulgated by Hildenbrand, professor of medicine at Pavia, who maintained that rubeola was a hybrid due to the fortuitous coincidence of the miasms of the two eruptions of scarlet fever and measles. A similar view was adopted by Schönlein, professor of medicine at Wurzburg, who described rubeola as a hermaphroditic affection presenting a union of the symptoms of scarlet fever and measles, as shown by the combination of a morbilliform eruption with faucial angina and of a scarlatiniform rash with bronchitis and coryza. This view of the hybrid nature of German measles, absurd as it may seem to-day, persisted until after the middle of the nineteenth century, being held by James Copland and Sir William Aitken, both eminent Fellows of this College, and Gintrac, an equally eminent physician of Bordeaux.

The first epidemic of rubella was described in 1807 by Jahn of Rudolstadt, but it was not until 1834 that the first detailed description of the disease was given by Wagner. In 1856, 1858 and 1859 Nymann saw isolated examples of the disease in St. Petersburg, where, in 1862 and 1868, he witnessed big epidemics of what he first took to be *roseola fugax aestiva*, but subsequently regarded as specific *rötheln*. The same description was given by Enko, who reported an epidemic at the Alexander School at St. Petersburg in 1880. In France the most notable upholder of the autonomy of rubella was Trousseau, who devoted a short clinical lecture to it under the title of *roséole*. On the rest of the Continent the chief writers of eminence who refused to allow rubella an independent existence, but merely regarded it as a mild form of measles, were Hebra and his disciple Kaposi, who, as we have seen, held a similar erroneous unicist doctrine regarding variola and varicella. In this country the merit of first distinguishing rubella from measles and scarlet fever is attributed by Squire to William George Maton, F.R.S., Physician Extraordinary to Queen Charlotte and a Fellow of this College. In a paper published

in our Transactions in 1819 under the title of "Some Account of a Rash Liable to be Mistaken for Scarlatina," he reported eight cases, and stated that the characteristic features of the disease were its contagious property, long incubation and enlargement of the lymphatic glands. Maton's paper, however, does not appear to have attracted much attention at the time, and it was not until over twenty years later that the German term was first introduced into this country by Paterson of Leith in a paper entitled "An Account of the R \ddot{o} theln of German Authors, together with a few Observations on the Disease as it has been seen to Prevail in Leith and its Neighbourhood." There is little doubt that some at least of Paterson's cases were really examples of scarlet fever for the following reasons: In the first place sore throat was the most constant symptom. Secondly, suppuration of the cervical glands was frequent. Thirdly, Paterson maintained that the prognosis must always be guarded, as, though it was generally a mild disease, r \ddot{o} theln was often in his experience an extremely and rapidly fatal disorder.

Before the London Congress of 1881, to which I shall refer later, few systematic writers in this country, with the exception of Dr. James Copland in his "Dictionary of Practical Medicine" (1858) and Sir William Aitken in his "Theory and Practice of Medicine" (1864), alluded to r \ddot{o} theln, which, like Hildenbrand and Sch \ddot{o} nlein, both Copland and Aitken regarded as "a hybrid disease developed from the combined poisons of scarlet fever and measles." There is no mention of the disease in Sir Thomas Watson's classical lectures, nor, as Murchison and Liveing point out in papers published in 1870 and 1874 respectively, in the nomenclature of this College to which it was not admitted until 1884.¹ The result was, as Murchison remarks, that few practitioners were

¹ The following entries appear in the Nomenclature of the College:

1884 Epidemic rose rash. Syn. R \ddot{o} theln. German measles, called by some authors Rubeola, Rubella.

1896 Rubella. Syn. R \ddot{o} theln. German measles, epidemic rose rash.

acquainted with the disease, and many had never heard of it.

