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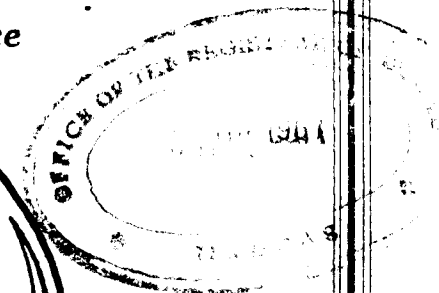
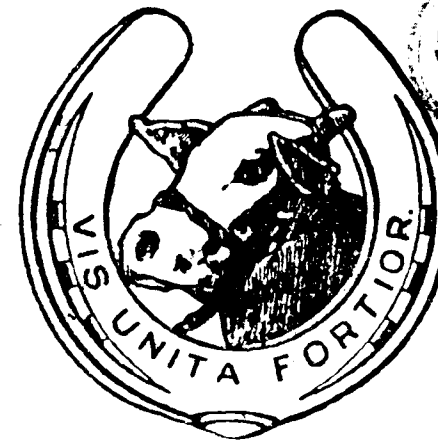
Vol. 38, No. 7

JULY, 1961

THE INDIAN VETERINARY JOURNAL

(The Journal of the Indian Veterinary Association)

*A Monthly Record of
Veterinary Science*



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EDITOR

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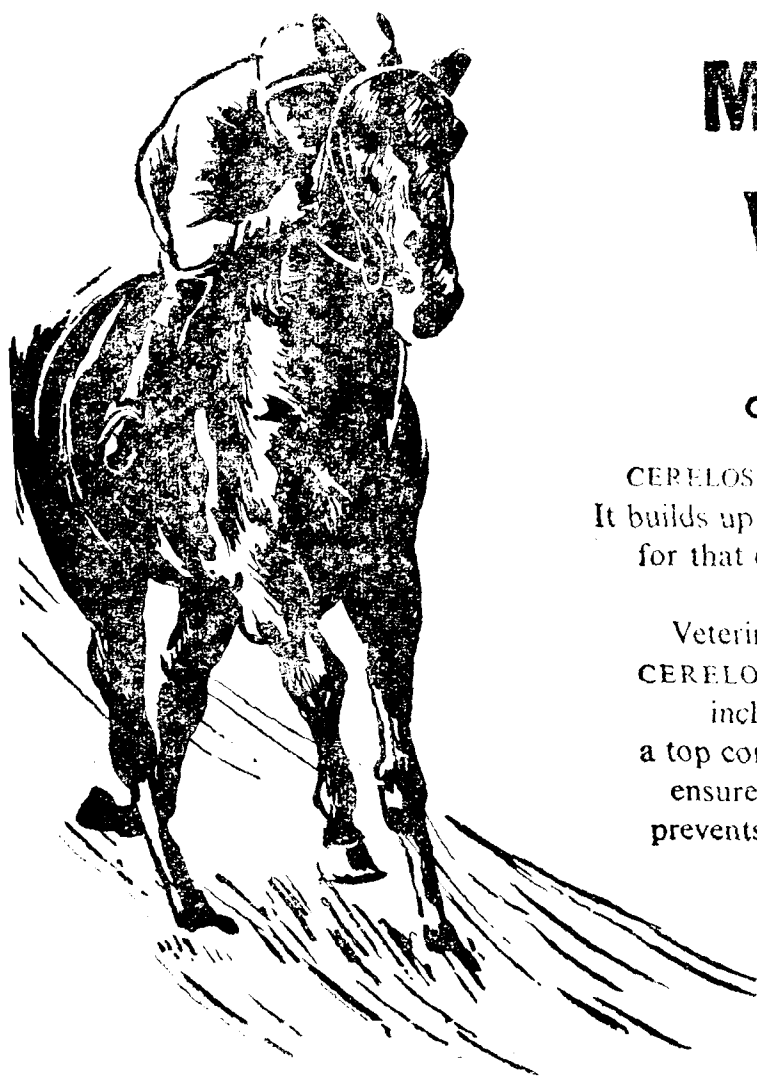


