congested. Frequently, a general tumefaction and ulceration involves the muscular tissue, and suppurating points dip down to the cartilages. By no unaided effort of the patients in the extreme paroxysm will the membrane be thrown off.

"In striking contrast, the croupous cast is semitransparent, delicate, and tender to handle, somewhat gelatinous, and of a pale yellowish colour, easily separable from the subjacent surface as an imperfect cast of the part on which it is formed. It is only after the death of the patient that it is seen to be opaque, and composed of more than one layer. It is generally thrown off during a violent fit of coughing, when the patient finds almost immediate relief from the more urgent symptoms. It is never found so intimately connected with the subjacent mucous membrane as to cause bleeding. It is simply a clean cast of the superficial epithelial layer, closely resembling the cast-off skin shed by some of the lower animals—the growing amphibia, for example.

"The histological differences are much more strongly marked. Diphtheritic membrane requires a good deal of teasing out to fit it for microscopic examination. A power of 350 diameters reveals an aggregation of granular matters, nucleated epithelium, fat-molecules, and minute crystals, held together by interspersed bands of connective tissue. Muco-purulent corpuscles often entangle foreign bodies; and in throat-affections, the spores of the oidium albicans are rapidly developed. The membrane is, in short, a laminated fibroid mass of the superficial and deeper seated structures, in a later stage involving the submucous tissues, muscles, glands, and cartilages. In sections made from various preparations, portions of all these structures have been well seen, and sometimes I have found considerable hypertrophy of the connective and fibrous tissues.

"A portion of a croupous cast, however, examined under the same power, consists of numerous cylindrical and pavement epithelial cells, granular matter, fat-corpuscles, and mucus, with some occasional foreign bodies, as particles of food entangled in a protoplasmic homogeneous matrix. The columnar epithelial cells retain their cilia, and are filled with clear sarcoid, and nucleated. It is, therefore, surmised that these casts are not long retained; probably they are thrown off soon after their formation. Fungus-spores are rarely found entangled in these films, which are characterised by an excessive cell-proliferation rather than a transudation or true exudation. Although some of the croup casts differ a good deal in colour and consistency, connective or fibrous tissue never enters into their composition."

These facts, which have been established by Mr. Hogg by repeated demonstrations under the microscope, and verified by Dr. Greenfield of St. Thomas's Hospital, account, in the most satisfactory manner, for the therapeutic value of emetics in croup, and their utter uselessness in diphtheria.

In a letter I have received from Mr. Jabez Hogg on this subject, dated September 15th, 1875, he adds to his previous observations: "My friend Dr. Greenfield's observations and microscopic examinations were founded upon five well-marked cases of diphtheria; and he appears to confirm me in almost every particular. He found that 'the inflammatory action extended to the larynx and trachea; and that the false membrane removed consisted of a stratified network of tissue, giving the reactions of fibrin, in the meshes of which were entangled altered layers of epithelium-cells and blood-corpuscles. The membrane throughout was partly catarrhal, with condensed epithelium and a true fibrinous exudation, with, in one case, the spores and fungus-mycelium intermixed. The inflammatory mischief extended and penetrated deeper about the pharynx than it did about the trachea, where there was, however, always a considerable amount of destruction of tissue. He was unable to say whether the fungus was an accidental or a potential agent in the inflammatory process.' There is, no doubt, something yet to be learnt in the history of the specific diphtheritic zymosis, which, unlike croup, is of a contagious poisonous nature: often an outgrowth of unsanitary conditions. With regard to croup, there is always one point in its etiology which appears to me not to have received much attention; and yet it is of some importance, as seeming to separate it very widely from diphtheria. I refer to its peculiar hereditariness. I have seen several well-marked instances of this; and I am now attending a family for an affection (strumous) of eye, in which croup has gone down to the third generation, affecting the males of the family in particular. No one ever heard of diphtheria having been transmitted from father to son, or from mother to daughter, that I am aware of."