The general recognition by the profession of rubella as an independent disease dates from an important meeting on its autonomy held in the Section of Diseases of Children of the Seventh International Medical Congress held in London in August, 1881. The opening papers were read by W. B. Cheadle of London, M. Kassowitz of Vienna, J. Lewis Smith of New York, G. E. Shuttleworth of Lancaster, and William Squire of London, while nine others, of whom the best known were D'Espine of Geneva, Jacobi of New York, and Charles West, the President of the Section, took part in the subsequent discussion. There was a general agreement among the speakers—for there were only two dissentients—that rubella was a distinct disease similar in some respects to, but not identical with, scarlet fever or measles. Squire identified it with the *rubeola sine catarrho* described by Willan and Bateman, but claimed that the fullest description had been given by Maton, as already stated. In spite of the remarkable unanimity expressed at this Congress as to the autonomy of rubella, some physicians of eminence and great experience in the eruptive fevers still continued to have doubts on the subject. Of these the most notable was Eduard Henoch, the well-known pædiatrist, who declared that he could not give a decisive judgment on the matter. Even as late as 1896 Theodor von Jürgensen, professor of medicine at Tübingen, stated that he held the same view as Henoch, and added that if he had to decide as to the autonomy of *rötheln* according to his own observations he would have to say unconditionally "I don't know." Perhaps even more surprising is the fact that Dr. Alexander Collie, who was for many years medical superintendent in the service of the fever hospitals

1906 German measles. Syn. Epidemic rose rash.

1917 Rubella. Syn. German measles.

1931 German measles. Syn. Rubella, Röteln. (In this year the word *röteln*, which had not figured in the Nomenclature since 1896, first appears without an h.)

of the Metropolitan Asylums Board, did not recognise the autonomy of the disease, and in the chapter on r  theln, in his text-book on fevers, merely quotes the description of Niemeyer, who states that epidemic r  theln is a modified form of scarlet fever or measles.

Next in interest and importance to the question as to the first descriptions and autonomy of rubella is that of the occurrence of severe and fatal attacks. Many of the earlier writers, especially in this country, who regarded rubella as a distinct disease, while generally agreed as to its mild character, were inclined to give a guarded prognosis. As late as 1870 Murchison, whose series probably included mild attacks of scarlet fever which are quite as liable to be followed by nephritis as severe ones, stated that the disease might be serious or fatal, and in rare instances be followed by dropsy. Edwards of Philadelphia, in 1884, while admitting that rubella was generally a mild disorder, remarked that "a disease the victims of which succumb as early as the fourth day cannot but be of sufficient importance to demand one's attention and the best efforts of our armamentarium." Owing to the frequency of pneumonia, bronchitis or enteritis among his patients probably the fatalities in his series were really due to measles.

Of the speakers in the London Congress, Cheadle alone maintained that in addition to the mild form there was another which might be extremely grave, its characteristic features being as follows: "coryza slight or absent; papular, non crescentic rash, in some cases confluent on the face and extremities, sometimes scarlatiniform there; prominent throat symptoms; absence of intestinal affection, in some cases enlargement of the glands at the angles of the jaw; with a shorter period of invasion and incubation than in ordinary measles. *The general features the same as in recognised r  theln, but certain of them increased and exaggerated.*" Since the 1881 congress, as Schick remarks, there has been a remarkable silence as regards the occurrence of severe epidemics of rubella so

as to justify the suspicion that the disease in question was not really rubella or else that it was complicated by a secondary infection.

All modern writers with extensive experience of the acute exanthemata, such as Goodall, Ker, Schick, Kolmer and Schamberg and myself, are unanimous as to the almost invariably mild course of the disease. In the few cases which were not of the usually benign type the severity was due to generalised arthritis, purpura hæmorrhagica, as in a case seen by myself, and reported by Gunn, secondary infections or other complications. In recent years numerous cases of meningitis and, more recently, of encephalitis complicating rubella have been recorded, but only one of them—a case of encephalitis reported by Motzfeldt—was fatal.

The causal organism of rubella has not yet been discovered. More than fifty years ago Edwards and Formad found micrococci in the blood, serum and white corpuscles in their cases, though to a less extent than in the blood of children with malignant measles, but they were unable to trace such direct relation to the etiology and prognosis of the disease as they had shown in the cases of measles. The more recent investigations of Sindoni and Ritossa, tending to show that the disease was due to Gram-positive cocci which could be cultivated from the blood on the Tarozzi-Noguchi medium, have not been confirmed by others.

In conclusion reference may be made to the doctrine of E. Glanzmann, professor of children's diseases at Bern, who maintains that rubella is a primary disease of the lymphatic system, and should be ranked with glandular fever in a group of benign infective lymphoblastoses in contrast with the malignant leukæmic lymphoblastoses.

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