Darwin's last remaining son, Major Leonard Darwin, R.E., born in 1850, has given me the following particulars of his father's daily meals. He generally breakfasted alone; tea, with sugar, milk or cream, toast and a little bacon. He lunched with his family—joint, vegetables, and a simple sweet pudding. He drank a glass of sherry. He had afternoon tea with Mrs. Darwin. Dinner was a repetition of luncheon, and sherry was again taken. He never took ales or spirits, but often drank tea with his dinner.

Many have found the accounts of Darwin's continued ill-health somewhat mysterious. There cannot have been any organic disease, for he lived to be seventy-three, and all seems clear now—he was the victim of chronic indigestion, induced by five years of hardship at sea, with scant accommodation on a small ship and with roughly prepared food. All this would permanently upset the digestive organs of a highly sensitive man.

Indigestion results from: (1) imperfect mastication; (2) too much food; (3) improper foods. I think the cold baths must have done harm, and it is evident a good dentist should have been consulted, periodically. The stomach should have been called into action three, and not four, times daily. For many, afternoon tea is an insult to their luncheon and a menace to their dinner. I think his dietary was all wrong, but this is a professional matter not to be discussed in these pages. The sad thing is that there was so much suffering while "Malignant Fate sat by and smiled".

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SCIENTIFIC CENTENARIES IN 1943

By ENG.-CAPT. EDGAR C. SMITH, O.B.E., R.N.

FOUR hundred years ago, on May 24, 1543, the famous astronomer Nicolaus Copernicus died in the city of Frauenberg, situated on the Fritsches Hof, about midway between Dantzig and Königsberg. He was buried in the cathedral, the centre of the diocese which he had served faithfully through his knowledge of canon law. As he lay on his bed stricken with paralysis, the first copy of his book "De Revolutionibus orbium cœlestrum, Libri VI" was placed in his hands, but it was too late; his memory had gone, his faculties were obscured. The book had lain completed for thirteen years, and it was only through the enthusiasm of the young German mathematician, Joachim Rheticus—whose attitude towards Copernicus was like that of Halley to Newton—that it was at last published. The expense of publishing was borne by Cardinal Schonberg, and to-day the first edition is exceedingly rare. A second edition appeared in 1566, and a third and last in 1617. Copernicus was just over seventy years of age, having been born at Thorn on January 19, 1473. Through his bishop-uncle he was able to study at Cracow, Bologna, Rome, Padua and Ferrara, at the last of which he took his doctor's degree in canon law. He returned north from Italy in 1505, lived at Heilsburg from 1507 until 1512, and from thence onward Frauenberg was his home. There is a statue of him at Thorn and another stands in the interior court of the library of the Jagellonian University, Cracow. A photograph of this was published in NATURE of March 2, 1922, to illustrate an article on "Science in Poland", and the question as to whether Copernicus was a Pole or a German was the subject of remarks in these columns so long ago as December 21, 1871 (p. 151).

A century after Copernicus died, John Bainbridge, the first Savilian professor of astronomy at Oxford, passed away "at his house opposite Merton College in this his 62d year, and his body was conveyed to the public school, where an oration having been pronounced in honour of him by Mr. William Strode, the University Orator, it was carried to Merton College Church and deposited on the left side of Mr. Henry Brigg's grave and an epitaph was inscribed upon his monument in Latin". Before his appointment to the Savilian chair, Bainbridge had taken degrees at Cambridge, kept a school, practised medicine and written on a comet. To what extent he had been influenced by the views of Copernicus we are not told, but his main interest was in Greek and Arabic scientific writings. A foreign mathematical contemporary of his was Habakkuk Guldinus (1577–1643), a Swiss Protestant who became a Jesuit and taught mathematics with success in the Jesuit colleges at Rome and Gratz.

