

while not overlooking this local variation, will regard the Swallow of all these tracts as forming a single species, the *Hirundo rustica* of Linnaeus.¹ Returning, usually already paired, to its summer-haunts, after its winter-sojourn in southern lands, and generally reaching England about the first week in April, it at once repairs to its old quarters, nearly always around the abodes of men; and, about a month later, the site of the nest is chosen, resort being had in most cases to the very spot that has formerly served the same purpose—the old structure, if still remaining, being restored and refurnished. So trustful is the bird that it commonly establishes itself in any of men's works that will supply the necessary accommodation, and a shed, a barn, or any building with an open roof, a chimney² that affords a support for the nest, or even the room of an inhabited house—if chance should give free access thereto,—to say nothing of extraordinary positions, may be the place of its choice. Wheresoever placed, the nest is formed of small lumps of moist earth, which, carried to the spot in the bird's bill, are duly arranged and modelled, with the aid of short straws or slender sticks, into the required shape. This is generally that of a half-saucer, but it varies according to the exigencies of the site. The materials dry quickly into a hard crust, which is lined with soft feathers, and therein are laid from four to six white eggs, blotched and speckled with grey and orange-brown deepening into black. Two broods are usually reared in the season, and the young on leaving the nest soon make their way to some leafless bough, whence they try their powers of flight, at first accompanying their parents in short excursions on the wing, receiving from them the food themselves as yet unable to capture, until able to shift for themselves. They collect in flocks, often of many hundreds, and finally leave the country about the end of August or early in September, to be followed, after a few weeks, by their progenitors. The Swallows of Europe doubtless pass into Africa far beyond the equator,³ and those of Northern Asia, though many stop in India or Burmah, even further to the southward, occasionally reaching Australia, while those of North America extend their winter-wanderings to southern Brazil; but, whithersoever they then resort, they during that season moult their feathers, and this fact affords one of the strongest arguments against the popular belief (which, curious to say, is still partly if not fully entertained by many who should know better) of their becoming torpid in winter, for a state of torpidity would suspend all animal action.⁴ The chestnut forehead and throat, the shining steel-blue upper plumage, and the dusky-white—in some cases reddening so as almost to vie with the frontal and gular patches—of the lower parts are well known to every person of observation, as is the markedly forked tail, which is become proverbial of this bird.

¹ Dr Stejneger (one of the chief leaders in the recent American movement, the results though not the intention of which would be the subversion of much of the nomenclature of birds hitherto thought in Europe to have been established on tolerably firm principles) would apply to the Swallow the generic term of *Chelidon*, generally accepted for the MARTIN (vol. xv. p. 581), and to the latter *Hirundo*. Herein he is technically incorrect, for one of the first principles of zoological nomenclature has always been that a generic term, to be valid, must be defined. In the absence of definition such a term may be, by courtesy, occasionally accepted; but this courtesy has never been, nor except in America is likely to be, extended to the misapplication here in question.

² Hence the common English name of "Chimney-Swallow." In North America it is usually the "Barn-Swallow."

³ It must be noted that the Swallow has been observed in England in every month of the year; but its presence from the beginning of December to the middle of March is an extremely rare occurrence.

⁴ See John Hunter's *Essays and Observations in Natural History*, edited by Sir R. Owen in 1861 (ii. p. 280). An excellent bibliography of the Swallow-torpidity controversy, up to 1878, is given by Prof. Coues (*Birds of the Colorado Valley*, pp. 878-390), who seems still to hanker after the ancient faith in "hibernation."

Taking the word Swallow in a more extended sense, it is used for all the members of the Family *Hirundinidae*,⁵ excepting a few to which the name MARTIN (vol. xv. p. 581) has been applied, and this Family includes from 80 to 100 species, which have been placed in many different genera. The true Swallow has very many allies, some of which range almost as widely as itself does, while others seem to have curiously restricted limits, and much the same may be said of several of its more distant relatives. But altogether the Family forms one of the most circumscribed and therefore one of the most natural groups of *Oscines*, having no near allies; for, though in outward appearance and in some habits the Swallows bear a considerable resemblance to SWIFTS (*q.v.*), the latter belong to a very different Order, and are not Passerine birds at all, as their structure, both internal and external, proves. It has been sometimes stated that the *Hirundinidae* have their nearest relations in the FLYCATCHERS (vol. ix. p. 351); but the assertion is very questionable, and the supposition that they are allied to the *Ampelidae* (*cf.* WAXWING), though possibly better founded, has not as yet been confirmed by any anatomical investigation. An affinity to the Indian and Australian *Artamus* (the species of which genus are often known as Wood-Swallows, or Swallow-Shrikes) has also been suggested; and it may turn out that this genus, with its neighbours, may be the direct and less modified descendants of a generalized type, whence the *Hirundinidae* have diverged; but at present it would seem as if the suggestion originated only in the similarity of certain habits, such as swift flight and the capacity of uninterruptedly taking and swallowing insect-food on the wing.

Swallows are nearly cosmopolitan birds, inhabiting every considerable country except New Zealand, wherein only a stray example, presumably from Australia, occasionally occurs. (A. N.)

SWAMMERDAM, JOHN (1637-1680), may be ranked almost with Leeuwenhoek as one of the most eminent Dutch naturalists of the 17th century. Born at Amsterdam in 1637, the son of an apothecary and naturalist, he was destined for the church; but he insisted on passing over to the profession of medicine, meanwhile passionately devoting himself to the study of insects. Having necessarily to interest himself in human anatomy, he devoted much attention to the preservation and better demonstration of the various structures, and he devised the method of studying the circulatory system by means of injections, so doing the greatest service to practical anatomy. The fame of his collection soon became European; thus the grand-duke of Tuscany offered him 12,000 florins for his collection, on condition of his coming to Florence to continue it. His *General History of Insects* and other kindred works lie at the foundation of modern entomology, and include many important discoveries. Thus he cleared up the subject of the metamorphosis of insects, and in this and other ways laid the beginnings of their natural classification, while his researches on the anatomy of mayflies and bees were also of fundamental importance. His devotion to science led to his neglect of practice; his father greatly resented this, and stopped all supplies; and thus Swammerdam experienced a period of considerable privation, which had the most unfortunate consequences to his health, both bodily and mental. In 1675 he published his *History of the Ephemera*, and in the same year his father died, leaving him an adequate fortune, but the mischief was irreparable. He became a hypocondriac and mystic, joined the followers of Antoinette Bourignon, and died at Amsterdam in 1680.

