THE SKULL OF THE DOMESTIC FOWL.

BY C. FEW SEISS.

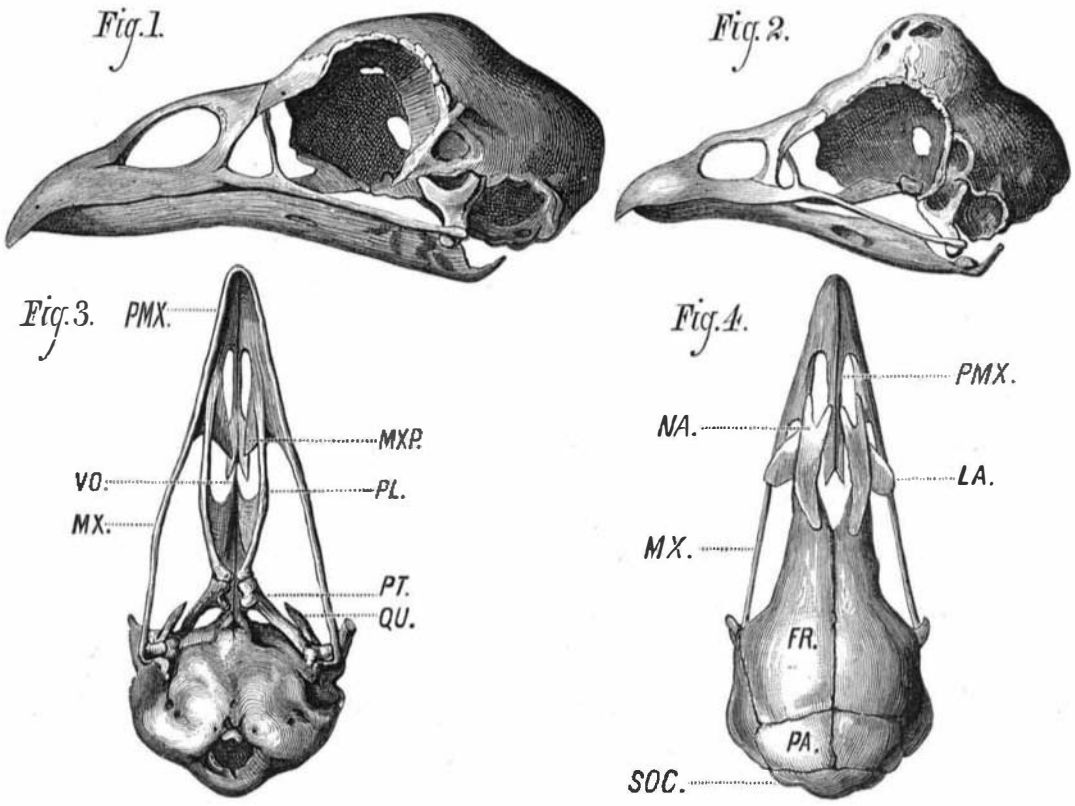
Bones constitute the foundation and framework of all the vertebrated animals; and yet how few persons know, or desire to know, anything about them. I have known ornithologists (?) who could determine the correct species of a bird at one glance, and yet were ignorant of the name and position of almost every bone in a bird's body. This is learning zoölogy before having studied its A B C. An ornithologist who has slaughtered thousands of our birds, simply for their "dry skins," says he "can see nothing in dry bones." I think it would be more beneficial to him and others, and most certainly so to the birds, if he would cease this wholesale slaughter, kill as few birds as possible, and these study thoroughly, both interiorly and exteriorly.