I might have entered into this subject much more fully, but I cannot venture to trespass further on the space of the JOURNAL; and I think I have said enough to show that croup and diphtheria are distinct, not identical. Two recent cases of diphtheria in my practice confirm me in this belief, and fully corroborate Mr. Hogg's observations.

A COMMENTARY ON DR. PATRICK BLACK'S THEORY OF ASPHYXIA.

By GEORGE JOHNSON, M.D., F.R.S.,
Professor of Clinical Medicine and Physician to King's College Hospital.

DR. BLACK, in his reply to my criticism, says that I prefer Dr. Reid's theory of asphyxia to his own. The fact is, that I prefer Dr. Reid's conclusive experiments to Dr. Black's theory unsupported by a single fact.

Dr. Black questions the statement that "the first impediment to the circulation consequent on the exclusion of air from the lungs occurs, not in the pulmonary, but in the systemic vessels", because, as he truly says, the right cavities of the heart are found much distended after death. He apparently is not aware that the arrested pulmonary circulation which results in the great distension of the right side of the heart, with comparative emptiness of the left cavities, is a later phenomenon than the impeded but not arrested passage of blood through the terminal systemic vessels. This is clearly shown by Dr. Reid's experiments, which I again commend to Dr. Black's notice. He will find that his theory of asphyxia is quite inconsistent with Dr. Reid's unquestionable facts.

With reference to nitrous oxide gas, I would ask Dr. Black if, as he assumes, no impediment to the pulmonary circulation result from its inhalation, what explanation he gives of the great lividity of the skin and the epileptiform convulsions which suddenly occur when the inhalation is carried beyond a period of something less than a minute. Has Dr. Black examined immediately after death the heart of an animal killed by the inhalation of nitrous oxide gas? If so, will he tell us in what condition he has found its cavities? With the kind assistance of my friend and colleague Mr. Hamilton Cartwright, I have quite recently administered a fatal dose of nitrous oxide gas to two rabbits, taking care that the respiratory movements were unimpeded while the gas was inhaled. Death in both cases was preceded by epileptiform convulsions. In both animals, the chest being opened immediately after death, the right cavities of the heart were found much distended, while the left were flaccid, and contained much less blood. In short, the evidence of impeded circulation through the lungs was precisely the same as in cases of ordinary asphyxia. Dr. Black's assertion that venous blood will pass through the lungs as freely as arterial blood is as demonstrably inaccurate, as his astounding statement that the orifices of the pulmonary artery and aorta are of exactly the same diameter.

REPORT UPON THREE FATAL CASES OF CEREBRO-SPINAL FEVER.

By STAFF-SURGEON ROBERT NELSON, Royal Naval Hospital, Plymouth.

[Communicated by the Director-General of the Medical Department of the Navy.]

THE following cases may be of importance, as illustrating a disease which of late years has appeared in various countries in an epidemic form, and the etiology and treatment of which are still wrapped in much obscurity.

CASE I.—A private in the Royal Marines, aged 20, was placed on the sick list of his barracks on January 21st, complaining of epigastric pain, with incessant vomiting, tongue thickly coated with a brown fur; had been restless and out of sorts during the night; felt cold, but had no distinct rigor. Pulse, 78; temperature, 99.4 deg. An emetic was administered previously to his admission, and, after its operation, the epigastric pain and vomiting were relieved. On admission, on the third day of illness, he complained of severe headache, without any pyrexial symptoms; felt cold and "shivery", and shortly afterwards the headache became intense, the patient frequently placing his hand upon the crown of his head and shrieking with agony. At midnight, he became very restless, tossing about continually, occasionally getting out of bed, and inclined to roam about the ward in an excited and maniacal manner, resisting all examination as to the state of the tongue, pulse, temperature, etc. The skin was quite cool and the pulse not rapid. He was ordered half a drachm of hydrate of chloral, but with no appreciable effect.

Fourth day.—He was quiet this morning. He lay on his right side. He could be roused to answer questions, but showed great impatience at being disturbed. He continued to put his hand up constantly to rub or press the crown of the head, which was drawn backwards, the