SWAN (A.-S. *Swan* and *Swon*, Icel. *Svanr*, Dutch *Zwaan*, Germ. *Schwan*), a large swimming-bird, well known from being kept in a half-domesticated condition throughout many parts of Europe, whence it has been carried to

⁵ An enormous amount of labour has been bestowed upon the *Hirundinidae* by Mr Sharpe (*Cat. B. Br. Museum*, x. pp. 85-210), only commensurate, perhaps, with that required for an understanding of the results at which he has arrived. Nothing can better shew the difficulty of unravelling the many puzzles which the Family offers than this; and it is to be hoped that in his finely-illustrated *Monograph* which is now in course of publication he will succeed in clearing up some of them.

other countries. In England it was far more abundant formerly than at present, the young, or Cygnets,¹ being highly esteemed for the table, and it was under especial enactments for its preservation, and regarded as a "Bird Royal" that no subject could possess without licence from the crown, the granting of which licence was accompanied by the condition that every bird in a "game" (to use the old legal term) of Swans should bear a distinguishing mark of ownership (*cygninota*) on the bill. Originally this privilege was conferred on the larger freeholders only, but it was gradually extended, so that in the reign of Elizabeth upwards of 900 distinct Swan-marks, being those of private persons or corporations, were recognized by the royal Swanherd, whose jurisdiction extended over the whole kingdom. It is impossible here to enter into further details on this subject, interesting as it is from various points of view.² It is enough to remark that all the legal protection afforded to the Swan points out that it was not indigenous to the British Islands, and indeed it is stated (though on uncertain authority) to have been introduced to England in the reign of Richard Cœur de Lion; but it is now so perfectly naturalized that birds having the full power of flight remain in the country. There is no evidence to shew that its numbers are ever increased by immigration from abroad, though it is known to breed as a wild bird not further from our shores than the extreme south of Sweden and possibly in Denmark, whence it may be traced, but with considerable vacuities, in a southerly direction to the valley of the Danube and the western part of Central Asia. In Europe, however, no definite limits can be assigned for its natural range, since birds more or less reclaimed and at liberty consort with those that are truly wild, and either induce them to settle in localities beyond its boundary, or of themselves occupy such localities, so that no difference is observable between them and their untamed brethren. From its breeding-grounds, whether they be in Turkestan, in south-eastern Europe, or Scania, the Swan migrates southward towards winter, and at that season may be found in north-western India (though rarely), in Egypt, and on the shores of the Mediterranean.

The Swan just spoken of is by some naturalists named the Mute or Tame Swan, to distinguish it from one to be presently mentioned, but it is the Swan simply of the English language and literature. Scientifically it is usually known as *Cygnus olor* or *C. mansuetus*. It needs little description: its large size, its spotless white plumage, its red bill, surmounted by a black knob (technically the "berry") larger in the male than in the female, its black legs and stately appearance on the water are familiar, either from figures innumerable or from direct observation, to almost every one. When left to itself its nest is a large mass of aquatic plants, often piled to the height of a couple of feet and possibly some six feet in diameter. In the midst of this is a hollow which contains the eggs, generally from five to nine in number, of a greyish-olive colour. The period

¹ Here, as in so many other cases, we have what may be called the "table-name" of an animal derived from the Norman-French, while that which it bore when alive was of Teutonic origin.

² At the present time the Queen and the Companies of Dyers and Vintners still maintain their Swans on the Thames, and a yearly expedition is made in the month of August to take up the young birds—thence called "Swan-apping" and corruptly "Swan-hopping"—and mark them. The largest Swannery in England, indeed the only one worthy of the name, is that belonging to Lord Ilchester, on the water called the Fleet, lying inside the Chesil Bank on the coast of Dorset, where from 700 to double that number of birds may be kept—a stock doubtless too great for the area, but very small when compared with the numbers that used to be retained on various rivers in the country. The Swanpit at Norwich seems to be the only place now existing for fattening the Cygnets for the table—an expensive process, but one fully appreciated by those who have tasted the results. The English Swan-laws and regulations have been concisely but admirably treated by the late Sergeant Manning (*Penny Cyclopædia*, xxiii. pp. 271, 272), and the subject of Swan-marks, elucidated by unpublished materials in the British Museum and other libraries, is one of which a compendious account, from an antiquarian and historical point of view, would be very desirable.

of incubation is between five and six weeks, and the young when hatched are clothed in sooty-grey down, which is succeeded by feathers of dark sooty-brown. This suit is gradually replaced by white, but the young birds are more than a twelvemonth old before they lose all trace of colouring and become wholly white.