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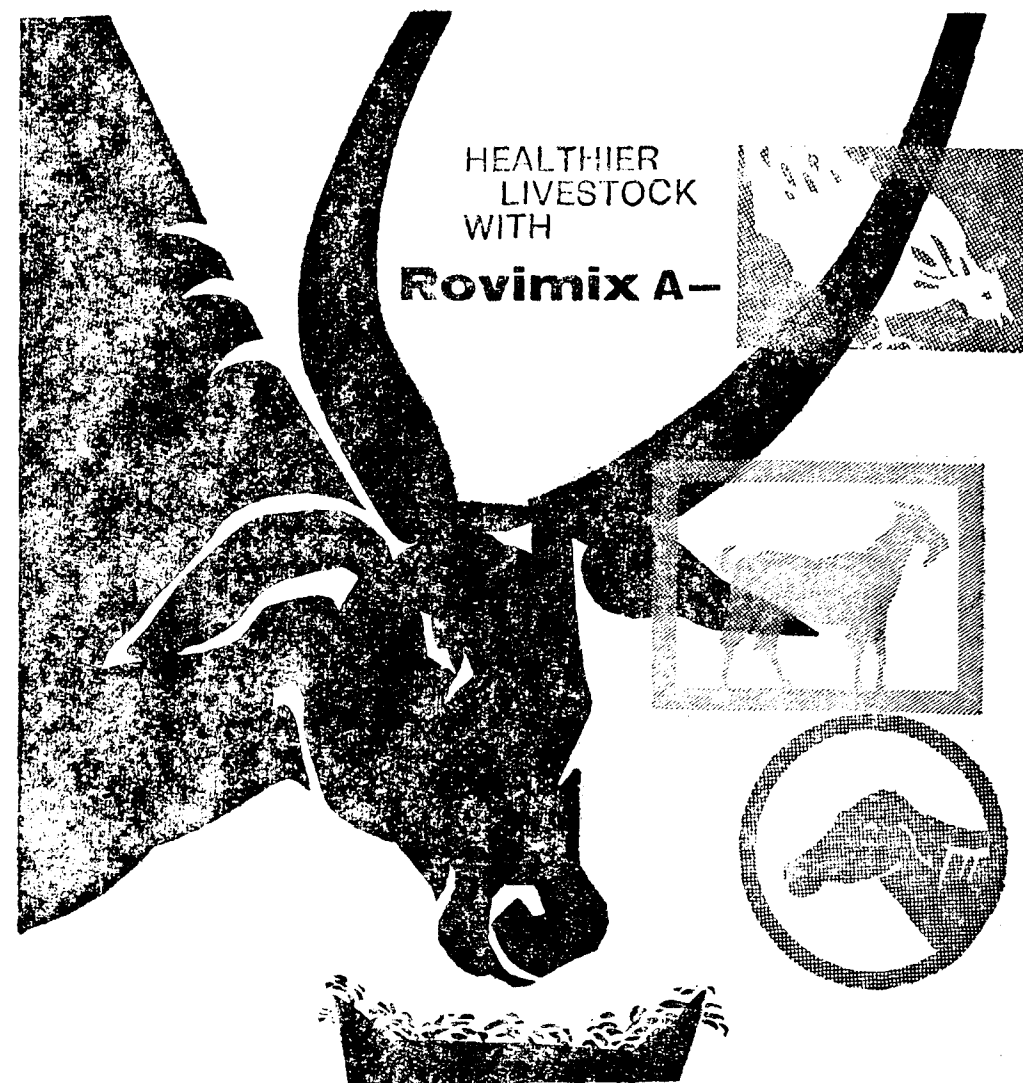
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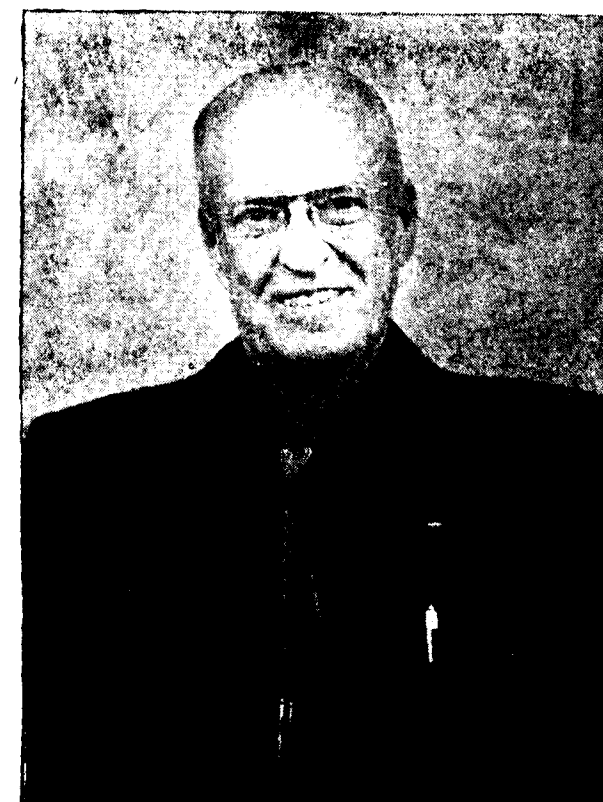
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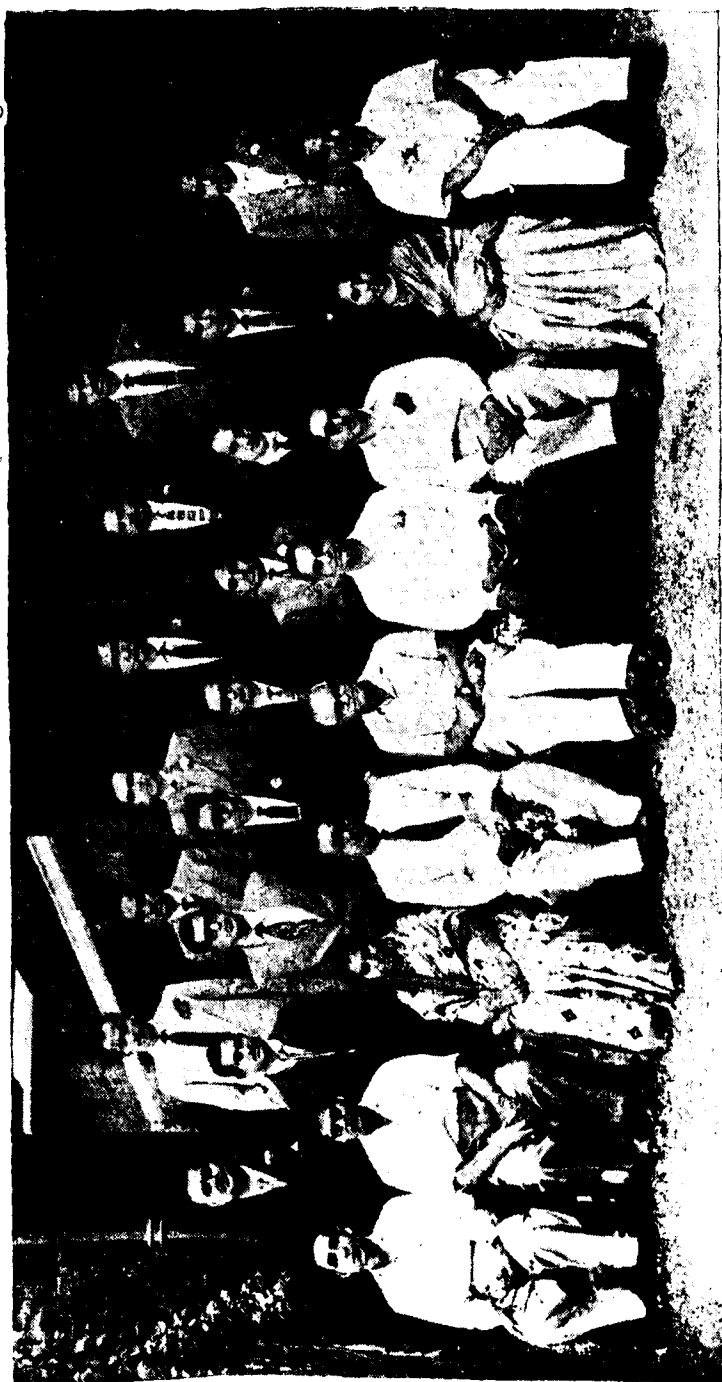
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Editorial

