

is one of the chief seats of the iron and steel industry in Upper Austria (Austria, vol. iii. p. 120), and very large quantities of cutlery, scythes, sickles, and edge-tools are annually produced in the town and neighbourhood. The Werndl small-arms factory, now carried on by a joint-stock company, and employing 4500 hands, is the largest in Austria. The population in 1880 was 17,199. Steyr was the capital of an early countship or grafschaft, at first belonging to Styria, but annexed to Austria in 1192.

STICKLEBACK is the name applied to a group of small fishes (*Gastrosteus*) which inhabit the fresh and brackish waters as well as the coasts of the temperate zone of the northern hemisphere. Although some of the species live chiefly either in fresh or in salt water, they readily accommodate themselves to a change, and, as far as the European kinds are concerned, all may be met with in the brackish water of certain littoral districts. The majority have a compressed well-proportioned body, which in the marine species is of a more elongate form, leading to the allied group of Flute-Mouths (*Fistulariidae*), which are, in fact, gigantic marine sticklebacks. Their mouth is of moderate width, oblique, and armed with small but firmly set teeth. But their most distinctive characteristic consists in the armature of their head and body. The head is nearly entirely protected by hard bone; even the cheeks, which in the majority of fishes are covered with a naked or scaly skin, are in this genus cuirassed by the dilated infraorbital bones. There are no scales developed on any part of the body, but a series of hard and large scutes protects a greater or lesser portion of the sides. The first dorsal fin and the ventrals are transformed into pointed formidable spines, and joined to firm bony plates of the endoskeleton. With regard to the degree in which this armature is developed, not only do the species differ from each other, but almost every species shows an extraordinary amount of variation, so that some older naturalists have distinguished a multitude of species, whilst the majority of the present day are inclined to reduce their number considerably. About ten kinds may be taken to be specifically distinct.

So far as is known at present, all sticklebacks construct a nest for the reception of the spawn, which is jealously guarded by the male until the young are hatched, which event takes place in from ten to eighteen days after oviposition. He also protects them for the first few days of their existence, and provides them with food, until they gradually stray from their home. The construction of the nest varies in the different species.

Sticklebacks are short-lived animals; they are said to reach an age of only three or four years; yet their short life, at least that of the males, is full of excitement. During the first year of their existence, before the breeding-season begins, they live in small companies in still pools or gently flowing brooks. But with the return of the warmer season each male selects a territory, which he fiercely defends against all comers, especially against intruders of his own species and sex, and to which he invites all females, until the nest is filled with ova. At this period he also assumes a bridal dress, painted with blue and red tints. The eggs are of comparatively large size, one female depositing only from 50 to 100; but, as the females deposit their spawn in nests of different males, the number of ova contained in one nest does not exceed one hundred.

Of the species known not one has so wide a geographical range, and has so well been studied, as the common British Three-Spined Stickleback (*Gastrosteus aculeatus*). It is found everywhere in northern and central Europe, northern Asia, and North America. The development of its scutes and spines varies exceedingly, and specimens may be found without any lateral scutes and with short spines, others with only a few scutes and moderately sized spines,

and again others which possess a complete row of scutes from the head to the caudal fin, and in which the fin-spines are twice as long and strong as in other varieties. On the whole, the smooth varieties are more numerous in southern than in northern localities. This species swarms in some years in prodigious num-



Gastrosteus aculeatus, var. *noveboracensis*, Three-Spined Stickleback.

bers; in Pennant's time amazing shoals appeared in the fens of Lincolnshire every seven or eight years. Their numbers may perhaps be conceived from the fact that a man employed in collecting them gained, for a considerable time, four shillings a day by selling them at the rate of a halfpenny a bushel. No instance of a similar increase of this fish has been observed in our time, and this possibly may be due to the diminished number of suitable breeding-places in consequence of the general introduction of artificial drainage. This species usually constructs its nest on the bottom, excavating a hollow in which a bed of grass, rootlets, or fibres is prepared; walls are then raised, and the whole is roofed over with the like material. The nest is an inch and more in diameter, with a small aperture for an entrance.

The Ten-Spined Stickleback (*Gastrosteus pungitius*) is so called from the number of spines usually composing its first dorsal fin, which, however, may be sometimes reduced to eight or nine or increased to eleven. It is smaller than the three-spined species, rarely exceeding 2 inches in length. Its geographical range nearly coincides with that of the other species, but it is more locally distributed, and its range in northern Asia is not known. With regard to its habits, it differs from the common species only in the selection of the site for its nest, which is generally placed among weeds above the bottom of the water. Breeding males are readily recognized at a distance by the intensely black colour of the lower parts of their body.

Both these species are for their size extremely voracious, causing no small amount of injury if allowed in breeding-ponds in which valuable fish are preserved. During the whole time they are not engaged in their breeding operations they are in pursuit of food. A small stickleback kept in an aquarium devoured, in five hours' time, seventy-four newly-hatched dace, which were about a quarter of an inch long. Two days after it swallowed sixty-two, and would probably have eaten as many every day, could they have been procured.

The Sea Stickleback (*Gastrosteus spinachia*) is a much larger and more slender species than those mentioned; it attains to a length of 7 inches, and is armed with fifteen short spines on the back. It is extremely common round the British coasts, but never congregates in large shoals. At suitable localities of the coast which are sheltered from the waves and overgrown with sea-weed, especially in rock-pools, one or two males establish themselves with their harems, and may be observed without difficulty, being quite as fearless as their freshwater cousins. Harbours and shallows covered with *Zostera* are likewise favourite haunts of this species, although the water may be brackish. The nest is always firmly attached to sea-weed, and sometimes suspended from an overhanging frond. This species inhabits only the northern coasts of Europe.