It was, however, noticed by Plot (*N. H. Staffordshire*, p. 228) 200 years and more ago that certain Swans on the Trent had white Cygnets; and it was subsequently observed of such birds that both parents and progeny had legs of a paler colour, while the young had not the "blue bill" of ordinary Swans at the same age that has in some parts of the country given them a name, besides offering a few other minor differences. These being examined by Yarrell led him to announce (*Proc. Zool. Society*, 1838, p. 19) the birds presenting them as forming a distinct species, *C. immutabilis*, to which the English name of "Polish" Swan had already been attached by the London poulterers.³ There is no question so far as to the facts; the doubt exists as to their bearing in regard to the validity of the so-called "species." Though apparently wild birds, answering fairly to the description, occasionally occur in hard winters in Britain and some parts of the European Continent,⁴ their mother country has not yet been ascertained,—for the epithet "Polish" is but fanciful,—and most of the information respecting them is derived only from reclaimed examples, which are by no means common. Those examined by Yarrell are said to have been distinctly smaller than common Swans, but those recognized of late years are as distinctly larger. The matter requires much more investigation, and it may be remarked that occasionally Swans, so far as is known of the ordinary stock, will produce one or more Cygnets differing from the rest of the brood exactly in the characters which have been assigned to the so-called Polish Swans as specific—namely, their white plumage slightly tinged with buff, their pale legs, and flesh-coloured bill. It may be that here we have a case of far greater interest than the mere question of specific distinction,⁵ in some degree analogous, but yet in an opposite direction, to that of the so-called *Pavo nigricornis* before mentioned (PEACOCK, vol. xviii. p. 443).

Thus much having been said of the bird which is nowadays commonly called Swan, and of its allied form, we must turn to other species, and first to one that anciently must have been the exclusive bearer in England of the name. This is the Whooper, Whistling, or Wild Swan⁶ of modern usage, the *Cygnus musicus* or *C. ferus* of most authors, which was doubtless always a winter-visitant to this country, and, though nearly as bulky and quite as purely white in its adult plumage, is at once recognizable from the species which has been half domesticated by its wholly different but equally graceful carriage, and its bill—which is black at the tip and lemon-yellow for a great part of its base. This entirely distinct species is a native of Iceland, eastern Lapland, and northern Russia, whence it wanders southward in autumn, and the musical tones it utters (contrasting with the silence that has caused its relative to be often called the Mute Swan) have been celebrated from the time of Homer to our own. Otherwise in a general way there is little difference between the habits of the two, and very closely allied to the Whooper is a much smaller species, with very well marked characteristics, known as Bewick's Swan, *C. bewicki*. This was first indicated as a variety of the last by Pallas, but its specific validity is now fully established. Apart from size, it may be externally distinguished from the Whooper by the bill having only a small patch of yellow, which inclines to an orange rather than a lemon tint; while internally the difference of the vocal organs is well marked, and its cry, though melodious enough, is unlike. It has a more easterly home in the north than the Whooper, but in winter not unfrequently occurs in Britain.

Both the species last mentioned have their representatives in North America, and in each case the trans-Atlantic bird is considerably larger than that of the Old World. The first is the Trumpeter-Swan, *C. buccinator*, which has the bill wholly black, and the second the *C. columbianus* or *americanus*⁷—greatly resem-

³ M. Gerbe, in his edition of Degland's *Ornithologie Européenne* (ii. p. 477), makes the amusing mistake of attributing this name to the "fourreurs" (furriers) of London, and of reading it "Cygne du pôle" (polar, and not Polish, Swan)!

⁴ Chiefly in the north-west, but Lord Lilford has recorded (*Ibis*, 1860, p. 351) his having met with them in Corfu and Epirus.

⁵ The most recent authorities on the Polish Swan are Stevenson, in separately-printed advance sheets (1874) of his *Birds of Norfolk* (vol. iii.), and Southwell (*Trans. Norfolk & Norwich Nat. Society*, ii. pp. 253-260), as well, of course, as Dresser (*B. Europe*, vi. pp. 429-433, pl. 419, figs. 1, 2).

⁶ In some districts it is called by wild-fowlers "Elk," which perhaps may be cognate with the Icelandic *Alft* and the Old German *Elbs* or *Elps* (*cf.* Gesner, *Ornithologia*, pp. 358, 359), though by modern Germans *Elb-schwan* seems to be used for the preceding species.

⁷ Examples of both these species have been recorded as occurring in Britain, and there can be little doubt that the first has made its way hither. Concerning the second more precise details are required.

bling Bewick's Swan, but with the coloured patches on the bill of less extent and deepening almost into scarlet. South America produces two very distinct birds commonly regarded as Swans,—the Black-necked Swan and that which is called *Cascaroba* or *Coscoroba*. This last, which inhabits the southern extremity of the continent to Chili and the Argentine territory, and visits the Falkland Islands, is the smallest species known,—pure white in colour except the tip of its primaries, but having a red bill and red feet.¹ The former, *C. melanocorypha* or *nigricollis*, if not discovered by earlier navigators, was observed by Narbrough 2d August 1670 in the Strait of Magellan, as announced in 1694 in the first edition of his *Voyage* (p. 52). It was subsequently found on the Falkland Islands during the French settlement there in 1764–65, as stated by Pernetty (*Voyage*, ed. 2, ii. pp. 26, 99), and was first technically described in 1782 by Molina (*Saggio sulla Stor. Nat. del Chile*, pp. 234, 344). Its range seems to be much the same as that of the *Coscoroba*, except that it comes further to the northward, to the coast of southern Brazil on the east, and perhaps into Bolivia on the west. It is a very handsome bird, of large size, with a bright red nasal knob, a black neck, and the rest of its plumage pure white. It has been introduced into Europe, and breeds freely in confinement.