THE SATURATION POINT

We admit we have missed the count! The total number of Veterinary Colleges in India is ever on the increase. We do not know what their exact number is to-day. One feels desperate to keep pace with them! Such is their rapid multiplication! Time there was, under the old British administration, when any such proposal would have been considered as the brain wave of an immature mind. No quarter was shown to such 'fantastic' proposals. Conservatism held sway. And the only Veterinary Colleges in this land till the turn of the present century, were Lahore (1882), Bombay (1886) and Bengal (1893). So slow and cautious was the progress made. Finance was the main bottle-neck. The result was, when independence dawned on the country the Veterinary Profession was found to be quite un-prepared for the kind and amount of work that lay ahead.

The country was pulsating with a new life; the urge for rapid progress was manifest on all sides; lamentations over the niggardly progress so far made were loud and bitter; and the new Government immediately began to think in terms of targets and Five-Year Plans. After the transfer of Livestock development work to the hands of Veterinarians, the progress made was so spectacular that the demand for more and more Veterinarians from the people was quite spontaneous and persistent. Bricks could not be made without straw. No Animal Husbandry work worth the name was possible without sufficient number of Veterinarians. So the Planning Body was right, absolutely right, in deciding to open a few more Veterinary Colleges. But 'so far and no further' ought to have been their direction. With the newly found enthusiasm running amuck in the country, and with the easily available money from other countries, more and yet more

number of Veterinary Colleges began to crop up in the land, with the result the four Veterinary institutions of pre-independence days have now swelled into eighteen or twenty institutions. We admit once again we have missed the count. More are appearing (we are tempted to say) every day. Each State is not only advised but offered substantial help to open more than one Veterinary College. We dread to think of the consequences. Already Bengal and Kerala are facing a difficult situation. It may not be long before the other States are in the same plight.

There is a saying in Tamil which says that a person may be gracious enough to present us with an elephant; but should we not stop to think whether we have the wherewithal to maintain it and consider to what use it could be put. In addition, the Powers-that-be decided to put out in the country what they call a 'cheaper agency' in the form of short-course men for rural extension work. They are being recruited in hundreds every year in each State. What is to happen to all these men? It does not require a prophet to say that unemployment is round the corner. Some say it has already raised its ugly head in some of the States. India is not America to support these men on private practice. No Country Councils, no subject matter specialists will get into proper stride in this country for a long time to come. We are cast in a different mould and let us take the people with us – may be slowly but steadily.

The better way would be to perfect the existing Colleges and raising their standards. Money spent on such a programme would be well spent. These Colleges should have been opened on a regional basis and not State-wise. In any case more than a single College in each State appears to us to be positively harmful. Some one said we have more number of Veterinary Colleges in India to-day than in America. It looks to us we have reached the saturation point in this matter of opening more and more Veterinary Colleges. It is time we cry halt. Our surprise is that men in authority do not speak out their minds though informally they go about saying that they themselves see the red signal in this matter.

We appeal to all concerned to bestow enough thought over this question and speak out boldly.

General Articles

COMPARATIVE ANATOMY OF THE BONY SYSTEM OF THE CAMEL

(*CAMELUS DROMEDARIUS*)

Part IV—Bones Of The Skull

By

M. N. JAMDAR, G.B.V.C., P.G. (I.V.R.I.),
Professor of Anatomy, Veterinary College, Jabalpur, (M.P.).

The likeness in form of the skull of the camel to that of the horse is an outstanding feature. The marked similarity in conformation of the cranium in particular, contributes to a large extent to the pronounced resemblance found in the skulls of these two animals. The skull of the camel is more massive and weighty than that of the ox and horse.