STIGMATIZATION, literally the infliction of *stigmata*, i.e., marks tattooed or branded on the person, the term used with specific reference to the infliction of wounds like those of Christ.

An ancient and widespread method of showing tribal connexion, or relation to tribal deities, is by marks set upon the person; thus Herodotus, in describing a temple of Hercules in Egypt (ii. 113), says that it is not lawful to capture runaway slaves who take refuge therein if they receive certain marks on their bodies, devoting them to the deity. Some such idea is perhaps alluded to by Paul (Gal. vi. 17) in the words, "from henceforth let no man trouble me, for I bear branded on my body the stigmata of Jesus"; and some few authors have even understood the passage as referring to stigmatization in the modern sense (Molanus, *De Historia SS. Imaginum et Picturarum*, ed. Paquet, iii. 43, p. 365). Branding, as indicative of servi-

tude, is mentioned in many of the classics (Pliny, *H. N.*, xviii. 3; Varro, *De Re Rustica*, i. 18; Suetonius, *Caligula*, xxvii. &c.), and was forbidden by Constantine.

In the period of persecution Christian martyrs were sometimes branded with the name of Christ on their foreheads (Pontius, "De Vit. S. Cypriani," *Biblioth. Veterum Patrum*, iii. p. 472, § vii.). This was sometimes self-inflicted as a disfigurement by nuns for their protection, as in the case of St Ebba, abbess of Coldingham (see Baronius, *Annales*, xv. p. 215, anno 870, also Tert., *De Vel. Virg.*). Some Christians likewise marked themselves on their hands or arms with the cross or the name of Christ (Procopius, *In Esaiam*, ed. Curterius, p. 496), and other voluntary mutilations for Christ's sake are mentioned (Matt. xix. 12; Fortunatus, *Life of St Rhadegund*, ed. Migne, col. 508; Palladius, *Lausiac History*, cxii.; Jerome's *Letter to St Eustochium*, &c.).

In the life of St Francis of Assisi we have the first example of the alleged miraculous infliction of stigmata (see vol. ix. p. 692). While meditating on the sufferings of our Lord, in his cell on Mount Alverno, we are told by his biographers, Thomas of Celano and Bonaventura, that the Lord appeared to him as a seraph and produced upon his body the five wounds of Christ; of these we are told that the side wound bled occasionally, though Bonaventura calls it a scar, and the wounds in the feet had the appearance and colour of nails thrust through. After his death St Clare endeavoured but in vain to extract one of these. Pope Alexander IV. and other witnesses declared that they had seen these marks both before and after his death (Raynaldus, ad annum 1255, p. 27). The divinely-attested sanctity of their founder gave to the newly-established order of Franciscans a powerful impulse, so that they soon equalled and threatened to overshadow in influence the previously-founded order of St Dominic.

The reputation of the latter order was, however, equally raised in the next century by the occurrence of the same wonder in the case of a sister of the third rule of St Dominic, Catherine Benincasa,—better known as St Catherine of Siena. From her biographer's account we gather that she was subject to hystero-epileptic attacks, in one of which, when she was twenty-three years old, she received the first stigma (see vol. v. p. 30). In spite of her great reputation, and the number of attesting witnesses, this occurrence was not universally believed in. Pope Sixtus IV. published a bull in 1475 ordering, on pain of anathema, the erasure of stigmata from pictures of St Catherine, and prohibiting all expressions of belief in the occurrence. Pope Innocent VIII. similarly legislated "ne de cetero S. Catherina cum stigmatibus depingatur; neve de ejus stigmatibus fiat verbum, aut sermo, vel prædicatio ad tollendam omnem scandali occasionem" (see references in Raynaud, *De Stigmatisme*, cap. xi., 1665). In the years which followed, cases of stigmatization occurred thick and fast,—now a Franciscan, now a Dominican, very rarely a religieuse of another order, showing the marks. Altogether about ninety instances are on record, of which eighteen were males and seventy-two females. Most of them occurred among residents in religious houses, and took place after the austerities of Lent, usually on Good Friday, when the mind was intently fixed on our Lord's Passion; and, from their occurrence being for the most part among members of the two orders to which St Francis and St Catherine belonged, the possibility of the reception of the marks was constantly before their eyes and thoughts. The order of infliction in the majority of cases was that of the crucifixion, the first token being a bloody sweat, followed by the coronation with thorns; afterwards the hand and foot wounds appear; that of the side being the last. The grade of the infliction varied in