A greater interest than attaches to the South-American birds last mentioned is that which invests the Black Swan of Australia. Considered for so many centuries to be an impossibility, the knowledge of its existence seems to have impressed (more perhaps than anything else) the popular mind with the notion of the extreme divergence—not to say the contrariety—of the organic products of that country. By a singular stroke of fortune we are able to name the precise day on which this unexpected discovery was made. The Dutch navigator Willem de Vlaming, visiting the west coast of Zuidland (Southland), sent two of his boats on the 6th of January 1697 to explore an estuary he had found. There their crews saw at first two and then more Black Swans, of which they caught four, taking two of them alive to Batavia; and Valentyn, who several years later recounted this voyage, gives in his work² a plate representing the ship, boats, and birds, at the mouth of what is now known from this circumstance as Swan River, the most important stream of the thriving colony of West Australia, which has adopted this very bird as its armorial symbol. Valentyn, however, was not the first to publish this interesting discovery. News of it soon reached Amsterdam, and the burgo-master of that city, Witsen by name, himself a fellow of the Royal Society, lost no time in communicating the chief facts ascertained, and among them the finding of the Black Swans, to Martin Lister, by whom they were laid before that society in October 1698, and printed in its *Philosophical Transactions* (xx. p. 361). Subsequent voyagers, Cook and others, found that the range of the species extended over the greater part of Australia, in many districts of which it was abundant. It has since rapidly decreased in numbers, and will most likely soon cease to exist as a wild bird, but its singular and ornamental appearance will probably preserve it as a modified captive in most civilized countries, and perhaps even now there are more Black Swans in a reclaimed condition in other lands than are at large in their mother-country. The species scarcely needs description: the sooty black of its general plumage is relieved by the snowy white of its flight-feathers and its coral-like bill banded with ivory.

The *Cygninae* admittedly form a well-defined group of the Family *Anatidae*, and there is now no doubt as to its limits, except in the case of the *Cascaroba* above mentioned. This bird would seem to be, as is so often found in members of the South-American fauna, a more generalized form, presenting several characteristics of the *Anatinae*, while the rest, even its Black-necked compatriot and the almost wholly Black Swan of Australia, have a higher morphological rank. Excluding from consideration the little-known *C. davidi*, of the five or six³ species of the

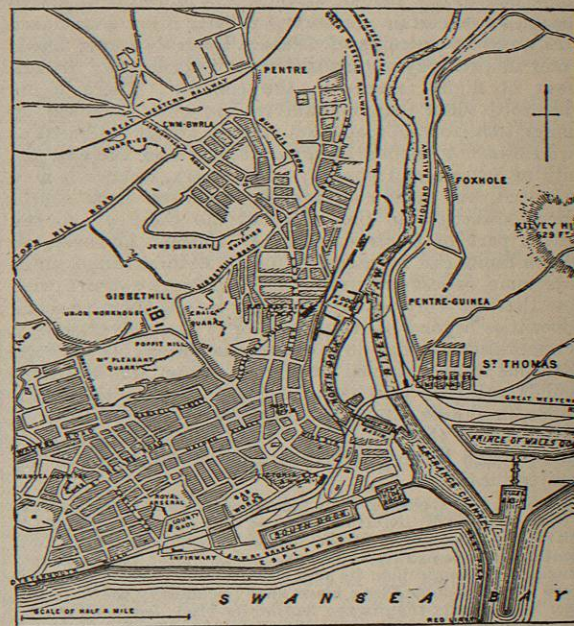
¹ Dr Stejneger (*Proc. U. S. Nat. Museum*, 1882, pp. 177–179) has been at much pains to shew that this is no Swan at all, but merely a large Anatine form. Further research may prove that his views are well founded, and that this, with another very imperfectly known species, *C. davidi*, described by Swinhoe (*Proc. Zool. Society*, 1870, p. 430) from a single specimen in the Museum of Peking, should be removed from the Sub-Family *Cygninae*. Of *C. coscoroba* Mr Gibson remarks (*Ibis*, 1880, pp. 36, 37) that its "note is a loud trumpet-call," and that it swims with "the neck curved and the wings raised after the true Swan model."

² Commonly quoted as *Oud en Nieuw Oost Indiën* (Amsterdam, 1726). The incidents of the voyage are related in Deel iii. Hoofdst. iv. (which has for its title Description of Banda) pp. 68–71.

³ The *C. univini* doubtfully described by Mr Hume (*Ibis*, 1871, pp. 412, 413) from India, though recognized by Dr Stejneger (*ut supra*), seems to be only the immature of the Mute Swan.

Northern hemisphere four present the curious character, somewhat analogous to that found in certain CRANES (vol. vi. p. 546), of the penetration of the sternum by the trachea nearly to the posterior end of the keel, whence it returns forward and upward again to revert and enter the lungs; but in the two larger of these species, when adult, the loop of the trachea between the walls of the keel takes a vertical direction, while in the two smaller the bend is horizontal, thus affording an easy mode of recognizing the respective species of each.⁴ Fossil remains of more than one species of Swan have been found. The most remarkable is *C. falconeri*, which was nearly a third larger than the Mute Swan, and was described from a Maltese cave by Prof. Parker in the *Zoological Transactions* (vi. pp. 119–124, pl. 30). (A. N.)

SWANSEA, a municipal and parliamentary borough and large seaport of Glamorganshire, South Wales, is finely situated in an angle between lofty hills, on the river Tawe,



Plan of Swansea.

near its mouth in the beautiful Swansea Bay, a recess of the Bristol Channel, and on the Great Western, London and North-Western, Midland, and Rhondda and Swansea Bay railway lines, 45 miles west-north-west of Cardiff. Being for the most part of comparatively modern growth, the streets are laid out with great regularity. Swansea retains few traces of antiquity, and some of its more picturesque features have been destroyed to make room for the construction of docks. Of the old castle,

⁴ The correct scientific nomenclature of the Swans is a matter that offers many difficulties, but they are of a kind far too technical to have any interest for the general reader. Dr Stejneger, in his learned "Outlines of a Monograph" of the group (*ut supra*), has employed much research on the subject, with the result (which can only be deemed unhappy) of upsetting nearly all other views hitherto existing, and propounding some which few ornithologists outside of his adopted country are likely to accept, since the principles on which he has gone are not those commonly received, nor (it may perhaps be added) are based on common sense. In the text, as above written, care has been taken to use names which will cause little if any misunderstanding, and this probably is all that can be said in the present state of confusion.