Bones of the Cranium

The Occipital bone:—The condyles are larger and resemble in placement those of the ox. Ventral articular surface is very much extensive in conformity with the corresponding surface of the Atlas. The superior margin of foramen magnum is notched in the centre. The condyloid fossa is wider and deeper than in the ox. The condyloid foramen is only one. But one small foramen may be found in addition. A little in front of condyloid foramen three or four foramina occur in series, which are formed out of the usual foramen lacerum-posterius, by the junction of the bulla with the basilar process. The paramastoid process is atypical in that it is in the form of a wide thick plate of bone; its anterior edge fuses with the posterior part of the bulla tympana. In so doing it meets the plate of bone running downwards from the external acoustic meatus, thus enclosing a larger and a deeper depression in which is placed the short hyoid process. The basilar process is wider. Its ventral surface is wide, irregular and shows three defined depressions. The basilar tubercles are not well developed. Dorsal surface is concave. Squamous part of the occipital bone resembles that of the horse but its external surface is wider, extensive and excavated. The external occipital protuberance is in the form of a ridged tubercle. The depression on either side of the latter is in the form of a large excavation in which is found at the external limit, the mastoid foramen. The internal surface is concave as in horse. The nuchal crest is longer and thicker than in the horse.

The Sphenoid bone:—The body is thicker and wider than that of the horse and the ox. Its ventral face is slightly convex in the post-sphenoid, and ridged and grooved in the presphenoid. The pituitary fossa on the cerebral surface is very much deeper than in the ox. The raised table-like area found in the presphenoidal bone of the ox and horse is absent in the camel. The optic canal courses a longer distance through the base of each of the orbital wing. The lateral wall of this canal projects anteriorly from the optic foramen in the form of a bony spicule about half an inch in length. The ethmoidal foramen is deeply placed in the lower part of deep ethmoidal fossa. The foramen orbito-rotundum is as in the ox. The foramen ovale is comparatively smaller than in the ox. Instead of the spheno-occipital crest, there is a tubercle. The cerebral surface of the temporal wing shows two large distinct grooves as in the horse. The pterygoid process is enormously developed. It projects vertically downward. Its lower end is curved backward.

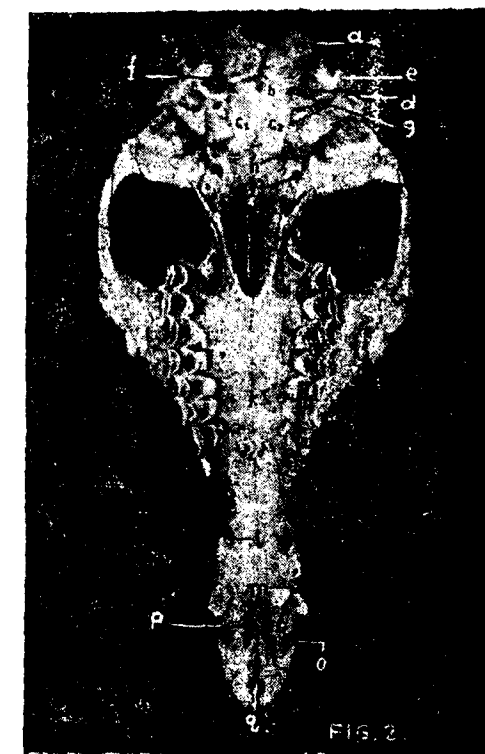
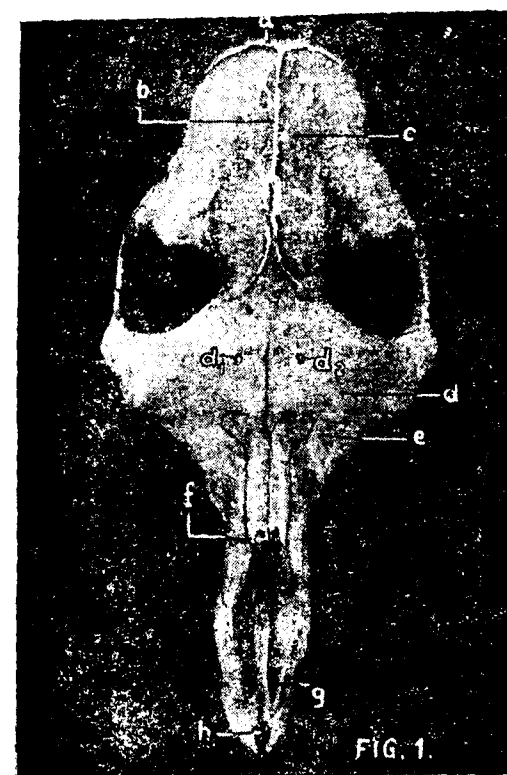
The Ethmoid bone:—The cribriform plate is very obliquely placed and is directed forward and upward. It is comparatively narrower. The ethmoidal crest is remarkable in that it stands in the form of a pillar (strong thick bar of bone) between the posterior ends of the ethmoidal fossae. The latter are narrow with deep triangular recesses. The great ethmoturbinate is very voluminous and pushes in between the two nasal turbinate bones and compresses the posterior half of the ventral turbinate from above downwards. This results in a bend of the basal lamella of the ventral turbinate, so that, it (the former) is directed downward in its posterior part.