individual cases, and they may be grouped in the following series:—

I. As regards full stigmatization, with the visible production of the five wounds, and generally with the mark of the crown as well, the oldest case, after St Francis, is that of Ida of Louvain (1300), in whom the marks appeared as coloured circles; in Gertrude von Oosten of Delft (1344) they were coloured scars, and disappeared in answer to prayer as they also did on Dominica de Paradis; in Sister Pierona, a Franciscan, they were blackish grey. They were true wounds in Margaret Ebnerin of Nuremberg (d. 1351), but they also disappeared in answer to her prayer (see her *Life*, Augsburg, 1717), as was the case with Brigitta, a Dominican tertiary (1390), and also with Lidwina. An intermission is described in the marks on Johanna della Croce of Madrid (1524), in whom the wound in the side was large, and the others were rose-coloured circular patches. The marks appeared on each Friday and vanished on Sunday. These emitted an odour of violets; but in Sister Apollonia of Volaterra they were fetid while she lived. Angela della Pace (1634) was fully stigmatized at nine years of age, being even marked with the sponge and hyssop on the mouth; while Joanna de Jesu-Maria at Burgos (1613), a widow, who had entered the convent of Poor Clares, was marked in her sixtieth year. To her in vision two crowns were offered,—one of flowers and one of thorns; she chose the latter and immediately was seized with such pain that her confessor heard her skull cracking. This case was investigated by the officers of the Inquisition. The stigmatization of Veronica Giuliani (1696) was also the subject of inquiry, and in this case the nun drew on a paper a representation of the images which she said were engraved on her heart. On a post-mortem examination being made in 1727 by Prof. Gentili and Dr Bordiga, the image of the cross, the scourge, &c., were said to have been impressed on the right side of the organ (*Vita della Veronica Giuliani*, by Salvatori, Rome, 1803). The case of Christina Stambelen, a Dominican at Cologne, is noteworthy, as on her skull there was found a raised ridge or crown which was at first green, with red dots. This relic is still preserved. In Lucia di Narni (1546) the marks were variable, as they also were on Sister Maria di S. Dominico. On the body of St Margaret of Hungary the stigmata were found fresh and clear when her body was exhumed some time after her death for transportation to Presburg. Other stigmatized persons were Elizabeth von Spalbeck, a Cistercian; Sister Coleta, a Poor Clare; Matilda von Stanz; Margaret Bruch of Enderingen (1503); Maria Razzi of Chios (1582); Catharina Januensis; Elizabeth Reith of Allgau; Stieva zu Hamm in Westphalia; Sister Mary of the Incarnation at Pontoise; Archangela Tardera in Sicily (1608); Catharina Ricci in Florence (1590); and Joanna Maria della Croce, a Poor Clare at Roveredo (d. 1673), upon whom the markings of the thorn crown and spear wound were especially deep.

II. In some cases, although the pains of stigmatization were felt, there were no marks apparent. This occurred to Helen Brunsen (1285); Helena of Hungary (1270); Osanna of Mantua (1476); Columba Rocessani; Magdalena de Pazzis; Anna of Vargas; Hieronyma Carvaglio; Maria of Lisbon, a Dominican; Joanna di Vernyma Carvaglio; Maria of Lisbon, a Dominican; Sister Christina, a Carcellian; Stephania Soncinas, a Franciscan; Sister Christina, a Carcellian; and Joanna Rodriguez, a Poor Clare. In the case of Ursula Aguir de Valenza, a tertiary of St Dominic (1608), and Catharina Cialina (d. 1619) the pain was chiefly that of the crown of thorns, as it was also in Amelia Bicchieri of Vercelli, an Augustinian.

III. In a third series some of the marks were visible on the body, while others were absent or only subjectively indicated by severe pains. The crown of thorns only was marked on the head of Vincentia Ferreria at Valencia (d. 1515) and Philippa de Santo Tomaso of Montemor (1670), while according to Torellus the Augustinian Ritta von Cassla (d. 1430) had a single thorn wound on the forehead. The crown was marked on Catharina of Raconizio (b. 1486), who also suffered a severe bloody sweat. In the case of Stephano Quinzani, in Soncino (1457), there was a profuse bloody sweat and the wounds were intermitting, appearing on Friday and Saturday, vanishing on Sunday. Blanche Gazinan, daughter of Count Arias de Sagavedra (1564), was marked only on the right foot, as also was Catherine, a Cistercian nun. The heart wound was visible in Christina Mirabilis (1232). Gabriella de Piezolo (d. 1473) died from the bleeding of such a wound, and similar wounds were described in Maria de Acostrin in Toledo; Eustochia, a tertiary of St Francis; Clara de Bugny, a Dominican (1514); Cecilia Nobili, a Poor Clare of Nuceria (d. 1655). In the last instance the heart wound was found after death—a three-cornered puncture. A similar wound was seen in the heart of Martina de Arilla (d. 1644). Maria Villana, a Poor Clare, daughter of the margrave of La Pella, was marked with the crown and the spear and thrust, and after death the impresses of the spear, sponge, and reed were found on her heart (d. 1670). The wound was usually on the left side, as in Sister Masrona of Grenoble, a tertiary of St Francis (1627); it was on the right in Margareta Columa, also a Clare. In Maria de Sarmiento it was said to have been inflicted by a seraph in a vision.

IV. In a fourth set of cases the imprints were said to have been found on the heart, even though there was no surface marking. Thus the Dominican Paula de St Thomas was said to have had the stigmata on her heart. The heart of Clare of Montfaucon (1308) was said to have been as large as a child's head and impressed with the cross, the scourge, and the nails. Similar appearances were found in Margaret of Citta di Capello and Johanna of Yepes (1591).

The instances of masculine stigmatization are few. Benedict di Rhegio, a Capuchin at Bologna, had the marks of the crown (1602); Carolus Sazia, an ignorant lay brother, had the wound in his side. Dodo, a Præmonstratensian lay brother, was fully stigmatized, as also was Philip de Aqueria. The marks after death were found on the heart of Angelos del Pas, a minorite of Perpignan, as also on Matheo Carey in Mantua, Melchior of Arazel in Valentia, Cherubin de Aviliana (an Augustinian), and Agolini of Milan. Walter of Strasburg, a preaching friar (1264), had the heart-pain but no mark, and the same was the case with a Franciscan, Robert de Malatestis (1430), and James Stephanus. On Nicholas of Ravenna the wounds were seen after death, while John Gray, a Scotsman, a Franciscan martyr, had one wound on his foot.