originally founded in 1099 by Henry Beauchamp, earl of Warwick, to secure possession of his lands in the province of Gower, the principal remains are the keep, built by Bishop Gower of St David's after the castle had been for some time in ruins, a range of arched dungeons lit by loopholes, and the hall, now fitted up for use as a volunteer drill hall. There are fragments of a wall with a Gothic window of the hospital of St David, founded by Bishop Gower in 1331. The church of St Mary's, founded by the same bishop, was rebuilt in 1739, with the exception of the tower and chancel. The modern public buildings include the guildhall, in the Italian style with Corinthian pillars and pilasters, erected in 1846, and comprehending the municipal offices, the crown and *nisi prius* courts, the council chamber, and the library of the Swansea and Neath Incorporated Law Society; the royal institution of South Wales, established 1835, a building in the Ionic style, and embracing a library, a lecture hall, and a museum of geology, mineralogy, natural history, and antiquities; the free public library, schools of art, and art gallery, a fine new building with about 30,000 volumes (including the library of the Rev. Rowland Williams, one of the authors of *Essays and Reviews*) and a large number of beautiful engravings; the grammar school, founded by Hugh Gore, bishop of Waterford, in 1682; the market (1830); the cattle market (1864); the Albert hall for concerts (1864), with a smaller hall erected in 1881; the agricultural hall; the working men's club (1875); the Prince of Wales hall (1882); and two theatres. The benevolent institutions include the general hospital, founded in 1817, and rebuilt with the addition of two wings in 1878; the Cambrian institution for the deaf and dumb, founded in 1847, and several times extended; the Swansea and South Wales institute for the blind (1865); the nursing institution (1853); the provident dispensary (1876); the eye hospital (1878); the industrial home (1859); and the sailors' home (1864). Swansea is specially well supplied with parks and recreation grounds. They include Brynmill grounds between Parkwern and Singleton (1872), 9 acres in extent, and containing a beautiful reservoir and ornamental lawns; Cwn-donkin park, on the uplands, 13 acres, and commanding fine views; the new recreation ground, formed in 1883, 11 acres, situated between Brynmill and the Oystermouth road; Park Llewelyn, to the north of Swansea, 40 acres; and the St Helen's Field, near the beach, about 20 acres, now being laid out. The population of the municipal borough (area 4363 acres) in 1871 was 51,702, and in 1881 it was 65,597. The population of the parliamentary borough in 1881 was 73,971. Its area then was 4777 acres, but in 1885, when Swansea received independent representation, the area was diminished, the population of this smaller area being 50,043 in 1881.

Swansea owes its prosperity to its situation in the neighbourhood of extensive collieries and to its possession of great natural advantages as a harbour. With some exaggeration it has been called the "metallurgical centre of the world," but the title must at least be allowed in reference to copper, which is imported to at least from all parts of the world. The smelting of copper, which has been carried on in the district from the time of Elizabeth, is the distinctive and most important industry of the town, the others including tinplate manufacture, lead smelting, spelter and zinc manufacture, the extraction and manufacture of silver, nickel, and cobalt, iron smelting, Siemens steel manufacture, the manufacture of chemicals, of agricultural manure, and of patent fuel, and the construction of railway carriages and waggons. In Swansea Bay there are valuable oyster fisheries. The earliest harbour works on a large scale were those of the South Dock Company, begun in 1847 and opened in 1859. This dock, which has an area of about 13 acres, with a half-tide basin of 4 acres and a lock 300 feet long by 60 feet wide, is used principally for the export of coal. The north dock, completed in 1882, has an area of about 10½ acres, in addition to several other smaller docks. An important addition was made by the completion of the Prince of Wales Dock in October 1881, with an area of 23 acres; and as yet this additional accommo-

dation is more than sufficient for the trade of the port. In 1876 the number of sailing and steam vessels that entered with cargoes and in ballast from foreign countries, British possessions, and coastwise was 7799, of 1,068,062 tons; the number that cleared being 7549, of 1,041,078 tons. In 1885 the entrances were 7447, of 1,461,218 tons, the clearances 7051, of 1,366,117 tons. The total average value of the imports of foreign and colonial produce during the five years ending 1885 was about £2,400,000, but has been decreasing; and the total average value of the exports of the produce of the United Kingdom was about £1,500,000, but has been steadily increasing, and has reached over £2,000,000. There is a large trade with France, Portugal, Spain, and the Mediterranean ports. There is also considerable trade with South Africa, and the trade is greater with South than with North America. The exports consist chiefly of the various manufactures of the town, especially tin plates, the direct trade in which between Swansea and American ports has within the last two years attained great importance; and the imports include chiefly metallic ores, timber, and various kind of provisions. Shipbuilding and ship-repairing are carried on, but the industry is of minor importance.

Swansea owes its origin to the erection of the castle in 1099 by Henry Beauchamp, earl of Warwick, who introduced into it a garrison of English and Flemish colonists. The fortress was frequently assaulted in the 12th and 13th centuries, and in 1260 was burned down by Llewelyn ab Grwydd, last prince of North Wales. During the insurrection of Owen Glendower against Henry IV. it was again destroyed. Swansea was created a borough by a charter of King John, which is said to be preserved among the records of the Tower of London. The earliest charter in possession of the corporation is that granted by Henry III. in 1234, conferring upon it freedom from toll pontage and other customs. Its privileges were confirmed by Edward II. and Edward III. The town was during the Civil War alternately in the hands of both parties, but in 1647 the castle was dismantled by the Parliamentarians, after which Oliver Cromwell was made lord of Swansea, of the signiory of Gower, and of the manor of Kelvey. The corporation now consists of a mayor, 6 aldermen, and 18 councillors, and the borough has a commission of the peace. From the reign of Henry VIII. it contributed along with other boroughs to return a member to parliament. In 1658 it received a charter from Cromwell permitting it to return a member for itself, but after the Restoration it resumed its character as contributory. In 1832 it became the head of a new district of boroughs, and in 1885 it received separate representation, while a portion of its area was also included in a district of boroughs to which it gives the name. In the reign of Edward IV. the castle came by marriage to the Somerset family, and it is held by the duke of Beaufort, whose title of Baron Herbert of Gower dates from 1506.

