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Lavoisier 1743-94

Antoine Laurent Lavoisier (1743-94) was born in Paris and spent all his life there. After a brilliant education, humanistic and scientific, he showed himself to be an exceptional man by the breadth of his activities and by his intellectual and practical gifts. A great administrator who served his government, a successful financier, a political economist, a versatile scientist who contributed to mineralogy, agronomy, pure and applied chemistry, and physiology, Lavoisier was able to pursue his several and parallel enterprises not only with order and method but with considerable effectiveness and authority. Happy in all his endeavors, his marriage to a girl of fourteen, Marie Anne Paulze, proved to be a great asset to his career: she took notes of his experiments, translated scientific articles by English chemists, sketched and engraved illustrations for his publications, and also acted as a hostess in their luxurious home, open to French and foreign philosophers, writers, and scientists. Lavoisier maintained close relations with the physiocrats, and became one of the most active representatives of the enlightened and liberal haute bourgeoisie, who played an essential role in bringing about reforms to the authoritarian monarchic institutions. At the advent of the Revolution, he collaborated with the governing body of the National Assembly, but when demagogy, violence, and dictatorship prevailed, he became one of the victims of the Terror. Arrested on the denunciation of one of his former subordinates and convicted on a false charge, he was guillotined on May 8, 1794, at the age of fifty. Hearing of this tragic death, the famous mathematician Lagrange exclaimed, "It took only one moment to sever that head, and perhaps a century will not be enough to produce another like it."

His research in chemistry, begun at the Académie des Sciences, to which he was elected at the age of twenty-five (1768), proceeded from 1775 in the laboratory he built at the Arsenal (the seat of the state controlled manufacture of gunpowder) of which he was, for practical purposes, the director. His research, which culminated in the discovery that respiration is a combustion, is impressive for its continuity in design, perseverance in effort, and application of precise physical methods.—André Courmand, M.D. Circulation of the Blood. Edited by Alfred P. Fishman, M.D., and Dickinson W. Richards, M.D. New York, Oxford University Press, 1964, p. 41.
The Scientific Revolution

The whole of modern thought is steeped in science; it has made its way into the works of our best poets, and even the mere man of letters, who affects to ignore and despise science, is unconsciously impregnated with her spirit, and indebted for his best products to her methods. I believe that the greatest intellectual revolution mankind has yet seen is now slowly taking place by her agency. She is teaching the world that the ultimate court of appeal is observation and experiment, and not authority; she is teaching it to estimate the value of evidence; she is creating a firm and living faith in the existence of immutable moral and physical laws, perfect obedience to which is the highest possible aim of an intelligent being.—T. H. Huxley (Collected Essays, VIII, Discourses, Biological and Geological. London,1893-94, p. 226).
tients with heart disease, 31 excreted subnormal amounts of Na, between 10 and 550 mEq. and only 10 excreted normal quantities. An alternate plan, in which 320 mEq. of Na was administered in 8 days, was also utilized in patients in whom the standard 920-mEq. Na load was considered inadvisable. There was no correlation between the impairment of Na excretion, as estimated by the Na tolerance test, and the etiology of the heart disease, the glomerular filtration rate, or any hemodynamic variable. Patients with marked functional disability excreted less Na than those with few symptoms, and the patients with the most severe impairment of Na excretion all had a history of edema. Striking improvement in Na tolerance followed corrective cardiac operations. The Na tolerance test was found of particular usefulness in the evaluation of patients in whom clinical examination and hemodynamic studies gave no conclusive evidence as to the presence or absence of congestive heart failure.