Within the last hundred years several cases have occurred. Anna Katharina Emmerich, a peasant girl born at Münster in 1774, afterwards an Augustinian nun at Agnetenberg, was even more famous for her visions and revelations than for the stigmata. Biographies, with records of her visions, have been published by Brentano at Munich in 1852 and the Abbé Cazalès at Paris (1870). Colombe Schanolt of Bamberg (1787) was fully stigmatized, as also was Rose Serra, a Capuchin of Ozieri in Sardinia (1801), and Madeleine Lorger (1806). Two well-known cases occurred in Tyrol,—one "L'Ecstatica" Maria von Mürl of Caldaro, a girl of noble family, stigmatized in 1839, the other "L'Addolorata" Maria Dominica Lazzari, a miller's daughter at Capriana, stigmatized in 1835 (see Boré, *Les Stigmatisées du Tyrol*, Paris, 1846). A case of the second class is that of Elizabeth Eppinger of Niederbrunn in Bavaria (1814), reported on by Kuhn. An interesting example of stigmatic trance also occurred in the case of a Protestant young woman in Saxony in 1820, who appeared as if dead on Good Friday and Saturday and revived on Easter Sunday.

The last case recorded is that of Louise Lateau, a peasant girl at Bois de Haine, Hainault, upon whom the stigmata appeared April 24, 1868. This case was investigated by Professor Lefebvre of Louvain, who for fifteen years was physician to two lunatic asylums. In her there was a periodic bleeding of the stigmata every Friday, and a frequent recurrence of the hysterical-cataleptic condition. Her biography has been written by Lefebvre and published at Louvain (1870).

On surveying these ninety cases, we may discount a certain number, including all those of the second class, as examples of subjective sensations suggested by the contemplation of the pains of crucifixion. A second set, of which the famous case of Jetzer (Wirz, *Helvetische Kirchengeschichte*, 1810, iii. p. 389) is a type, must be also set aside as obvious and intentional frauds produced on victims by designing persons. A third series, and how large a group we have not sufficient evidence to decide, we must regard as due to the irresponsible self-infliction of injuries by persons in the hysterical-epileptic condition, those perverted states of nervous action which Charcot has done so much to elucidate. To any experienced in this form of disease, many of the phenomena described in the records of these examples are easily recognizable as characteristic of the hysterical-epileptic state.

There are, however, some instances not easily explained, where the self-infliction hypothesis is not quite satisfactory.

Parallel cases of physical effects due to mental suggestion are well authenticated. Beaunis vouches for rubefaction and vesication as produced by suggestion in the hypnotic state, and Bourru and Burot describe a case, still under observation, of bloody sweat, and red letters marked on the arm by simple tracing with the finger. See *Congrès Scientifique de Grenoble, Progrès Médical*, 29 Aug. 1885, and Berjon's *La Grande Hystérie chez l'Homme*, Paris, 1886. We know so little of the trophic action of the higher nerve centres that we cannot say how far tissue nutrition can be controlled in spots. That the nerve centres have a direct influence on local nutrition is in some cases capable of experimental demonstration, and, in another sphere, the many authenticated instances of connection between maternal impression and congenital deformity seem to indicate that this trophic influence has wider limits and a more specific capacity of localization than at first sight seems possible. There is no known pathological condition in which blood transudation can take place through an unbroken skin.

Literature.—See references to each name in *Acta Sanctorum* or *Hæber, Menologium Franciscanorum*, 1698; Henriquez, *Mémoires cisterciens*; Marchese, *Sagra Diario*; Steill, *Ephemerides Dominicano Sacre*, Dillingen, 1692; Petrus de Alva y Astorga, *Prodigium Naturæ Portentium Gratia*, Strasburg, 1664; Thiépolus, *De Passione Christi*, tract. xii.; Meyer, *Blätter für höhere Wahrheit*, vii. 5; Hurter, *Tableau des Institutions et des Mœurs de l'Eglise au Moyen Age*, Paris, 1842; Görres, *Die Christliche Mystik*, Ratisbon, ii. p. 410 sq.; Franciscus Quaresmius, *De Vulneribus Domini*, Venice, 1652, i. 4; Raynaud, *Opera*, vol. xiii., Lyons, 1665; *Dublin Review*, 1871, p. 170; Maury, *Magie et Astrologie*; Beaunis, *Recherches exp. sur l'Activité Cérébrale*, Paris, 1886; Bourbeyre, *Les Stigmatisées*, Paris, 1886; Ennemoser, *Der Magnatismus im Verhältniss zur Religion*, Stuttgart, 1853, § 92; Tholuck's *Fernsichtliche Schriften*, Hamburg, 1839, p. 97; Schmieder, in *Evang. Kirchenzeitung*, Berlin, 1875, pp. 180, 345; *Comptes Rendus de la Société de Biologie*, 12th July 1885. (A. M.A.)

STILICHO, FLAVIUS, Roman general and statesman, was of Vandal origin, and was born about 359 A.D. At an early age he entered the imperial army, where his father before him had served under Valens; and he speedily attained high promotion. He had already become magister equitum when in 384 he was sent by Theodosius as his ambassador to Persia; his mission was very successful, and soon after his return he was made comes domesticus and commander-in-chief, receiving also in marriage Serena, the emperor's niece and adoptive daughter. Theodosius, when dying, made Stilicho and Serena the guardians of Honorius and his other children. Honorius, in 398, was married to Stilicho's daughter Maria, and in 408 to her sister Thermantia. It was by Stilicho that Alaric in 396 was compelled to quit the Peloponnesus (see ALARIC), and that in 398 the revolt of the Mauretanian prince Gildo was repressed. Stilicho again encountered Alaric at Pollentia in 402, and at Verona in 403, compelling his retreat into Illyria, and was rewarded with a triumph on his return to Rome. In 405 he almost annihilated the army of Radagaisus, the leader of the Ostrogoths, at Fiesole. The arrangements into which he subsequently entered with Alaric (see ALARIC) were made use of by his enemies to alienate the emperor from him, and when at last revolt was the only course that might possibly have saved him his continued loyalty proved fatal. Abandoned by his troops he fled to Ravenna, and, having been induced by false promises to quit the church in which he had taken sanctuary, he was beheaded on August 23, 408. Stilicho is the hero of much of the poetry of CLAUDIAN (*q.v.*).