The Interparietal bone:—This bone although fused with surrounding bones in the adult, is distinctly marked off from the squamous-occipital and the parietal as a three sided mass. There is no intracranial projection which is found in the horse. The internal surface is depressed.

The Parietal bones:—The parietal bones are similar in form and position to those of the horse, but are much more extensive forming almost the whole of the roof of the cranial cavity (the frontal bone forming a very small anterior part of the roof). The external parietal crest is median in position for almost whole of its length (unlike that in the horse) and bifurcates only at its extreme anterior part, where it marks the limit between the parietal and the frontal. The external parietal crest is exceptionally prominent being raised about half to three fourths of an inch above the surface of the bone forming a strong roughened ridge: This crest forms one of the distinguishing features of the skull of the camel. The temporal canal is formed by the parietal

and temporal bones as in the horse. A peculiar feature that is noticed in regard to this canal in the camel is that there are two large external openings—one just in front of the opening of the external acoustic meatus, behind the lateral part of the postglenoid process (comparable to the usual postglenoid foramen), and the second larger one is medial to the inner end of the glenoid cavity of the squamous temporal bone.

The Frontal bones:—They in general resemble those of the horse. But the nasofrontal part of each projects laterally towards the orbit to a greater extent so that the width of the two frontal bones between the upper margin of the orbits is greater than in the horse. The external



surface of the two bones together show a central rhomboid depressed area with variable number of small foramina. At each of the lateral angles of this area is found a large foramen which is the upper opening of the supraorbital canal. The lower opening of this canal is on medial wall of the orbit. Thus the canal is similar to that found in the ox.

The rest of the external surface of each frontal bone is convex and slopes abruptly downward in its anterior part and gradually outward and downward in its lateral part. The supraorbital process is inclined outward and backward and articulates with the frontal branch of the malar as in the ox. The orbital surface shows the fovea trochlearis bridged over by a thin bony plate. In between lacrimal fossa and the maxillary foramen, is an opening which leads into the cavity of the ventral turbinate.

The Temporal bones :—These bones also resemble in form and position those of the horse. But the temporal surface of the squamous part is wider. One main foramen leading into the temporal canal is present on this surface. The zygomatic process has a much wider posterior part. The condyle is wider than in the horse but is slightly narrower and longer than in the ox. It is arched in a transverse direction showing a concavity on its ventral aspect, whereas in the ox it shows a pronounced convexity. The glenoid cavity and the glenoid process are appreciably larger. The anterior part of the zygomatic process is much longer and wider and is markedly curved. Its anterior extremity is notched, the two arms of the notch being unequal. This notched extremity fits into the deeply notched extremity of the zygomatic process of the malar. Because of the width and the curvature of the zygomatic process, the extent of the temporal fossa is increased.

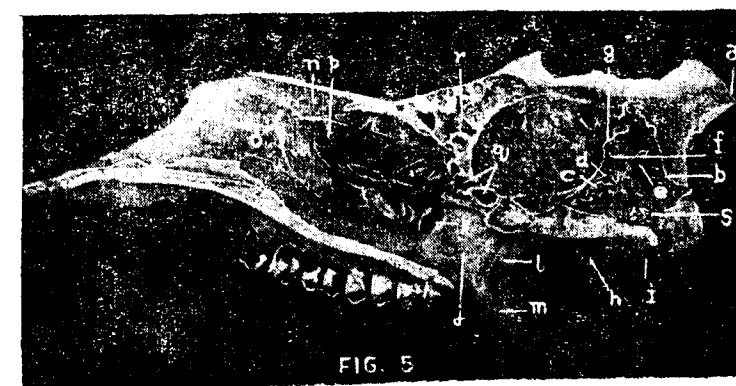
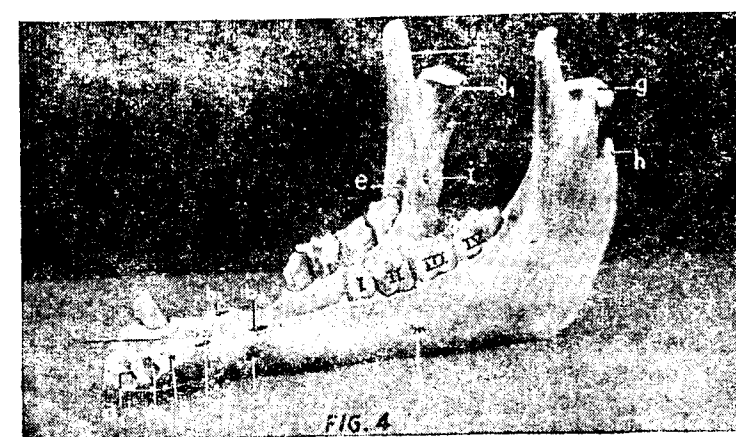
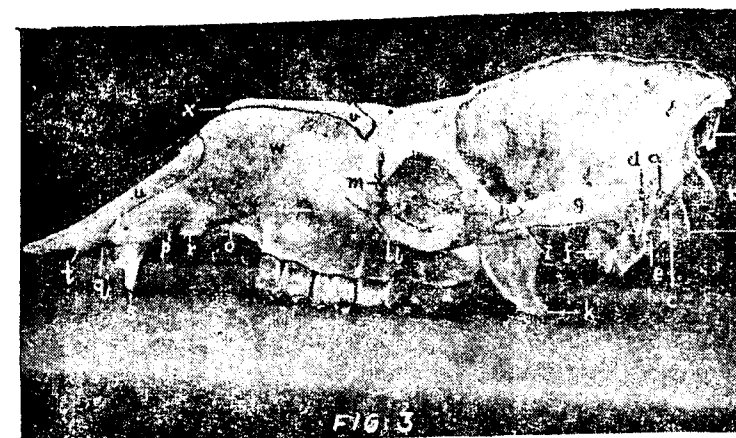
The petrous part is larger than the corresponding part of the ox and horse. It shows a very short visible projection of the external acoustic process. The opening of the external acoustic meatus is at the same level, lying behind the postglenoid foramen. Just below the petrosal crest is a large floccular fossa, on the medial face of the bone. The base of the bone overlaps the lateral edge of the basilar process. The bulla tympana joins the basilar process and appears as a thick triangular flattened plate. The extent of the foramen lacerum is therefore very much reduced and is transformed into a number of distinct foramina. The hyoid process is lodged in a large deep fossa behind the bulla as already mentioned. The muscular process is short and blunt.