SWARTZ, OLOF (1760–1818), a celebrated Swedish botanist, was born in 1760. He commenced his botanical studies in Upsala, under Linnæus and Thunberg, and began early to make excursions. He made a voyage to America in 1783, visited England in 1788, returned to Sweden in 1789, and was made professor of natural history in Stockholm. He was the author of many systematic works, and largely extended our knowledge of both flowering plants and cryptogams. He died in 1818.

See Sachs, *Geschichte d. Botanik*.

SWATOW (also, less frequently, SWARTOW and SHANTOW), a port of China, in the province of Kwang-tung, opened to foreign trade in 1869. It is situated at the mouth of the main branch of the river Han, which 30 miles inland flows past the great city of Chow-chu or Tai-chu (Tie-chu), and the surrounding country is more populous and full of towns and villages than any other part of the province. English merchants settled on Double Island in the river as early as 1856; but the city, which is built on ground but recently recovered from the sea, was formerly a mere fishing village. The trade of the port has rapidly increased. In 1869 718 vessels of all nations entered or cleared (of 310,500 tons burden), in 1884 1387 vessels (1,282,936 tons)—the total value of the trade being respectively £4,800,000 and £5,519,772. The surrounding country is a great sugar-cane district producing annually about 2,000,000 piculs (= 133½ lb) of sugar, and there is an extensive refinery in the town employing upwards of 600 workmen and possessing a reservoir for 7,000,000 gallons of water. Next in value comes the manufacture of bean-cake, which is also imported in large quanti-

ties from New-chwang, Chefoo, Shanghai, Amoy, and Hong-Kong (total import in 1874, 1,408,384 piculs; in 1884, 2,539,710). Among the leading exports are tea (since about 1872); grass-cloth, manufactured at Swatow from so-called Taiwan hemp (the fibre of the *Boehmeria nivea* from Formosa); pine-apple cloth, manufactured in the villages about Kieh-Yang (a town 22 miles distant); oranges, for which the district is famous; cheap fans; and pewter, iron, and tin wares. Swatow is also a great emigration port. In 1870 about 22,000 Chinese embarked there for Singapore, Bangkok, and Saigon; and the number of emigrants has since increased so that British vessels alone carry 50,000 to 53,000 per annum. Of the whole foreign trade of the port upwards of 83 per cent. is in British bottoms, the trade with Hong-Kong being of especial importance. The population of Swatow is upwards of 30,000. In 1874 the foreign residents numbered 147 (63 British), including Double Island.

About 1865 the whole Swatow district was still divided into a number of "independent townships, each ruled by its own headmen," and the population was described in the official gazetteer as "generally rebellious and wicked in the highest degree." Mr Forrest, British consular agent, relates that in that year he was witness to the preparations for a fight between the people living on the opposite sides of the estuary, which was only prevented by an English war-vessel. The Taipings swept over the country, and by their ravages and plundering did much to tame the independence of the clans. The punishment inflicted in 1869 by Commander Jones on the inhabitants of Otingpui (Ou-ting-pai), about 8 miles from Swatow, for the attack they had made on the boats of H.M.S. "Cockchafer," showed the Chinese authorities that such piratical villages were not so strong as had been supposed. General Fang (a native of Chow-chu-fu) was sent to reduce the district to order, and he carried out his instructions with remorseless rigour.

SWEAT. See NUTRITION, vol. xvii. p. 685.

SWEATING-SICKNESS. A remarkable form of disease, not known in England before, attracted attention at the very beginning of the reign of Henry VII. It was known indeed a few days after the landing of Henry at Milford Haven on August 7, 1485, as there is clear evidence of its being spoken of before the battle of Bosworth on August 22. Soon after the arrival of Henry in London on August 28 it broke out in the capital, and caused great mortality. Two lord mayors successively and six aldermen, beside numerous other persons, died in one week. At the end of October, however, the epidemic in London suddenly ceased. In Oxford it had already begun at the end of August, and lasted with great mortality for six weeks. In the course of the autumn it attacked various places, and by the end of December had spread over all England. Then the epidemic disappeared as suddenly as it came. This alarming malady soon became known as the sweating-sickness. It was regarded as being quite distinct from the plague, the pestilential fever, or other epidemics previously known, not only by the special symptom which gave it its name, but also by its extremely rapid and fatal course and by other characters to be noted presently.

From 1485 nothing more was heard of it till 1507, when the second outbreak occurred, which was much less fatal than the first (it is said because the treatment was better understood) and attracted less notice. In 1517 was a third and much more severe epidemic. It began in London in July, and lasted till the middle of December. Many distinguished persons died, including Lord Clinton, Lord Grey of Wilton, Andrea Ammonio, the king's secretary, and others, with an immense number of the common people. In Oxford and Cambridge it was also very fatal, as well as in other towns, where in some cases half the population are said to have perished. There is evidence of the disease having spread to Calais and Antwerp, but with these exceptions it was confined to England.