STILL, JOHN (c. 1543–1607), bishop of Bath and Wells, and now best known as the probable author ("Mr S., Master of Arts") of *Gammer Gurton's Needle*, the earliest comedy but one in the English language (see DRAMA, vol. vii. p. 428), was a native of Grantham, Lincolnshire, and

was born about 1543. He became a student of Christ's College, Cambridge, where he duly graduated and took orders. He was appointed in 1570 Lady Margaret's professor of divinity in his university, subsequently held livings in Suffolk and Yorkshire, and was master successively of St John's College (1574) and of Trinity College (1577). Still was raised to the bishopric of Bath and Wells in 1592, and, after enjoying considerable fame as a preacher and disputant, he died on February 26, 1607, leaving a large fortune from lead mines discovered in the Mendip Hills.

STILLING, HEINRICH. See JUNG.

STILLINGFLEET, EDWARD (1635–1699), a conspicuous figure in the church of the Restoration, was descended from the Stillingfleets of Stillingfleet, in the neighbourhood of York, and was born at Cranbourne in Dorset on the 17th April 1635. There and at Ringwood he received his preliminary education, and at the age of thirteen was entered at St John's College, Cambridge, as Isaac Barrow five years before and at the same age had been entered at Peterhouse. He took his bachelor's degree in 1652, and in the following year was elected to a fellowship. After residing as tutor first in the family of Sir Roger Burgoine in Warwickshire and then with the Hon. Francis Pierrepont in Nottingham, he was in 1657 presented by the former to the living of Sutton in Bedfordshire. Here he brought to completion and published (1659) his *Irenicum*, in which he sought to give expression to the prevailing weariness of faction and to find some ecclesiastical compromise in which all could conscientiously unite. Schemes of comprehension were then the most familiar topics of conversation. There seemed every probability that a moderate Episcopacy might attract all parties; and it was to be expected that a learned and able scholar fresh from the atmosphere of Cambridge Platonism should desire to help present entanglements towards a liberal solution. Much may still be learned from his cogent and earnest exposition of the great principle that it is unwarrantable for the church to make other conditions of her communion than our Saviour did of discipleship. In 1662 he reprinted the *Irenicum* with an appendix, in which he sought to prove that "the church is a distinct society from the state, and has divers rights and privileges of its own, . . . resulting from its constitution as a Christian society, and that these rights of the church cannot be alienated to the state after their being united in a Christian country." In the same year the country gave its answer to his and all similar proposals in the Act of Uniformity, which, by requiring that all clergymen should be episcopally ordained and should use the revised liturgy, lost to the church of England such men as Richard Baxter, John Howe, and Philip Henry. Stillingfleet's actions were as liberal as his opinions. He sheltered in his rectory at Sutton one ejected minister and took for another a large house to be used as a school. But, as time wore on, his liberalism degenerated and gave occasion to Howe's remark that the rector of Sutton was a very different person from the dean of St Paul's. But, though in 1680 he published his *Unreasonableness of Separation*, his willingness to serve on the ecclesiastical commission of 1683, and the interpretation he then proposed of the damatory clauses of the Athanasian creed, are proof that to the end he leaned towards toleration. Another work which Stillingfleet published in 1662 won for him the confidence and admiration of his church. This was his *Origines Sacre, or a Rational Account of the Christian Faith as to the Truth and Divine Authority of the Scriptures and the Matters therein contained*. Rendered obsolete though it be by the general advance of the discussion, this apologetic made a deep impression at the time, and rapid preferment followed its publication.

Henchman, bishop of London, employed him to write a vindication of Laud's answer to Fisher the Jesuit. In 1665 the earl of Southampton presented him to St Andrew's, Holborn; two years later he became prebendary of St Paul's, in 1668 chaplain to Charles II., in 1670 canon residentiary and in 1677 dean of St Paul's. Finally, but under different auspices, he was consecrated bishop of Worcester 13th October 1689. During these years he was ceaselessly engaged in controversy with Nonconformists, Romanists, Deists, and Socinians. His unrivalled and various learning, his dialectical expertness, and his massive judgment rendered him a formidable antagonist; but the respect entertained for him by his opponents was chiefly aroused by his recognized love of truth and superiority to personal considerations. He had the courage, along with the saintly and noble-minded Ken and the other six bishops, to incur the anger of James II. by resisting his proposed Declaration of Indulgence (1688). Strangely enough, he crossed swords both with Dryden and Locke,—with Dryden in connexion with the papers favourable to the authority of the Church of Rome which were found in the strong box of Charles II. and were supposed to have been written by him, and with Locke because the theologian considered that the philosopher's definition of substance was prejudicial to the doctrine of the Trinity. In most of his writings there is a small residuum of permanent value. The range of his learning is most clearly seen in his *Bishops' Right to Vote in Parliament in Cases Capital*. His *Origines Britannicæ, or Antiquities of the British Church* (1685), is a surprising mixture of critical and uncritical research; and his *Discourse concerning the True Reason of the Sufferings of Christ* (1669), written in answer to Crellius, contains a most forcible statement of the doctrine of Christ's substitution. So handsome in person as to have earned the sobriquet of "the beauty of holiness," Stillingfleet was twice married,—first to Andrea, daughter of William Dobbins of Wormington, by whom he had two daughters, who died in infancy, and one son; afterwards to Elizabeth, daughter of Sir Nicholas Pedley, by whom he had seven children. He died in his house at Westminster, 28th March 1699, and was buried in his own cathedral, where a handsome monument briefly records his virtues. His library was bought by Marsh, archbishop of Armagh, to form the foundation of a public library in Dublin.