Bones of the face

The Maxillary bone :—The body is shorter than that in ox and horse. The facial part of the bone is almost vertically placed and is remarkable for its height; its lateral surface is convex anteriorly and irregularly depressed posteriorly; this surface is markedly depressed near its junction with the posterior part of the nasal bone. Because of this depression on either side of the posterior end of the two nasal bones, a confirmation resembling the bridge of the nose in man, gets

Bony System of the Camel Part IV

By M. N. JAMADAR



formed. The infraorbital foramen is oval and large and is situated about an inch above the level of the interdental space between the second and the third molar. It is much nearer the roots of the molars than in the horse, a point of surgical importance. The facial crest is in the form of a smooth round elevation ending in front at the infraorbital foramen. The portion of the lateral surface above the alveolar border is almost flat or slightly concave and shows the jugo-alveolaris more prominently. This bone along with the protruding orbit largely determines the shape of the skull of the camel.

The posterior extremity forms a large thick maxillary tuberosity which also forms an alveolus for the last molar, unlike that in the ox and horse. Dorsally the maxillary tuberosity forms a part of the floor of the orbit where it shows a very roughened character. The maxillary hiatus is neither deep as in the ox nor so wide open as in the horse. The sphenopalatine foramen is larger and oval. The maxillary foramen is far removed outwards from the other two foramina of the hiatus and is very large. A greater part of the infraorbital canal can be seen through it. The latter is very wide and is shorter. The canal and the maxillary foramen resemble in placement and character those of the dog.

The alveolar border bears at its anterior part, one large alveolus and one small alveolus for the two canine-like teeth. Behind the latter and in between it and the first molar, the border is very thin, sharp and concave. The rest of the alveolar border has five dental alveoli for the five molars.

The palatine process is very narrower and longer than in the ox and the horse. Its palatine surface is slightly concave. The median palatine suture shows on this surface a sharp crest which gets effaced posteriorly. The anterior palatine foramen is found at the level of interval between the first and second molar. In two specimens it was found at the level of the first molar. It is midway between the dental alveolus and the medial border of the palatine process. The palatine canal is situated in the maxilla and not in the palatine bone. Two or three accessory palatine foramina are found. The palatine process is not excavated. The palatine fissure is smaller and narrower than in the ox and is more obliquely placed.

The Premaxilla :—Its body is thicker as in the horse but it is narrow and pointed. It has one alveolus for a small canine like tooth at the anterior end of the nasal process, at the junction of latter with the body. The oral surface of the body is very rugged. The body shows the incisive notch as in the ox and is not joined to the opposite bone. Its palatine process is thick and short; the nasal faces of the two process

together form a deep groove. The nasal process is longer than that of the ox, yet does not at all reach the nasal bone. Its dorsal edge in its anterior two thirds is very thin and sharp. The nasal processes of the opposite bones appear to converge anteriorly. This makes the anterior end of the nasal cavity much narrow and pointed in contrast to that of the ox and horse.

The Palatine bone :—Its horizontal plate is comparatively longer than in the ox and horse. It is not excavated to form any sinus. The palatine canal does not traverse this plate.

The perpendicular plate is thick, massive and more or less square in outlines. The posterior part of the plate curves outward so that the choanae are comparatively wider. The ventral border of the plate is longer and slightly concave; at its anterior end is a roughened depression. The lower end of the pterygoid process of the sphenoid and the hamulus of the pterygoid bone form with the postero-ventral angle of the plate a deep pulley. The sphenopalatine foramen is large and oval. The pterygopalatine fossa is shallower and is open.

The Pterygoid bone :—It is directed almost vertically. It is slightly shorter, but broader. Its ventral extremity with that of the pterygoid process of the sphenoid forms a pulley as already noted.

