necessitates an entirely different arrangement of holes and keys and a different scheme of fingering.

The bore of the saxophone is large, and there are from 18 to 20 keys covering holes of large diameter to produce the fundamental scale. The first 15 semitones are obtained by opening successive keys, the rest of the compass by means of octave keys enabling the performer to sound the harmonic octave of the funda- mental scale. The compass of the various saxophones extends over 2 octaves and a fifth with chromatic intervals, being one octave less than the clarinet. The complete family consists of the accompanying members. The treble clef is used in notation, and all saxophones are transposing instruments, the music being written in a higher key, according to the difference in pitch between the funda- mental note of the instrument and the standard C of the notation. The keys given above are of the orchestral saxophones; the instruments used in military bands are a tone lower. The quality of tone of this family of instruments is inferior to that of the clarinets and has affinities with that of the harmonium. According to Berlioz it has vague analogies with the timbre of ’cello, clarinet and cor anglais, with, how­ever, a brazen tinge. To a clock- maker of Lisieux named Desfon- tenelles, who made a clarinet with a conical bore and an upturned bell in 1807, is due the combina­tion of single reed mouthpiece with a conical tube. In 1840 Adolphe Sax, in trying to produce a clarinet that would overblow an octave like the flute and oboe, in­vented the saxophone, which at once leapt into popularity in France and Belgium, where the alto, tenor and baryton have super- seded the bassoon in almost all the military bands. Many modern

French composers, Meyerbeer, Massenet, Ambroise Thomas and others, have scored for it in their operas. Kastner introduced it into the orchestra in Paris in 1844 in *Le Dernier Roi de Juda.* The saxophone has been adopted in England at the Royal Military School of Music at Kneller Hall. (K. S.)

SAY, JEAN BAPTISTE (1767-1832), French economist, was horn at Lyons on the 5th of January 1767. His father, Jean Étienne Say, was of a Protestant family which had originally belonged to Nlmes, but had removed to Geneva for some time in consequence of the revocation of the edict of Nantes. Young Say was intended to follow a commercial career, and was sent, with his brother Horace, to England, and lived first at Croydon, in the house of a merchant, to whom he acted as clerk, and afterwards in London, where he was in the service of another employer. When, on the death of the latter, he returned to France, he was employed in the office of a life assurance company directed by E. Clavière, afterwards known in politics. Clavière called his attention to the *Wealth of Nations*, and the study of that work revealed to him his vocation. His first literary attempt was a pamphlet on the liberty of the press, published in 1789. He worked under Mirabeau on the *Courrier de Provence.* In 1792 he took part as a volunteer in the campaign of Cham­pagne; in 1793 he assumed, in conformity with the Revolu­tionary fashion, the pre-name of *Atticus,* and became secretary to Clavière, then finance minister. He married in 1793 Mlle Deloche, daughter of a former *avocat au conseil;* the young pair were greatly straitened in means in consequence of the deprecia­tion of the assignats. From 1794 to 1800 Say edited a periodical

entitled *La Décade philosophique, littéraire, et politique,* in which he expounded the doctrines of Adam Smith. He had by this time established his reputation as a publicist, and, when the consular government was established in the year VIII (1799), he was selected as one of the hundred members of the tribunate, and resigned, in consequence, the direction of the *Décade.* He published in 1800 *Olbie, ou essai sur les moyens de réformer les mœurs d'une nation.*

In 1803 appeared his principal work, the *Traité d'économie politique.* In 1804, having shown his unwillingness to sacrifice his convictions for the purpose of furthering the designs of Napoleon, he was removed from the office of tribune, being at the same time nominated to a lucrative post, which, however, he thought it bis duty to resign. He then turned to industrial pursuits, and, having made himself acquainted with the processes of the cotton manufacture, founded at Auchy, in the Pas de Calais, a spinning-mill which employed four or five hundred persons, principally women and children. He devoted his leisure to the improvement of his economic treatise, which had for some time been out of print, but which the censorship did not permit him to republish; and in 1814 he availed himself (to use his own words) of the sort of liberty arising from the entrance of the allied powers into France to bring out a second edition of the work, dedicated to the emperor Alexander, who had professed himself his pupil. In the same year the French government sent him to study the economic condition of Great Britain. The results of his observations during his journey through England and Scotland appeared in a tract *De l'Angleterre et des Anglais;* and his conversations with distinguished men in those countries contributed to greater correctness in the exposition of principles in the third edition of the *Traité,* which appeared in 1817. A chair of industrial economy was founded for him in 1819 at the Conservatoire des Arts et Métiers. In 1831 he was made professor of political economy at the Collège de France. He published in 1828-1830 his *Cours complet d'économie politique pratique,* which is in the main an expansion of the *Traité,* with practical applications. In his later years he became subject to attacks of nervous apoplexy. He lost his wife in January 1830; and from that time his health con­stantly declined. When the revolution of that year broke out, he was named a member of the council-general of the department of the Seine, but found it necessary to resign. He died at Paris on the 15th of November 1832.

Say was essentially a propagandist, not an originator. His great service to mankind lay in the fact that he disseminated throughout Europe by means of the French language, and popularized by his clear and easy style, the economic doctrines of Adam Smith. It is true that his French panegyrists (and he is not himself free from censure on this score) are unjust in their estimate of Smith as an expositor and extol too highly the merits of Say. On the side of the philosophy of science his observations are usually commonplace or superficial. Thus he accepts the shallow dictum of Condillac that *toute science se réduit à une langue bien faite.* He recognizes political economy and statistics as alike sciences, and represents the distinction between them as having never been made before him, though he quotes what Smith had said of political arithmetic. While deserving the praise of honesty, sincerity and independence, he is inferior to his predecessor in breadth of view on moral and political questions. In his general conception of human affairs there is a tendency to regard too exclusively the material side of things, which made him pre-eminently the economist of the French liberal *bourgeoisie.* He is inspired with the dislike and jealousy of governments so often felt and expressed by thinkers formed in the social atmosphere of the 18th century. Soldiers are for him not merely unproductive labourers, as Smith called them; they are rather “destructive labourers.” Taxes are uncompensated payments; they may be described as of the nature of robbery.

Say is considered to have brought out the importance of capital as a factor in production more distinctly than the English economists, who unduly emphasized labour. The special doctrines most commonly mentioned as due to him are—(1) that of “ immaterial products, and (2) what is called his “ théorie des débouchés." Objecting, as Germain Garnier had, to Smith’s distinction between productive and unproductive labour, he maintains that, production consisting in the creation or addition of a utility, all useful labour is productive. He is thus led to recognize immaterial products, whose characteristic quality is that they are consumed immediately and are incapable of accumulation; under this head are to be ranged the *services* rendered cither by a person, a capital or a portion of