In 1528 the disease recurred for the fourth time, and

with great severity. It first showed itself in London at the end of May, and speedily spread over the whole of England, though not into Scotland or Ireland. In London the mortality was very great; the court was broken up, and Henry VIII. left London, frequently changing his residence. When the epidemic ceased cannot be accurately stated, nor have we any precise estimate of the mortality. The most remarkable fact about this epidemic is that for the first and last time it spread over the Continent. On the 25th July 1528 (English style) or 1529 (Roman style), when it was beginning to decline in London, it suddenly appeared at Hamburg. The story went that the infection was brought by a ship returning from England, the sailors of which were suffering from the disease. However this may have been, the disease spread rapidly, so that in a few weeks more than a thousand persons died. In less than a week it had spread to Lübeck, and thus was the terrible sweating-sickness started on a destructive course, during which it caused fearful mortality throughout eastern Europe. France, Italy, and the southern countries were spared. It spread much in the same way as cholera, passing, in one direction, from north to south, arriving at Switzerland in December, in another northwards to Denmark, Sweden, and Norway, also eastwards to Lithuania, Poland, and Russia, and westwards to Flanders and Holland, unless indeed the epidemic, which declared itself simultaneously at Antwerp and Amsterdam on the morning of September 27, came from England direct. In each place which it affected it prevailed for a short time only, —generally not more than a fortnight. By the end of the year it had entirely disappeared, except in eastern Switzerland, where it lingered into the next year; and the terrible "English sweat" has never appeared again, at least in the same form, on the Continent.

England was, however, destined to suffer from one more outbreak of the disease, which occurred in 1551, and with regard to this we have the great advantage of an account by an eye-witness, John Kaye or Caius, the eminent physician. It first appeared at Shrewsbury on April 13, and, after spreading to other towns in Wales and in the midland counties, broke out in London, causing in one week the death of seven hundred and sixty-one persons. At the end of July it ceased in London, but it went through the east of England to the north, until the end of August, when it began to diminish. At the end of September it ceased altogether, without affecting Scotland or Ireland. Nor did it apparently widely affect the Continent, though Caius mentions its occurrence at Calais, and Brasavolus (*De Morbo Gallico*) speaks of the English sweating-sickness as raging in Flanders in the year 1551, in which he wrote, causing the death of several thousand persons, and lasting at least till September.

Symptoms.—The symptoms as described by Caius and others were as follows. The disease began very suddenly with a sense of apprehension, followed by cold shivers (sometimes very violent), giddiness, headache, and severe pains in the neck, shoulders, and limbs, with great prostration,—in short, the usual symptoms of an acute febrile attack. In some cases the stomach was affected, and there was vomiting, but according to Caius this happened only in those who were full of food. The breathing was deep and frequent, the voice like a moan. After the cold stage, which might last from half an hour to three hours, followed the stage of heat and sweating. The characteristic sweat broke out suddenly, and, as it seemed to those unaccustomed to the disease, without any obvious cause. In some cases it was much more copious than in others, these differences depending, according to Caius, mainly on age, clothing, food, and other external circumstances, and also on the season, sweating being more profuse in hot weather. With the sweat, or after that was poured out, came a sense of heat, and with this headache and delirium, rapid pulse, and intense thirst. Palpitation and pain in the heart were frequent symptoms. No

¹ Guggenbühl, *Der englische Schweiß in der Schweiz*, Lichtensteig, 1838.

eruption of any kind on the skin was generally observed; Caius makes no allusion to such a symptom. In the later stages there was either general prostration and collapse, or an irresistible tendency to sleep, which was thought to be fatal if the patient were permitted to give way to it. The malady was remarkably rapid in its course, being sometimes fatal even in two or three hours, and some patients died in less than that time. More commonly it was protracted to a period of twelve to twenty-four hours, beyond which it rarely lasted. Those who survived for twenty-four hours were considered safe.

The disease, unlike the plague, was not especially fatal to the poor, but rather, as Caius affirms, attacked the richer sort and those who were free livers according to the custom of England in those days.—"They which had this sweat sore with peril or death were either men of wealth, ease, or welfare, or of the poorer sort, such as were idle persons, good ale drinkers, and tavern haunters."

Relapses were not uncommon; but the statements sometimes made about the disease attacking the same person several times seem to rest on a misunderstanding of the original authorities. What is meant is that they had several, even twelve, successive attacks of sweating. The disease was not thought to be transmitted by contagion from one person to another. Nevertheless, in its spread, it appears, like cholera, to have followed the main lines of human travel and traffic,—passing with Richmond's army to Bosworth, thence to London, and so on. It would be difficult otherwise to explain why Calais should have been affected and not the adjacent parts of France. Even the very circumstantial story of the disease having been brought to Hamburg by a ship from England seems by no means incredible, though it is doubted by some.

Causes.—Some attributed the disease to the English climate, its moisture and its fogs, a view which was thought to be supported by the occurrence of unusual rainfall and atmospheric moisture in the years of the sweating-sickness. But it is plain that the English climate was much the same before and after, and can hardly be regarded even as a predisposing cause, certainly not as an explanation. Nor is there much evidence that the epidemic years were distinguished for their humidity.

In 1485, 1507, and 1517 the seasons were in no way remarkable. The year 1528 (1529 in Continental reckoning) was, however, certainly notable for excessive moisture. In England eight weeks continuous rain began in April, and the harvest was spoiled. In Germany the copious rainfall, and the cold fogs which endured through the summer, gave the impression that the air of England had been carried over to the Continent. In 1551 the outbreak of the sickness in Shrewsbury is described as having been preceded by dense and stinking fogs, which arose from the valley of the Severn and spread over other parts of England. The summer was everywhere very hot, and in England moist as well. In Amsterdam a similar fog announced the outbreak of the sickness in 1528. But we cannot attribute much importance to these circumstances, since in other epidemics they were wanting, and similar conditions have often occurred without any pestilence resulting.

It was again attributed by some to the intemperate habits of the English people, and to the frightful want of cleanliness in their houses and surroundings which is noticed by Erasmus in a well-known passage, and about which Caius is equally explicit. But causes such as these cannot, any more than climate, account for the incidence in time of an epidemic, even if they do something towards explaining its geographical range. Nor is there much evidence that the English were worse in these respects than most European nations, though the native country of Erasmus may have set an early example of cleanliness.