For the first step into the osteology of the aves, I give drawings of the skulls of three varieties of the domestic fowl (*gallus domesticus*). A poultry fancier presented me with the head of a prize "McClellan game cock," and of a "white Polish hen." On examining the skull of the latter I found the frontal region extremely gibbous, and with twelve holes entering into the brain chamber, two of which were two eighths of an inch in length. I do not know whether all individuals of this breed have the skull thus perforated, that is to such a degree as this, but if they have, it were better this white Polish deformity were rapidly and for ever exterminated. The premaxillaries running up between the nasals are weak and thread-like, and indeed the whole skull is weakly put together. We often see among poultry fanciers the most deformed and unnatural breeds the most prized. I would suggest this: Let some popular poultryman work up a fancy breed—something new and interesting—a breed without eyes, and without feet, and give it some good but short name, say, for instance "E-pluribus-unum-sic-semper-tyrannis" fowls. It would be a success. A breed of this description would have many recommendations. It would eat little, never scratch, never suffer from blindness after a combat, and best of all, would be an everlasting "sitter." Poultry fancier, what would'st thou have more?

The skull of the game cock is more of the typical or natural order. The brain case is thick, solid, firm and heavy; the premaxillæ, running toward and between the nasals, are strong, broad, and arched; the *os quadratum* and the maxillæ are strongly made, and the whole skull is substantially put together. It belongs to a breed of chickens which should be encouraged.

I regret the smallness of my collection of fancy chicken crania, for I should like, if able to study out the good or bad points appearing in the various varieties.

Fig. 1 is a lateral view of the skull of the McClellan game cock, and Fig. 2 that of the white Polish hen. Fig. 3 is the under view of the skull of a common chicken, with the nasals, frontals, and lachrymals removed; PMX, the premaxillæ, including the bill and the two narrow bones running up from its center; MXP, the maxillo-palatine process; PL, the palatine bone, with the vomer, VO, between or in the center; PT, the pterygoid; MX, the maxilla (the upper jaw proper); QU, the *os quadratum*, quadrate or anvil bone, with or upon which the mandible or inferior maxillary articulates. Fig. 4 is the upper view of the skull of the cockerel, showing the sutures, the bones not yet anchylosed. The sutures are undistinguishable in adult fowls. FR is the frontal; PA, the parietal; SOC, the supra occipital. The foramen magnum is of the usual size, and, as with all birds, there is but one occipital condyle.



THE SKULL OF THE DOMESTIC FOWL.

Effect of Green Vitriol and Carbolic Acid upon the Growth of Plants.

Both sulphate of iron and carbolic acid are employed to disinfect fecal matter, which is afterwards employed as fertilizer. Nessler has therefore been experimenting upon the effects of these disinfectants upon the germination of seeds and the growth of plants. If the soil was kept quite dry the plants died when 25 parts of sulphate of iron or 10 parts of carbolic acid were added to 170,000 parts of earth. If the soil was moist the plants would stand 200 parts of sulphate of iron and 50 parts of carbolic acid to 170,000 of earth, without injury. When the manure is evenly distributed, as it should be for other reasons too, these disinfectants are uninjurious to husbandry.

LOMARIA DALGAIRNSIÆ.

This plant is a very fine greenhouse fern of arborescent character, with something the aspect of another arborescent form of the same species known to cultivators as *l zamioides*. It has a blackish trunk, which is shaggy at the apex, with long subulate dark brown scales. The fronds are but subcoriaceous in texture, pinnate in the lower part, and pinnatified above; the pinnæ lanceolate, acute, the lower ones small, tapered to the base, but scarcely stalked, the upper ones adnate, and the uppermost decurrently confluent. Below the small basal pinnæ each edge of the stipes is set with a row of abortive ones reduced to wart-like excrescences or callosities. The color of the sterile fronds is a dark green on the upper surface, and a paler green beneath. No fertile fronds have yet been produced.

The plants to which the above description applies have been recently imported from South Africa, and are therefore to be classed as greenhouse ferns. As such they are a valuable acquisition, since they prove to be of free-growing habit, not indicating the tendency of other allied forms to dwindle away; but on the contrary, pushing their fronds with remarkable vigor.

LOMARIA DALGAIRNSIÆ.

Separation of Vanadic Acid from the Alkalies.

The interest which is beginning to be felt in this rare element, vanadium, since it has found such a valuable application in the arts, in dyeing, printing, etc., induces us to insert an abstract of Gerland's paper, on the separation of vanadic acid from the alkalies in the form of ammonium vanadate.