A collected edition of his works, with life prefixed, was published in London (1710); and a most useful edition of *The Doctrines and Practices of the Church of Rome Truly Represented* was published in 1845 by Dr Cunningham.

STILLWATER, a city of the United States, at the head of Washington county, Minnesota, on the west bank of the St Croix river, 18 miles north-east of St Paul. It is a great centre of the lumber trade, contains a State prison, a high school, and a public library, and increased its population from 4124 to 9055 between 1870 and 1880.

STILT, or LONG-LEGGED PLOVER, a bird so called for reasons obvious to any one who has seen it, since, though no bigger than a Snipe, the length of its legs (their bare part measuring 8 inches), in proportion to the size of its body, exceeds that of any other bird's. The first name (a translation of the French *Echasse*, given in 1760 by Brisson) seems to have been bestowed by Rennie only in 1831; but, recommended by its definiteness and brevity, it has wholly supplanted the second and older one. The bird is the *Charadrius himantopus*¹ of Linnæus, the *Himantopus*

¹ The possible confusion by Pliny's transcribers of this word with *Hæmatopus* has been already mentioned (OYSTERCATCHER, vol. xviii. p. 111, note 2). *Himantopus*, with its equivalent *Loripes*, "by an awkward metaphor," as remarked by Gilbert White, "implies that the legs are as slender and pliant as if cut out of a thong of leather."

candidus or *melanopterus* of modern writers, and belongs to the group *Limicola*, having been usually placed in the Family *Scolopacidae*, though it might be quite as reasonably referred to the *Charadriidae*, and, with its allies to be immediately mentioned, would seem to be not very distant from *Hematopus*, notwithstanding the wonderful development of its legs and the slenderness of its bill.

The very peculiar form of the Stilt naturally gave Buffon occasion (*Hist. Nat. Oiseaux*, viii. pp. 114-116) to lament the shortcomings of Nature in producing an animal with such "enormous defects," its long legs in particular, he supposed, scarcely allowing it to reach the ground with its bill. But he failed to notice the flexibility of its proportionately long neck, and admitted that he was ill-informed as to its habits. No doubt, if he had enjoyed even so slight an opportunity as occurred to a chance observer (*Ibis*, 1859, p. 397), he would have allowed that its structure and ways were in complete conformity, for the bird obtains its food by wading in shallow water and seizing the insects that fly over or float upon its surface or the small crustaceans that swim beneath, for which purpose its slender extremities are, as might be expected, admirably adapted. Widely spread over Asia, North Africa, and Southern Europe, the Stilt has many times visited Britain—though always as a straggler, for it is not known to breed to the northward of the Danube valley,—and its occurrence in Scotland (near Dumfries) was noticed by Sibbald so long ago as 1684. It chiefly resorts to pools or lakes with a margin of mud, on which it constructs a slight nest, banked round or just raised above the level so as to keep its eggs dry (*Ibis*, 1859, p. 360); but sometimes they are laid in a tuft of grass. They are four in number, and, except in size, closely resemble those of the OYSTERCATCHER (vol. xviii. p. 111). The bird has the head, neck, and lower parts white, the back and wings glossy black, the irides red, and the bare part of the legs pink. In America the genus has two representatives, one¹ (fig. 1) closely resembling that just described, but rather smaller and with a black crown and nape.

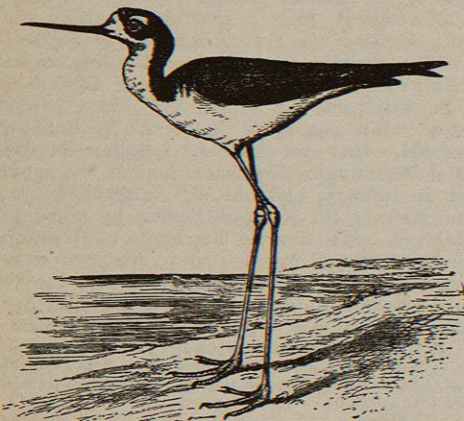


FIG. 1.—Black-Necked American Stilt. (After Gosse.)

This is *H. nigricollis* or *mexicanus*, and occurs from New England to the middle of South America, beyond which it is replaced by *H. brasiliensis*, which has the crown white. The Stilt inhabiting India is now recognized to be *H. candidus*, but Australia possesses a distinct species, *H. novæ-hollandiæ*, which also occurs in New Zealand, though that country has in addition a species peculiar to it, *H. novæ-zelandiæ*, differing from all the rest by assuming in the breeding-season an altogether black plumage. Australia, however, presents another form, which is the type of the genus *Cladorhynchus*, and differs from *Himantopus* both in its style of plumage (the male having a broad bay pectoral belt), in its shorter tarsi, and in having the toes (though, as in the Stilt's feet, three in number on each foot) webbed.

Allied in many ways to the Stilts, but differing in many undeniably generic characters, are the birds known as Avosets,² forming the genus *Recurvirostra* of Linnæus.

¹ This species was made known to Ray by Sloane, who met with it in Jamaica, where in his day it was called "Longlegs."

² This word is from the Bolognese *Avosetta*, which is considered to be derived from the Latin *avis*—the termination expressing a diminutive of a graceful or delicate kind, as *donnetta* from *donna* (Prof. Salvadori in *epist.*).

Their bill, which is perhaps the most slender to be seen in the whole Class, curves upward towards the end, and has given the oldest known species two names which it formerly bore in England,—“Cobbler's-awl” from its likeness to the tool so called, and “Scoop,” because it resembled the scoop with which mariners threw water on their sails. The legs, though long, are not extraordinarily so, and the feet, which are webbed, bear a small hind toe.