Passing to the year 1743, we are faced with a long list of men of science, of greater or lesser fame, but all of interest. Of these the outstanding figure is Lavoisier, who was born in Paris on August 16, 1743, and fell beneath the guillotine on May 8, 1794. "The spring sends its green leaves and bright weather, bright May, brighter than ever: Death pauses not. Lavoisier, famed chemist shall die and not live: chemist Lavoisier was Farmer-General Lavoisier too, and all the Farmers-General are arrested; all, and shall give an account of their moneys and incomings, and die for 'putting water in the tobacco' they sold." So wrote Carlyle. Twenty-eight Farmers-General and their three assistants were sentenced at one sitting of the Tribunal of the Terror; and it was then that the terrible Coffinhal immortalized himself by replying to Lavoisier: "The Republic requires neither savants nor chemists; the course of justice cannot be suspended". Condorcet (1743–94), author of works on the calculus, and of "The Progress of the Human Mind", perpetual secretary to the Royal Academy of Sciences, only escaped a similar fate by taking poison, but the unfortunate German astronomer, Johan Wilhelm Wallot (1743–94), who had been employed on the testing of Leroy's chronometers and had lectured and observed in Paris for many years, perished on the scaffold on July 27, the day before Robespierre fell and the prisons were thrown open. The 'father' of crystallography, René Just Haüy (1743–1822), born six months before Lavoisier, was at one time in danger, but friends came to his rescue. None took a more active part in the foundation of the metric system than Lavoisier, and in some of his measurements Haüy was associated with him. There is a statue of Condorcet near the French Institute, and statues of Lavoisier behind the Madeleine Church and at the Sorbonne. A reduced replica of the latter is in the National Gallery of Scotland.

The discoveries and theories of Lavoisier were embraced by some chemists and rejected by others, but the credit for their favourable reception in Germany was largely due to the tireless Martin Heinrich Klaproth, who was born on December 1, 1743, and died on January 1, 1817. Klaproth made a host of accurate analyses of minerals and discovered several elements. In 1792, when professor of chemistry in Berlin, he proposed to the Berlin Academy of Sciences to repeat the more important of Lavoisier's experiments. His offer was accepted, and from that

time most of the Berlin chemists declared in favour of the new theories. With F. B. Wolff, Klaproth published the first German chemical dictionary. Another French chemist of this time was Antoine-Alexis-François Cadet-de-Vaux, born in Paris on September 13, 1743, whose investigations dealt with matters of domestic economy, public health and agriculture.

In other fields of science occur the names of Antonio Cagnoli (1743–1816), the intimate of Lalande, who had observatories in the Rue Richelieu in Paris and at his birthplace, Verona; of Johan Ferber (1743–90), a learned Swedish mineralogist and traveller; of Colonel James Capper (1743–1825), of the East India Company, who in 1801 published his work on winds and monsoons, and of the two self-taught British mathematicians, John Mole (1743–1827), originally a farm labourer, and Henry Andrews (1743–1820), first a domestic servant and then a bookseller. For forty years Andrews calculated for the "Nautical Almanac", and as the compiler of "Moore's Almanac" raised its sale from 100,000 to 500,000, getting but £25 a year from the not too generous Stationers' Company. Among the other publications of the Stationers' Company was the "Ladies' Diary", begun by John Tipper in 1704. When Tipper died in 1713, Henry Beighton became its editor, and conducted it successfully until his own death in 1743. The "Ladies' Diary" filled a place in the mathematical life of Great Britain in the eighteenth century, and Beighton in his prefaces speaks of it as being "peculiarly adapted for the use and diversion of the fair sex", and of his own "gallant endeavours to introduce his readers to the study of the mathematical sciences". Beighton too has a place in the history of experimental science and of the steam engine.

To complete the review of the bicentenaries which fall this year, mention may be made of the ingenious Rev. Edmund Cartwright (1743–1823), the inventor of the power loom, over which, and other inventions, he lost a sum of £30,000; a Government grant in 1809 of £10,000 made the evening of his life comfortable, and he was afterwards remembered as "a portly dignified old gentleman, grave and polite, but full of humour and spirit".