Caius and some of the chroniclers make out that this special liability of Englishmen to the sweating-sickness followed them even into foreign parts, so that in Calais, Brabant, and Spain it affected the English only and not the natives. This is puzzling and improbable, except so far that the English abroad may have belonged to the same classes who mainly suffered at home. But a careful examination of those statements shows that they referred either to Englishmen who had left England while the disease was raging there and carried the infection with them, or to merchants and others who were in direct communication with home. This disease, like others introduced into a foreign country, did not always take root there. But it did so sometimes, as, according to contemporary evidence, was the case in Flanders in 1551. The statement also made that foreigners in England were not affected likewise requires qualification, since we know several instances of foreigners in London who died of it. On the whole, no great importance can be attached to this supposed special liability of the English physical constitution.

From all this we must conclude that climate, season, and manner of life were not adequate, either separately or collectively, to produce the disease, though each may have acted sometimes as a predisposing cause. The sweating-sickness was in fact, to use modern language, a specific infective disease, in the same sense as plague, typhus, scarlatina, or ague. The origin of such diseases is not

explained by causes such as those above enumerated. We can only suppose that they come into being by laws similar to those which have determined the evolution of species of animals and plants. But when once their specific distinctness is established they "breed true" and always present the same characters.

Probable Identity with Miliary Fever.—The important question, however, arises—Did this specific disease exist before or has it existed after the sixty-six years of its recognized history? or is it identical with any other known disease called by another name? It is very unlikely that any epidemic of so striking a disease should have existed before without having been noticed, and there is certainly no record since of any outbreak precisely similar. The only disease of modern times which bears any resemblance to the sweating-sickness is that known as miliary fever ("Schweissfriesel," "suette miliaryre," or "the Picardy sweat"), a malady which has been repeatedly observed in France, Italy, and Southern Germany, but not in the United Kingdom. It is characterized by intense sweating, and occurs in limited epidemics, not lasting in each place more than a week or two (at least in an intense form). On the other hand, the attack lasts longer than the sweating-sickness did, is always accompanied by an eruption of vesicles, and is not usually fatal. It is therefore evidently not the same as the English disease, though allied to it. The first clearly described epidemic was in 1718 (though probably it existed before), and the last in 1861. Between these dates some one hundred and seventy-five epidemics have been counted in France alone. A single epidemic of a disease which had a striking resemblance to the sweating-sickness was observed in 1802 at Rottingen, a village in the district of Würzburg, Germany. Its access was sudden; it affected chiefly robust persons; it was accompanied by profuse perspiration, rheumatic pains, &c., without any constant eruption. If death resulted it was usually in twenty-four hours. The epidemic lasted some ten days, and then entirely vanished. It may be considered as an extremely severe form of miliary fever. Finally, Hirsch has drawn attention to certain cases of a choleraic affection, observed first by Dr Murray in India (1839-40), which has been described as a sweating-sickness. It has, however, more resemblance to miliary fever than to the English sweat. A similar form of disease has been described by some French physicians as "choléra cutané ou sudoral." On a review of the whole evidence, it would appear that the only disease which the sweating-sickness much resembled was the miliary fever, of which it may conceivably have been, like the Rottingen epidemic, a highly malignant form.

Where did it Originate?—Whether it really originated in England is a question difficult to answer. Its appearance certainly coincided with the arrival of a foreign army, consisting, as we know, largely of foreign mercenaries, men of foul habits and irregular lives (whom the French king was thought to have done his country a service by getting rid of), and crowded into small vessels. Among such men any infective disease which arose would, by want of cleanliness and overcrowding, be likely to be fostered into great intensity. It is in accordance with the history of many epidemics to suppose that an ordinary and not very fatal disease might under such circumstances assume a malignant form.¹ Now, supposing that the French soldiers brought with them their native "Picardy sweat," a malady local and not severe in its French home, might not this have become developed into the formidable English sweating-sickness? If so, its great destructiveness in England would also be in great measure explained by its affecting a new population. For we find that any exported epidemic disease is generally more fatal in a country which receives it for the first time, among a population which offers a virgin soil to the disease, than it was in the country where it was endemic, and where men were inured to the infection. The notable exemption of northern France from the true sweating-sickness would then have depended upon the population there being already inured to a milder form of the same disease. As to southern France and other countries of the south, they were evidently not adapted by climate to receive the infection. If this be true, we need hardly expect to see the sweating-sickness again. The sweat of Picardy may continue from time to time to produce its comparatively slight epidemics; but the conditions which launched the English sweat on its rapid career of destruction are unlikely to occur a second time. The example of the Rottingen epidemic, which on a small scale was scarcely less remarkable, may show, however, that such an event is not quite impossible.

Authorities.—For history see Bacon's *Life of Henry VIII.*, and the chronicles of Gratton, Hollnshed, Baker, Fabyan, &c. The only English medical account is that of John Caius, who wrote in English *A Booke or Counsell Against the Disease commonly called the Sweate, or Sweating Sickness* (London, 1552), and in Latin *De Ephemera Britannica* (Louvain, 1556; reprinted London, 1721). The English treatise is reprinted in Babington's translation of Hecker's *Epidemics of the Middle Ages*, Syd. Soc., 1844. This also contains Hecker's valuable treatise on the English sweat, published in German, 1834, and also printed in his *Volkskrankheiten des Mittelalters*, edited by Hirsch, Berlin, 1865. Gruner's *Scriptores de Sædore Anglice*, Jena, 1847, contains nearly all the original documents, including the two treatises of Caius. See also Hirsch, *Handbook of Geographical and Historical Pathology*, transl. by Creighton, New Syd. Soc., 1885. (J. F. P.)

¹ This is the case even with the Oriental plague itself. See PLAGUE.