This species (fig. 2), the *R. avocetta* of ornithology, was of old time plentiful in England, though doubtless always restricted to certain

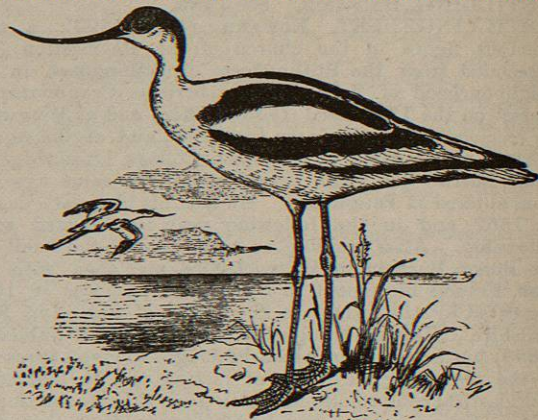


FIG. 2.—Avoset. (After Naumann.)

localities. Charleton in 1668 says that when a boy he had shot not a few on the Severn, and Plot mentions it so as to lead one to suppose that in his time (1686) it bred in Staffordshire, while Willughby (1676) knew of it as being in winter on the eastern coast, and Pennant in 1769 found it in great numbers opposite to Fosslyke Wash in Lincolnshire, and described the birds as hovering over the sportsman's head like Lapwings. In this district they were called “Yelpers” from their cry,³ but whether that name was elsewhere applied is uncertain. At the end of the last century they frequented Romney Marsh in Kent, and in the first quarter of the present century they bred in various suitable spots in Suffolk and Norfolk,—the last place known to have been inhabited by them being Salthouse, where the people made puddings of their eggs, while the birds were killed for the sake of their feathers, which were used in making artificial flies for fishing. The extirpation of this settlement took place between 1822 and 1825 (cf. Stevenson, *Birds of Norfolk*, ii. pp. 240, 241).⁴ The Avoset's mode of nesting is much like that of the Stilt, and the eggs are hardly to be distinguished from those of the latter but by their larger size, the bird being about as big as a LAPWING (vol. xiv. p. 308), white, with the exception of its crown, the back of the neck, the inner scapulars, some of the wing-coverts and the primaries, which are black, while the legs are of a fine light blue. It seems to get its food by working its bill from side to side in shallow pools, and catching the small crustaceans or larvæ of insects that may be swimming therein, but not, as has been stated, by sweeping the surface of the mud or sand—a process that would speedily destroy the delicate bill by friction. Two species of Avoset, *R. americana* and *R. andina*, are found in the New World; the former, which ranges so far to the northward as the Saskatchewan, is distinguished by its light cinnamon-coloured head, neck, and breast, and the latter, confined so far as known to the mountain lakes of Chili, has no white in the upper parts except the head and neck. Australia produces a fourth species, *R. novæ-hollandiæ* or *rubricollis*, with a chestnut head and neck; but the European *R. avocetta* extends over nearly the whole of middle and southern Asia as well as Africa.

A recent proposal (*Ibis*, 1886, pp. 224-239) to unite the Avosets and Stilts in a single genus seems to have little to recommend it but its novelty, and will hardly meet with acceptance by systematists. (A. N.)

³ Cf. “Yarwhelp” (GODWIT, vol. x. p. 720) and “Yaup” or “Whaup” (CURLEW, vol. vi. p. 711). “Barker” and “Clinker” seem to have been names used in Norfolk.

⁴ The same kind of lamentable destruction has of late been carried on in Holland and Denmark, to the extirpation probably of the species in each country.

STIRLING, a midland county of Scotland, is bounded N. by Perthshire, N.E. by Clackmannan and the Firth of Forth, S.E. by Linlithgowshire, S. by Lanarkshire and a detached portion of Dumbartonshire, and S.W. and W. by Dumbartonshire. In the north-east there are two isolated portions,—one forming the parish of Alva, bounded partly by Clackmannan and partly by Perthshire, and the other forming part of the parish of Logie and bounded by Perthshire. The outlines of the main portion are extremely irregular, the boundary on the north following for the most part the windings of the Forth, while on the west it passes through the middle of Loch Lomond, and on the south coincides to a considerable extent with various streams. The extreme length of the county from north-west to south-east is about 45 miles, and the greatest breadth from north to south about 18 miles. The land area is 286,338 acres, and the total area 298,579 acres, or about 466 square miles. Apart from the district round Loch Lomond, the principal charm of the scenery of Stirlingshire is in the views of the valley of the Forth with the winding river, and for background the distant peaks of the Grampians, or the nearer ranges of the Ochils, which encroach on the north-eastern corner and detached sections of the county. The valley of the Forth runs along nearly the whole of the northern border, widening towards the east. The centre of the county from north-east to south-west is occupied by the broad irregular ranges of the Lennox Hills, which are known under four different names, according to the parishes in which they are principally situated,—the Gargunnoch Hills (attaining a height of 1591 feet), the Fintry Hills (1676), the Kilsyth Hills (1393), and the Campsie Fells (1894). Nearly the whole of the county to the north-east of Loch Lomond is occupied by a spur of the Grampians, reaching in Ben Lomond a height of 3192 feet. Besides Loch Lomond, situated partly in Dumbartonshire, and Loch Katrine, which bounds the county at its north-western corner, the principal lakes are Loch Arket to the south of Loch Katrine, Loch Coulter, in the south of St Ninians parish, Loch Ellrig in Falkirk parish, and Black Loch partly in Lanarkshire. The river Forth, from its junction with the Kelty near Gartmore, forms the northern boundary of the county, except where it bounds on the north the part of Kippen parish which is in Perthshire and separates a portion of Lecropt parish from that of St Ninians and a portion of Logie from that of St Ninians and Stirling. It receives from the north the Teith, which touches the county at Lecropt parish, and the Allan, which separates the parishes of Lecropt and Logie, and from the south the Boquhan burn, the Touch burn, and the Bannock burn. The Carron water flows eastwards from the Fintry Hills to the Firth of Forth at Grangemouth. On the south there are a number of streams which form at various places the boundary of the county,—the Endrick water flowing westwards from the Fintry Hills to Loch Lomond, the Kelvin from near Kilsyth flowing south-westwards to the Clyde, and the Avon from Lanarkshire flowing north-eastwards to the Firth of Forth. The Forth and Clyde Canal crosses the south-eastern corner of the county from Castlecary to Grangemouth.