If for no other reason, the centenaries of men of science who died in 1843 would be of interest inasmuch as they include that of the French astronomer, Jean Nicolas Nicollet (1786–1843), whose intelligence and spriteliness as a boy were maintained throughout his life and led him to have a share in the greatest scientific deception ever perpetrated—the so-called "Moon Hoax". Born to a life of poverty and drudgery, from these Nicollet was rescued by the local curé, and he ultimately gained an education which led him to the librarianship and secretaryship of the Paris Observatory. Grant refers to a "beautiful paper" of Nicollet's in the "Connaissance des Temps", 1822, and to observations he made with Bouvard on the moon's libration in longitude. But it is not for such things he will be remembered longest. Desiring to be rich, he speculated on the Stock Exchange, lost, got into debt and then fled to the United States. That was in 1831. In 1833, Sir John Herschel, with considerable public attention, sailed to the Cape to survey the southern heavens. An unforeseen result was the compilation of accounts of most extraordinary discoveries he had made in the moon. Sir John, of course, knew nothing of them. The ball was apparently set rolling by the Somerset-Cambridge man, Richard Adam Locke, as impecunious as he was versatile and unscrupulous. In 1832, at the age of thirty-two, he too went to the United States, where in 1833 the New York *Sun* made its first appearance. To the editor of the *Sun* Locke proposed an account of Herschel's discoveries in the moon, and so in issue after issue one could read about brown quadrupeds, temples, man bats and what not. The *Sun's* circulation soared and Edgar Allan Poe declared Locke's hoax to be "the greatest hit in the way of sensation . . . ever made by any similar fiction either in America or Europe". At any rate the story made people read, who had never read newspapers before. There is, however, another side to the matter. In Messrs. Sotheran's Catalogue, No. 826, p. 179, there is an entry: "The History of the Moon; or an account of . . . the Rocks, Trees, Flowers, Verdant Plains, Volcanoes, etc." (*c.* 1833), and the authorship of this is attributed by Messrs. Sotheran's to Nicollet, who "published the above account in the New York *Sun* partly to 'raise the wind' and partly to entrap M. Arago, his enemy, into believing it". Did Locke and Nicollet ever meet? Did they collaborate? What is the truth?

Of Alexis Bouvard (1767–1843), called by Miss Clerke "the indefatigable computating partner of Laplace", little seems to be known. He was perhaps the first to conceive the existence of a planet beyond Uranus. Another Frenchman of that time was Silvestre-François Lacroix (1765–1843), mathematical professor at the Collège de France and the Sorbonne. It was the translation by Herschel, Babbage and Peacock of his "Elementary Treatise on the Differential Calculus" which gave the first impulse to a mathematical revival in England. A Swiss mathematician of note who died in 1843 was Ferdinand Rudolph Hassler; Simon Newcomb married Hassler's grand-daughter. After taking part in the trigonometrical survey of Switzerland, Hassler went to the United States, in 1807 was made a professor at West Point Academy and in that same year put forward plans for a survey of the sea coast of the various States; thus he was the virtual founder of that great scientific service, the United States Coast Survey, of which he was the first director. He was born at Aarau in Switzerland in 1770.

Recrossing the Channel to recall some British men of science who died or were born in 1843, we come first to the well-known names of Macintosh, Hedley and Forsyth. Charles Macintosh (1766–1843), the industrial chemist, will always be remembered for his patent of 1823 for making waterproof fabrics by cementing two thicknesses together with india rubber dissolved in naphtha; William Hedley (1779–1843), one of the pioneers of the locomotive, will be remembered so long as his "Puffing Billy" stands in the Science Museum and his "Wylam Willy" stands in the halls of the Royal Scottish Museum, Edinburgh. The work of the Rev. Alexander John Forsyth (1769–1843) on the percussion lock for firearms is recorded on a memorial tablet erected on the walls of the Tower of London in 1930. To these names may be added that of Robert Bakewell (1768–1843), who when geology was first attracting widespread attention lectured up and down the country and wrote excellent text-books, the perusal of one of which awakened Lyell's interest in the subject.

When Herschel arrived at the Cape and set up his observatory at Feldhausen, the Royal Observatory near Cape Town had been nominally in existence since 1821, but no instruments were fixed until some years later. The Rev. Fearon Fallows was the first

director and he was succeeded in turn by Thomas Henderson, Sir Thomas Maclear and Edward J. Stone, who in 1879 was followed by Sir David Gill. Gill was born at Aberdeen a century ago next June. Under Gill, who held the post of "Her Majesty's Astronomer" until 1906, the Observatory was completely transformed and it took a leading part in many of the principal projects of the day, including the great Astrographic Chart of the Heavens. Gill was also deeply interested in the measurement of an arc of meridian from the Cape northward through the entire African Continent. His retirement led to little lessening in his activities, and in 1913 he completed his "History and Description of the Cape Observatory". He died on January 24, 1914. Two other astronomers who laboured in the southern hemisphere in Gill's time were Henry Alfred Lenehan (1843–1908), the Government Astronomer of New South Wales and in 1905 president of the Royal Society of that colony, and John Macon Thome (1843–1908), who assisted and then succeeded Gould at the Argentine National Observatory at Cordoba.