In the first experiment pure pentoxide of vanadium was fused with 3 molecules of sodium and potassium carbonate; the mass was dissolved and precipitated hot with a hot saturated solution of sal ammoniac, and when cold filtered and washed until the filtrate left no residue upon evaporation, then washed with weak alcohol until the chlorine reaction ceased. The salt was pressed and dried over sulphuric acid. An analysis of 1 grain of this salt showed the presence of 2·11 per cent potassium.

In the next experiment ammonium vanadate was prepared from potassium ortho-vanadate, and was found to contain 2·42 per cent of potassium.

The first of these salts, when purified by dissolving in boiling water and pouring into a boiling solution of sal ammoniac, still held on to 0·23 per cent of potassium chloride, while the second contained 0·25 per cent of potassium after re-crystallization and purification.

In a third experiment the pentoxide was converted into sodium orthovanadate by fusing with sodium carbonate; the solution was precipitated by ammonium chloride and purified asbestos. Analysis showed the ammonium salt to be perfectly pure and free from sodium.

These experiments prove that ammonium vanadate cannot be prepared free from potash if the solution contained any potash, while sodium does not adhere to it in this way, hence in analysis the introduction of any potassium salt must be carefully avoided.

Gerland states that several other salts of vanadium also possess this property of carrying down small quantities of potassium which they stubbornly retain. Among these are the neutral and acid vanadid sulphates, vanadylo-sulphate and vanadylid-sulphate.

To a certain extent ammonium acts like potassium, so that metavanadic acid (VHO_3) holds on firmly to a small quantity of ammonium, which cannot be removed by digestion with acid. Copper ortho-vanadate cannot be obtained pure if ammonia were present when it was precipitated.

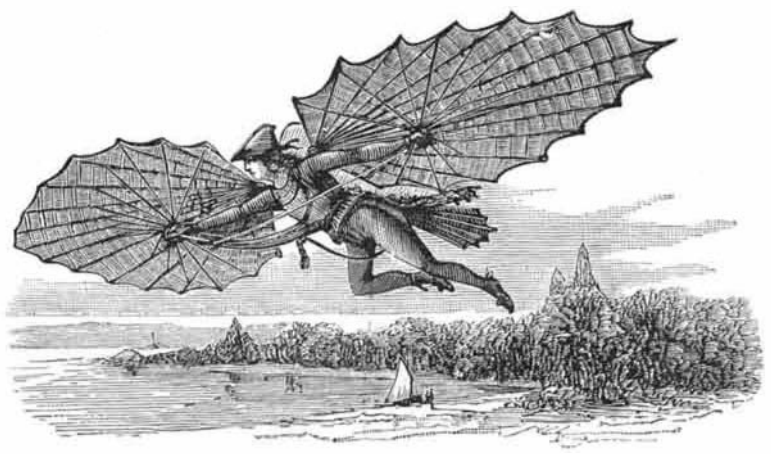
Prussic Acid to Absorb Carbonic Oxide.

C. Böttinger states that in studying the subject of glyoxylic acid he passed pure carbonic oxide gas through pure hydrocyanic acid

distilled over chloride of calcium and cooled, when he observed a large absorption of the gas. When he treated this liquid with concentrated aqueous hydrochloric acid and shook the two liquids they refused to mix, but formed two layers. On removing the vessel from the cooling mixture the liquid gave out a steady stream of pure carbonic oxide. After some time the evolution of gas became stronger, especially when warmed by the heat of the hand. Prussic acid was then mixed with the carbonic oxide. Finally, the liquids mix with violent gas evolution. The products correspond to those of pure prussic acid. He was unable to obtain glyoxylic acid in this manner. The experiment was repeated a second time with precisely the same results.—*Berichte d. D. Ch. Gesell.*

SIGNOR IGNAZIO'S "FLYING MAN."