The Nasal bone :—It is very much shorter and narrower than in the ox and horse. Its posterior extremity curves outwards and is fixed into the recess formed by the frontal and the maxilla. But it does not reach the lacrimal bone which is very small in extent. The diverging posterior extremities of the two nasal bones form a narrow deep triangular notch which reciprocates with the projection formed by the anterior extremities of the two frontal bones; this feature resembles that of the horse. The anterior extremity is variably notched with a larger lateral and a very small medial segment; but the notch is never so deep as in the ox. Consequently the trifid appearance of the nasal peak as found in the ox is not so distinct in the camel; it is almost semilunar in outline, resembling the nasal peak of the dog. In between the anterior extremity of the nasal bone and the adjacent part of the maxilla a small, narrow and deep naso-maxillary notch was found in the two out of the three specimens; this notch is very large in the ox and the horse. The lateral border of the bone articulates only with the maxilla.

The Lacrimal bone :—It is very small; especially its facial part (convex) is of very small extent. It articulates only with the frontal maxilla and the malar. The lacrimal fossa is large and resembles in position that of the horse in being situated away from the orbital margin. The latter is largely defective showing either excrescences and

notches or foramina which may be two or three. The lacrimal tubercle is absent unless a roughened portion on the adjacent part of the maxilla is taken to represent it. The Lacrimal bulla is absent. The lacrimal canal is very short and ends about one and a half inches from the lacrimal fossa and is later continued by a groove.

The Malar bone :—This bone is also smaller than in the ox and horse with a narrow marginal strip of bone forming the facial part around the orbital margin and a comparatively larger orbital (than the facial) portion. The orbital surface slopes outwards, opposite of what is found in the ox and horse. The facial part is grooved and rather projects like the eaves of a roof over the maxilla. Its zygomatic process is divided into two branches as in the ox; but the frontal branch is shorter and thicker and is directed upward while the posterior branch is very long (about three inches) and is divided into a short dorsal and a long ventral branch, including between them a notch which receives the anterior extremity of the zygomatic process of the squamous temporal. The orbital margin formed by this bone appears to have fused with the facial crest described in the ox. This, in a measure accounts for the existence of a large orbital part of this bone.

The Turbinate bones :—The dorsal turbinate is very much smaller than the ventral. The latter is greatly developed and is larger than that of the ox. The great ethmoturbinate is so voluminous that the posterior half of the ventral turbinate is compressed from above downwards so that the width of this bone here (from side to side) is considerable, and this portion occupies a large space of the nasal cavity at the expense of the maxillary sinus.

The lamella of the ventral turbinate splits up into two plates which are rolled in opposite direction as in the ox, in the anterior part. But in the posterior part the basal lamella gets so twisted that the dorsal convolution becomes medial and the ventral convolution becomes lateral in position.

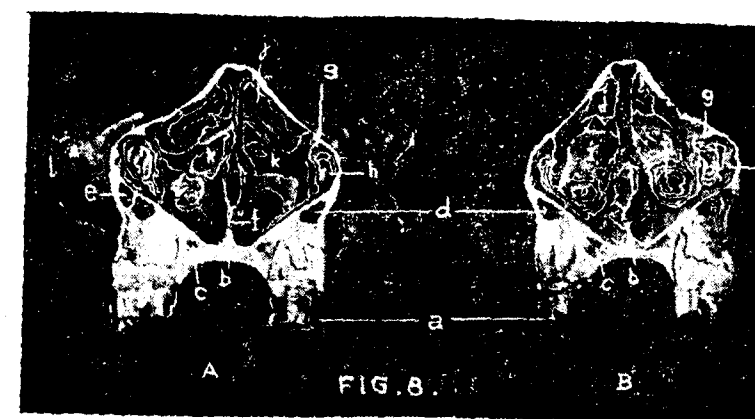
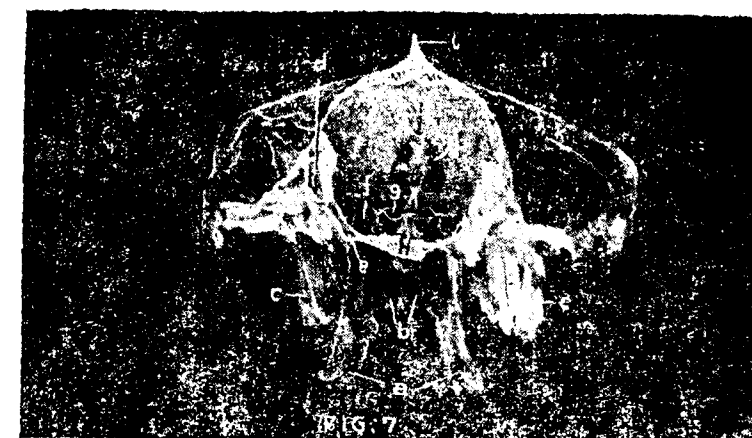
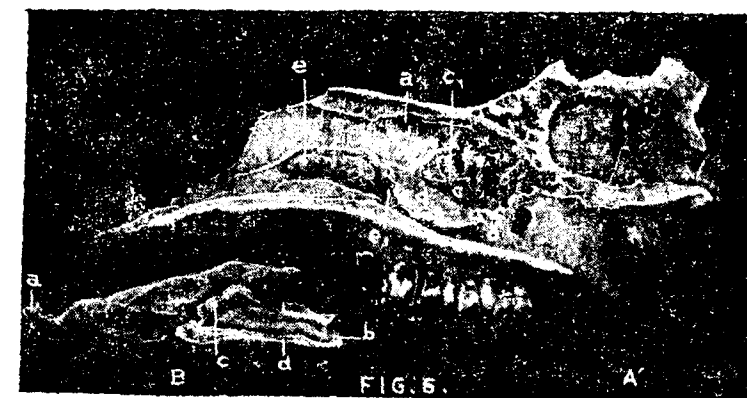
The Vomer bone :—It is considerably longer and stronger than the same bone of the ox and horse. Its ventral border takes almost complete articulation with the nasal floor leaving only posterior one third of the border free. In none of the specimens studied, its posterior portion was found to reach the orbital cavity as is mentioned in Chauveau.