References

The Enigma of Creativity

The creative process is often not responsive to conscious efforts to initiate or control it. It does not proceed methodically or in programmatic fashion. It meanders. It is unpredictable, digressive, capricious. As one scientist put it, "I can schedule my lab hours, but I can't schedule my best ideas." Obviously in any complex performance the process must at some point be brought under conscious discipline and control. But the role of the unconscious mind in creative work is clearly substantial.—John W. Gardner. Self-Renewal. The Individual and the Innovative Society. New York, Harper & Row, Publishers, 1963, p. 34.
resulting from atrial contraction was exaggerated in severe pulmonary stenosis and was larger than normal in many of the mild and moderate cases.

Recordings of precordial movement in pulmonary stenosis, though nonspecific in morphology, are nevertheless useful as an index of severity of the lesion, in timing phases of the cardiac cycle, in following the progress of cases before and after surgical interference, and as a method of improving appreciation of palpable phenomena at the bedside.

References

The Circulatory System of Science

Scientific journals are the circulatory system for the ideas of science. It is largely through them that science develops, for scientific growth is the result of cross-fertilization between laboratories and groups in different countries. One of the evil consequences of war is that it stops the flow of scientific ideas from one nation to another. And to the extent that this process is blocked the development of science is definitely retarded.—Raymond B. Fosdick.

Structure and Movement of the Heart
Richard Lower—1631-1690

Richard Lower (1631-90) was one of the early members of the Royal Society. His careful studies of the musculature of the heart and the form of its contraction exhibited his extraordinary powers of observation, matching in skill if not in originality his observations on the oxygenation of blood in the lungs. Here Lower has probably received less credit than he has deserved. This may well have been in part because of his irascible personality and barbed pen, and the numerous enemies that he acquired. When he died, among the poetic tributes was the following:

"Upon Dr. Lower's Death, Being a Man of a Morose Disposition:
Had not good nature o'er ye ill prevail'd
Death in attempting Dr. Lower had fail'd
Who might have lived with us many a year
Prepared (in his own pickle) vinegar.
But when ye Alkali had killed ye soure
His blood being sweetened, off went Dr. Lower."


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The Pulmonary Circulation. Michael Servetus—1511-1553

"... It is not said that the divine spirit is principally in the walls of the heart, or in the body of the brain or of the liver, but in the blood, as is taught by God Himself in Gen. 9, Levit. 8, Deut. 12.

"In this matter there must first be understood the substantial generation of the vital spirit which is composed of a very subtle blood nourished by the inspired air. The vital spirit had its origin in the left ventricle of the heart, and the lungs assist greatly in its generation. It is a rarefied spirit, elaborated by the force of heat, reddish-yellow (flavo) and of fiery potency, so that it is a kind of clear vapor from very pure blood, containing in itself the substance of water, air, and fire. It is generated in the lungs from a mixture of inspired air with elaborated, subtle blood which the right ventricle of the heart communicates to the left. However, this communication is made not through the middle wall of the heart, as is commonly believed, but by a very ingenious arrangement the subtle blood is urged forward by a long course through the lungs; it is elaborated by the lungs, becomes reddish-yellow and is poured from the pulmonary artery into the pulmonary vein. Then in the pulmonary vein it is mixed with inspired air and through expiration it is cleaned of its sooty vapors. Thus finally the whole mixture, suitably prepared for the production of the vital spirit, is drawn onward to the left ventricle of the heart by diastole."—André Cournand, M.D. Circulation of the Blood. Edited by Alfred P. Fishman, M.D., and Dickinson W. Richards, M.D. New York, Oxford University Press, 1964, pp. 21 and 22.
gesting that the factors contain more than simple dipolar information. This would in turn suggest that a more complex generator than the dipole must be employed to explain the surface potentials derived from the standard electrocardiogram. With only two principal factors the precordial leads were rather easily reconstructed but reconstruction of leads I and $V_F$ was considerably more difficult. Because the principal factors represent the most commonly occurring waveforms in the group, the less perfect resynthesis of leads I and $V_F$ with two factors alone may result from lack of detection of multipolar component in the limb leads which have less in common with the precordial leads than the precordial leads do with each other.