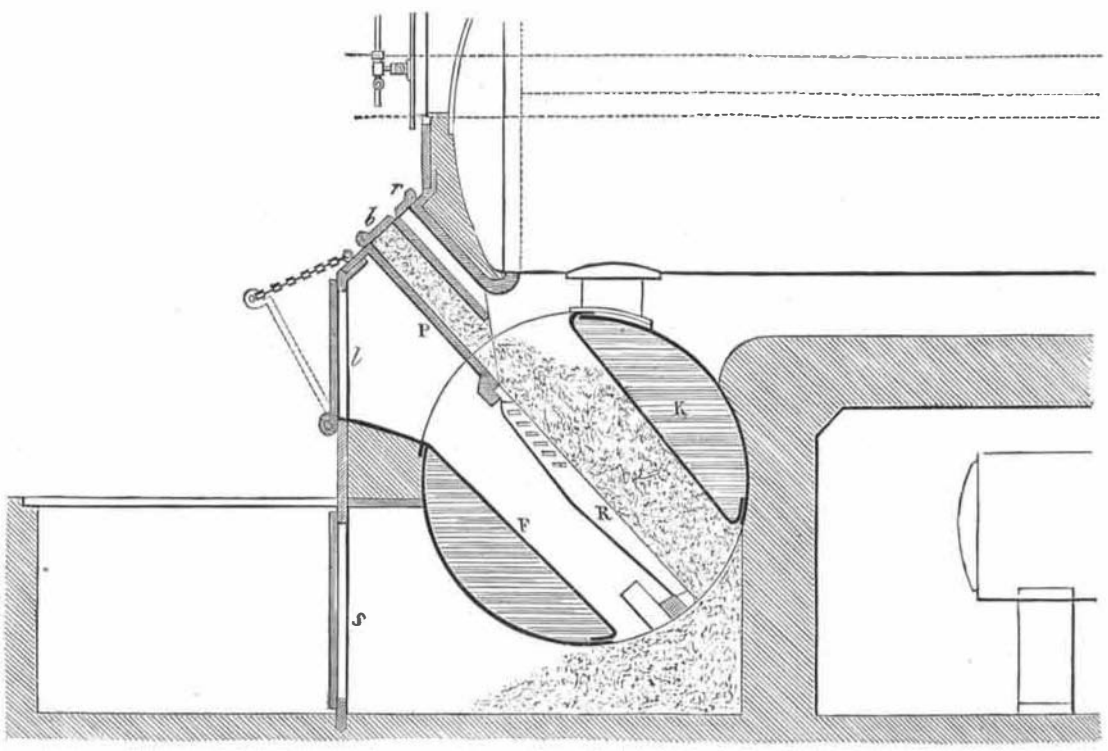
Signor Capretti Ignazio, of Milan, has recently added to the list of avatars with which attempts have been made to navigate the air, an apparatus which he designates the "Flying Man." Like his predecessors, he has chosen the wings and tail of a bird as models for his machine. Each wing is composed of sixteen pieces of cane, which are connected by sets of movable fans. The tail resembles a section of an umbrella. The canes in the wings are adjusted to a shell working on a universal joint, which in turn is attached to a framework that is strapped to the body. At the furthest stretch of the arm is a band ring, to which are bound sticks of cane connected with the larger ones on which the fan moves. There is also strapped upon the back of the wearer a large folded bag, which, by a simple movement, can be converted into a sort of parachute in case any portion of the flying gear gets out of order. By the arrangement of a large number of movable fans, the operator is relieved of a great amount of resistance which it would be natural to suppose the air would offer; and the entire apparatus is said to be readily manipulated by a cool-headed adventurer.



SIGNOR IGNAZIO'S "FLYING MAN."

NEW SMOKE-BURNING FURNACE FOR STEAM BOILERS.