Another eminent man of science holding, like Gill, a high official position and born in 1843 was Sir William Chandler Roberts-Austen (1843–1902), the successor of Thomas Graham at the Mint and the successor of Dr. Percy as professor of metallurgy at the Royal School of Mines, London. While assayer at the Mint, he was responsible for the standard fineness of about £190,000,000 of gold, silver and copper coin. He was the first secretary of the Physical Society, president of the Iron and Steel Institute and a Chevalier of the Legion of Honour. Some of his most valuable work was done for the Alloys Research Committee of the Institution of Mechanical Engineers.

To the foregoing may be added the names of Sir John Isaac Thornycroft, F.R.S. (1843–1928), the famous naval constructor and marine engineer; Ralph Hart Tweddell (1843–95), a pioneer of hydraulic tools for shipbuilding, bridge-building, etc.; George Frederick Deacon (1843–1909), a great water engineer who carried through the Vyrnwy Valley project in Montgomeryshire for the water supply of Liverpool; James Campbell Brown (1843–1910), for forty-three years associated with Liverpool as public analyst and as lecturer and professor of chemistry in the University; and finally the name of the eminent Belgian metallurgist, engineer and industrialist, Adolphe Greiner (1843–1915), director of the great Cockerill Works at Seraing, Bessemer medallist and president of the Iron and Steel Institute, who saw his medal and other valuables stolen during the "foul flood" which inundated Belgium a generation ago.

It will not have escaped notice that most of the men included in these notes were workers in the physical sciences. Readers who are more interested in the biological sciences can no doubt recall other workers of renown. One such distinguished man was the famous naturalist, Sir Joseph Banks, who, for forty-one years, was president of the Royal Society. Reference books differ as to the day and year of his birth, but Weld in his "History of the Royal Society" says he was born in Argyle Street, London, "on the 2nd of February, 1743 O.S.". Of the birth of the famous German bacteriologist, Robert Koch, who isolated the bacillus of tuberculosis, there is no such question. He was born at Klausthal in the Harz on December 11, 1843, and died in 1910; an obituary of him appeared in NATURE of June 2, 1910 (p. 402).

NEWS and VIEWS

Wooden Aircraft for War Purposes

IT has been announced that a wooden construction aircraft, the Curtis C.76 known as the Caravan, has just been completed in the United States, being the first of its kind, in that country, to be designed especially for war transport purposes. It is a high-wing monoplane, powered with two 1,200 h.p. engines. It carries two pilots and a radio operator, and has a large cabin space suitable for the carriage of troops, guns, or other military equipment. The body is built specially low when standing on the ground, and the doors are arranged to facilitate the quick transfer of the contents. Outlets specially suitable for para-troops are also provided. An interesting feature of this development is that it represents, with several British contemporaries the most notable of which is the Mosquito day bomber, a return from metal to wooden construction that has taken place since the outbreak of war.

The immediate pre-war policy of the Air Forces of most countries was to use metal construction (1) because it allowed a rapid expansion of output along mass-production lines, (2) because of its relative immunity from fire due to enemy bombing of large concentrations in store. War experience has almost completely reversed these. In the case of (1), the need for constant progress in design makes real mass production prohibitively wasteful in labour and materials allotted to production machinery, tools, etc. It also neglects a large reservoir of wood-working labour and machinery that has not so great a use in any other sphere of war production. With (2), the large concentration of war material close behind the static lines preparatory to an attack is no longer needed, partly because warfare has proved to be more fluid; also the speed at which it has been proved that aircraft can be concentrated at any given point allows it to be dispersed in store over a wider area. Another field for wooden aircraft is that of pure transport, distinct from fighting or bombing. The rapid carriage of troops or material to points where needed for fighting operations can proceed far enough away from the enemy to be reasonably safe from interference on a large scale, and the high speeds of the aircraft allow it to take evasive action to avoid isolated attack from occasional enemy machines. Thus a machine designed to a transport specification rather than a war one becomes the ideal, and in this case wood construction has many advantages.

Short-Wave Broadcasting: Transmission

SIR NOEL ASHBRIDGE, controller of the Engineering Division of the B.B.C., gave an account of "Short-Wave Broadcasting: Ten Years Technical Progress", in the Overseas Service of the Corporation on December 17. Sir Noel said that it is about eleven years since the B.B.C., in spite of inconclusive reports on the existing service, decided that an attempt