References


How Medicine Became a Science

In the early part of the nineteenth century clinical science celebrated several successes. Methods of examination had improved by the introduction of percussion, introduced by Auenbrugger in 1761, and of auscultation devised by Laennec in 1816. In addition the knowledge of morbid anatomy in England had been advanced by the publication of Matthew Baillie's Atlas. Medical teaching in London was at that time specially concentrated at Guy's Hospital and it was there that the increased knowledge bore most fruit. The names of Bright, Addison and Hodgkin are sufficient to prove that accurate observation, both of the living and the dead, careful consideration of what one has observed, and confirmation by further observation of nature's experiments on the human frame, may serve to produce real scientific advances. Clinical science conducted with minimal laboratory aid still retains its value.—Zachary Cope, KT. Some Famous General Practitioners and other Medical Historical Essays. London, Pitman Medical Publishing Co., Ltd., 1961, p. 189.
(2) parachute mitral valve, (3) subaortic stenosis, and (4) coarctation of the aorta. In the case of corrected transposition representing the inverted form of this condition, the right-sided atrioventricular valve exhibited a parachute deformity and in the venous ventricle there was subpulmonary stenosis (fig. 2).

**Summary and Conclusions**

Inverted malformations are defined as those malformations that are specific for certain anatomic structures in the heart and that occur in corrected transposition. An inverted malformation appears on the contralateral side of the heart from that characteristic for the basic malformation when present in the normally oriented heart.

Two cases of corrected transposition with inverted malformations are presented. One was an example of an anomalous muscle mass occurring in the arterial ventricle of a heart with a special form of corrected transposition. This mass is considered to be an inverted form of anomalous muscle bundle of the right ventricle. The second case of corrected transposition was associated with a parachute deformity of the right atrioventricular valve, membranous subpulmonary stenosis, and bicuspid pulmonary valve. These malformations are considered to represent the inverted form of the developmental complex in which a parachute deformity of the mitral valve and subaortic stenosis are part.

**References**


**Quiet Reverence**

The way in which the persecution of Galileo has been remembered is a tribute to the quiet commencement of the most intimate change in outlook which the human race had yet encountered. Since a babe was born in a manger, it may be doubted whether so great a thing has happened with so little stir.—A. N. Whitehead.
5. Grant, R. P.: The morphogenesis of corrected transposition and other anomalies of cardiac polarity. Circulation 29: 71, 1964 (Figure 5B).

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The Output of the Heart

The animal having expired, following exsanguination, Hales filled the left ventricle with melted beeswax and on its solidifying, measured its volume—10 cubic inches, or 160 cc. Assuming complete emptying of the ventricle in systole (we recall that Harvey, a more careful observer, did not make this assumption), and having found the pulse rate of a normal horse at rest to be 36, Hales calculated the cardiac output of the horse at rest to be 360 cubic inches or 6 liters per minute. This is a low figure, caused in part no doubt because the animal had bled to death, and the ventricular cavity was small. Further blood pressure and ventricular volume measurements in other species gave proportionate figures. For man, Hales took Harvey’s estimates of two ounces as a likely volume of ventricular ejection, and calculated a cardiac output of about four liters per minute.

He noted that systole occupied only one-third of the cardiac cycle, and concluded that the run-off was therefore accomplished by the elasticity of the large vessels. He calculated the velocity imparted to the aortic column of blood in systole to be 86.7 feet per minute. He was impressed by the variability of blood pressure and heart rate under different circumstances. . . .

A broad concept of blood pressure, blood flow, blood velocity and their relations, and quantitative measurements or calculations of each—these were the great contributions made by Stephen Hales to the knowledge of the output of the heart, a contribution which has oriented all future work.—William F. Hamilton, M.D., and Dickinson W. Richards, M.D. Circulation of the Blood. Edited by Alfred P. Fishman, M.D., and Dickinson W. Richards, M.D. New York, Oxford University Press, 1964, p. 83.