The novel smoke-consuming furnace herewith illustrated is the invention of M. Ten-Brink, of Arlen, Baden, and is now in use on some 500 locomotives on the French Chemin de Fer de l'Est. The engraving, which we extract from the Belgian *Bulletin de Museé*, exhibits the application of the system to a simple cylindrical boiler with the heater, K, placed below, with its major axis at right angles and horizontal to that of the boiler. One or two furnaces, F, traverse the heater, making with the horizon an angle of about 48°. In these furnaces is placed the grate formed of the table, P, and bars, R, the latter resting on the table at one extremity, and at the other on a support riveted to the end of the furnace. The table has two lateral sides surmounted by a cover, so that a close four-sided box is formed upon the door and grate extremities. The front piece to which this box is attached is a plate of cast iron in which several different openings are made. The aperture, *s*, serves to remove the ashes, etc., and thus to facilitate the descent of fuel on the grate; a second opening, *l*, affords passage to the draught under the grate. Fuel is inserted through the door, *p*, and a hinged cover, *r*, admits air in order to insure the complete combustion of disengaged gases. The heater is connected to the boiler by short tubes through which the cooler water at the bottom of the generator descends into the heater while the steam formed in the latter passes up into the boiler through an annular space formed by larger tubes surrounding those above mentioned.



SMOKE-BURNING FURNACE FOR STEAM BOILERS.

The following figures show the results of a comparative test made between a boiler provided with this furnace and one having the ordinary plane grate. The trials lasted five consecutive days. Both boilers were alike and each had three heaters and two water tubes. The heating surface of the two principal boilers was 172 square feet 32 inches; of the two water tubes, 70 square feet, and of the three heaters 341 square feet 31 inches, or, in all 583 square feet 63 inches. Boiler I had a Ten-Brink furnace of 48 square feet 63 inches. Boiler II had an ordinary plane grate.

	I.	II.
Quantity of water vaporized	112640 lbs.	78100
Temperature of feed water	63·5° Fah.	63·5° Fah.
Water vaporized reduced to 32° Fah	109047·4 lbs.	77394·8 lbs.
Consumption of fuel	11825· "	11319· "
Ashes per 220 lbs. of fuel	20·24 "	23 98 "
Pure coal consumed	10738 "	10080 "
Vaporization per 2·2 lbs. of fuel	20·3 "	15· "
" " calculated by reducing water to 32° Fah	22·3 "	16·76 "
Water entrained by steam calculated by Hirn's method	4·5 per cent	4·4 per cent.
Temperature of gases in chimney	321·8° Fah.	390·2° Fah.

New and Remarkable Galvanic Battery.

In ordinary galvanic batteries the electric current results from the chemical action of a liquid acid upon a metal, but according to the invention of Mr. Paul Jablochkoff, of Paris, whose name has recently been mentioned in the SCIENTIFIC AMERICAN in connection with an improved electric light, the current is produced by the action upon carbon of a solid body in a state of fusion. Instead of taking a metal for the negative electrode of a battery—that is, the electrode which is consumed in the action—he takes coke or an artificial conglomerate of carbonaceous matter possessing the same qualities, and acts upon this electrode by means of nitrate of potash or of soda or of ammonia in a state of fusion. He prefers to employ the nitrate of soda on account of its cheapness.

The carbonaceous matter is acted upon by the molten nitrate in the same manner as zinc is acted upon by the different acids or salts in the ordinary batteries. As the second electrode, he places in the same liquid either platinum or other metals that are not acted upon by the liquid in the presence of carbon. The crucible itself, in which the nitrate is fused, may constitute the positive electrode. For introducing the carbon into the liquid, the former may have attached to it a metal rod which serves for attachment of the conducting wires, or he places a metal grating or perforated metal receptacle in the liquid in which the carbon is contained, such grating or receptacle being insulated from the crucible if this constitutes the second electrode. In the latter arrangement the carbon may be added from time to time, as in a furnace, in proportion as it is consumed.

For bringing the battery into action in the first instance, the nitrates may either be fused in advance in the crucible, and the carbon be then introduced, or the nitrate may be placed in the crucible in a pulverulent state, and the carbon be ignited and plunged into the nitrate, which will become fused thereby. While the battery is in operation, large quantities of gases are developed similar in their nature to those produced by the combustion of gunpowder. These gases, collected by any suitable arrangement, as, for instance, in a boiler or closed chamber, may be utilized as motive power, so that this improved battery serves as a source both of electricity and of motive power. By mixing various metallic salts with the nitrates, the double effect may be obtained of regulating the intensity of action of the battery, and of obtaining metallic deposits upon the positive electrode, as in the ordinary electroplating process.