The whole of the district to the north of Loch Lomond is occupied by the crystalline schists of the Highlands, which, by the existence of a great fault, are connected on the east with the Old Red Sandstone, which occupies the broad valley between the base of the Highland hills and the chain of the Ochils. These latter heights, portions of which are included in detached areas of the county, consist of volcanic rocks associated with the Old Red Sandstone (see vol. x. p. 343). The Lennox Hills in the centre of the county are formed by volcanic rocks of Carboniferous age resting on strata of red and white sandstone (see vol. x. p. 346). The lower grounds are deeply buried under glacial drifts, and conspicuously marked by broad terraces that represent former sea-margins. On one of these, at a height of 50 feet above the present sea-level, lies the Carse of Falkirk. Another stands at an elevation of about 100 feet. There are saline mineral springs at Bridge of Allan.

The coalfield runs obliquely along the south-east of the county, the principal seams being in Denny, Kilsyth, Larbert, Falkirk, and Slamannan parishes. Ironstone, fire-clay, and oil-shale are also found. Limestone is extensively wrought in the Campsie district, and there are a number of sandstone quarries in various parts of the county. The total output of coal in 1884 was 1,182,891 tons, of ironstone 75,351 tons, of fireclay 15,872, and of oil-shale 4535.

Agriculture.—According to the landowners return of 1872-73 the land was held by 4257 proprietors, possessing 284,751 acres, at an annual valuation of £521,407, an average value all over of £1, 16s. 3½d. Of the proprietors 3409 possessed less than one acre. The following possessed over 5000 acres each:—Duke of Montrose, 68,878; William Forbes, 13,041; Rear-admiral Sir William Edmonstone, 9778; Hon. Mrs. Margaret Lennox, 7606; Alex. Graham Speirs, 7172; W. C. G. Bontine, 6931; Lieutenant-Col. John Murray, 6813; Sir Alex. C. R. Gibson-Maitland, 6023; Henry Fletcher Campbell, 5679; and James Johnstone, 5340. The two arable soils of Stirlingshire are distinguished locally as carse and dryfield, the remainder of the county being occupied by mountain pasture land, moor, and moss. The Carse of Stirling extends along the banks of the Forth from Buchlyvie to the eastern extremity of the county,—a length of about 28 miles, with a breadth varying from 1 to 4 miles, the total area being about 30,000 acres. The carse soil consists of the finest clays, without stones, but interspersed with strata of marine shells. It has been partly reclaimed from superincumbent peat moss, of which there are still considerable areas adjoining it. It requires a great deal of labour, but, by means of draining, subsoil ploughing, and the use of lime, has been rendered one of the most fertile soils in Scotland, being specially well adapted for wheat and beans. The dryfield occupies the slopes of the hills above the carse and the valleys in the interior of the county, which constitute the more fertile portions; the crops for which it is best suited being potatoes and turnips. A great part of the dryfield has been reclaimed from moor within the present century. The Lennox Hills, occupying about a fourth of the total area of the county, form one of the most valuable tracts of pasture land in Scotland. The following table gives a classification of the holdings in 1875 and 1885:—

	50 acres and under.		50 to 100 acres.		100 to 300 acres.		300 to 500 acres.		500 to 1000 ac.		Above 1000 ac.		Total.	
	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.	No.	Acres.		
1875	789	13,130	382	28,493	329	52,080	29	10,411	7	4299	1	1418	1637	109,831
1885	725	12,550	363	27,876	370	59,418	28	10,325	5	3489	1	1418	1492	113,076

According to the agricultural returns for 1886, out of a total of 295,285 acres 115,477, or nearly 39 per cent., were arable land, the area under corn crops amounting to 29,306 acres, under green crops to 8752, rotation grasses 30,664, permanent pasture 45,232, flax 15 and fallow 1508. Oats, the principal corn crop, occupied 19,662 acres, wheat 2065 acres (a decrease of about one half within twenty years), barley 4297 acres, rye 30, beans 3221, and pease 31. Of green crops the principal are potatoes (3500 acres) and turnips (4623 acres). Considerably more than half of the arable area is occupied by rotation grasses and permanent pasture, and their acreage is constantly increasing, which is sufficiently accounted for by the steady increase in the numbers of sheep and cattle. The number of horses in 1886 was 4616, of which 3176 were used solely for purposes of agriculture, and 1440 were unbroken horses and mares kept solely for purposes of breeding. The Clydesdale breed are in general use on the larger farms. Cattle in 1886 numbered 29,422, of which 10,745 were cows and heifers in milk or in calf, and 8684 were other cattle two years old and above. Butter-making is largely practised on the dryfield farms, the Ayrshire being the principal breed of cows, but cattle-feeding is also an important industry, for which Irish cattle and cross breeds are frequently bought, a considerable number of shorthorns being also reared. Sheep, chiefly blackfaced, for which there is extensive pasturage on the Lennox Hills and the slopes of the Grampians, numbered 109,897 in 1886, and pigs 1775.

Though, as is evident from the remains of trees in the mosses, an extensive district of the county was at one time occupied by forest, it is now comparatively devoid of timber, the area under woods in 1881 being only 12,483 acres. There is a natural tendency to the growth of birch on the lower slopes of the mountains in the parishes