According to one arrangement of batteries, constructed according to this invention, the crucible containing the nitrate and carbon forms the positive electrode, the carbon being suspended in the liquid nitrate in a wire gauze cylinder attached to a cross bar, the ends of which rest upon a ring of insulating material on the top of the crucible. The latter is closed in by a hinged cover having an aperture, to which is connected a pipe for conveying the gases generated to wherever required. According to another arrangement, the crucible is made of earthenware, glass, or other non-metallic substance, centrally within which is placed the wire gauze cylinder containing the carbon, and surrounding this is a metal cylinder constituting the positive electrode, or this may simply consist of a rod or bar of metal. If it be desired to employ the battery principally or entirely for utilizing the gases generated as motive power, the crucible or vessel containing the nitrate and carbon is closed at top, and is provided with a pipe leading to a boiler or closed vessel for collecting the gases under any desired pressure. The top or dome of the crucible may in this, as also in the previous arrangements, be provided with a hopper by a valve, through which carbonaceous matter may be introduced from time to time, and also with a second hopper for the addition of nitrate when required.

British Official Reports on the Philadelphia Exhibition.

The following are the classes treated of by Mr. Barlow, in this report: "Water Wheels, Water Engines, Hydraulic Rams, Windmills, etc." and "Apparatus for the Transmission of Power," "Shafting, Belting, Cables, etc," "Hydraulic Jacks, Presses, Elevators, etc.," "Pumps and Apparatus for Lifting and Moving Fluids."

In the first class, Mr. Barlow noticed an extensive display of turbines, which seem to have superseded water wheels and other water motors. There were also some ingenious contrivances for applying small amounts of hydraulic power. In the second class, leather belting occupied a prominent position from the extensive use made of it in the States as a transmitter. The Belgian hair machine belting is also noticed. Wire rope also was extensively shown, and there were some driving chains working over cogged chain wheels, and constructed so as to be detachable for lengthening or shortening, which attracted notice. In the shafting, the shafts made by a process of cold rolling afforded the greatest novelty. These are first rolled hot, then treated with acid to remove scale and oxide, and finally subjected to cold rolling in cast steel rollers. In the elevator class, a curious safety device was noticed. The lifting chain is a strong flat-linked endless chain, arranged so that it can only move in the direction of its length. If the chain breaks, the lower part below the carriage, being unable to move laterally in its groove, becomes a rigid support to the carriage. Among the pumps were some pulsometers and vacuum engines. The former are characterized as being cheap in construction and repair, but wasteful in steam from condensation. As the latter are intended to be worked by exhaust steam from other engines, all the work they do is so much utilization of waste power. Other pumps, hydraulic rams, etc., are also noticed.

Looking at the exhibits of the whole group, Mr. Barlow was struck by the great fertility of invention displayed in America, and the excellent workmanship. American machinery seems somewhat lighter than English, and therefore less steady and free from vibration. "The aim at improvement takes two different directions: one being that of obtaining simplicity and cheapness of construction, putting the cost of working as of secondary importance. The other being the endeavor to obtain high perfection in the details and great economy of working, treating the cost of construction as of less importance. The one, in fact, being aimed at cases where engines and machinery are employed for temporary purposes, the other directed to those cases where continuous working is the object."

The Machinery Hall, as a whole, gave "a high opinion of the mechanical skill of the Americans."

A Watch.

[Lines Printed on an old English Watch Card.]

Could but our tempers move like this machine,
Not urged by passion or delayed by spleen;
And true to Nature's regulating power
By virtuous acts distinguished every hour.

Then health and joy would follow as they ought
The laws of nature and the laws of thought—
Sweet health to pass the present moments o'er,
And involving joy when time shall be no more.

ASPHALTUM may be used to advantage in staining in imitation of hard woods.