The Mandible :—The bone is thicker, massive and very heavy. As a whole it resembles that of the horse. The body is very long and narrow. It is almost twice as long as that of the ox and the horse. The symphysis is completely ossified. Because of the narrowness of the body its dorsal surface appears as a long narrow groove. Its alveolar

Bony System of the Camel

Part IV

By M. N. JAMADAR



border of the body shows eight alveoli for the incisors. The posterior most alveolus of this series (on either side) is very large; in this a large canine like tooth is fixed. Behind the latter and separated by a small interval, the body presents an alveolus (one on either side) for the canine. Below the level of this alveolus and on the external surface of the body is found the mental foramen. The body presents in all ten alveoli including those for the canines instead of eight as mentioned by Chauveau.

The rami are slightly more divergent. Each is thicker in its horizontal part and shows four alveoli for the lower cheek teeth; the alveolar border in this part is straight as in the horse and not curved as in the ox; behind the last molar, the border widens out and presents a large depressed area where the vertical portion of this border abruptly begins (unlike that in the ox and the horse).

The horizontal portion of the ventral border of the ramus is thick, rounded and straight. The vertical part of this border is very thin and sharp and forms a process about an inch and a half below the condyle, resembling the angular process in the dog. The confirmation of the ventral border is such that it rests as in the horse on its body, and the angle of the jaw when placed on the floor, which is quite unlike the case in the ox in which the body and the anterior part of the ramus remain lifted above the floor. The lateral surface of the ramus shows an additional opening of the mandibular canal just above the ventral border and at the level of the second molar tooth. The lateral surface of the vertical part is extensive, depressed and rough. The medial surface of the ramus in its vertical part is concave in front and above the mandibular foramen and is convex below and behind it. A little below the mandibular foramen, a small canal begins and leads into the lingual groove. A small tubercle on this surface, a little below and behind the last molar marks the limit between the vertical and horizontal parts. The anterior border of the vertical portion of the ramus descends on this tubercle forming there a sharp ridge.

The coronoid process is thicker and its tip is wider and tuberculate. It is shorter and inclined forward. The condyle is triangular showing a posterior prolongation of the articular surface.

The Hyoid bone :—It presents no marked differential features from that of the ox.

Sinuses of the Skull of the Camel

The Frontal Sinus :—It is of a smaller extent and resembles in position that of the horse.

The Sphenoidal Sinus :—The body of the presphenoid is excavated to form a considerable sphenoidal sinus. It does not extend into the perpendicular plate of the palatine.

The Maxillary sinus :—It is found as a deep fossa in the posterior part of the bone about the orbital region. Medial wall of the orbit separates this sinus from the orbital cavity. Its posterior limit can be marked on the outside by the edge of the frontal bone which curves medially from behind the root of the supraorbital process; lateral limit is indicated by the medial part of the orbital margin or medial wall of the orbit; anterior limit is indicated by a line joining the notch of the orbital rim lateral to the lacrimal fossa, to the depression found immediately lateral to the posterior extremity of the nasal bone. Internally the maxillary sinus is marked off from the nasal cavity by a semicircular bony ridge extending obliquely forward and outward from the sphenopalatine foramen to the level of the posterior extremity of the nasal bone.

The sinus is incompletely divided into two main parts, medial and lateral, by almost circular rim of bone which is well defined ventrally. The lateral compartment shows pockets which intercommunicate over the septa which separate them.

The great ethmoturbinate is seen projecting into the inner compartment of the sinus. When that is removed, a large opening remains through which the sinus communicates with the nasal cavity.

The Palatine Sinus :—It is entirely absent, both from the horizontal and the perpendicular part.

Temporal fossa :—It resembles that of the horse but is more extensive and slightly deeper. The zygomatic process makes a great sweep outward thus increasing the extent of the fossa. Only one or two openings leading into the temporal canal are seen.

The Orbit :—It projects laterally to a pronounced degree. Its floor is irregular; it slopes downward, laterally and slightly forward. The orbital margin is irregular, more particularly in its medial part as already noted. The supraorbital canal running through the frontal bone is sharply curved so that it is difficult to pass a probe.

The Nasal Cavity :—It is narrower and longer than in the ox and horse. Its dorso-ventral diameter is also greater. Anterior nasal aperture is elliptical and the nasal peak is almost semicircular and resembles that of the dog.

The Cranial Cavity :—It resembles that of the horse. The cerebral compartment is smaller and the cerebellar compartment is larger than the corresponding one of the horse. The relative size of

these two compartments is almost the same in the camel and the ox. The ethmoidal fossae are narrow and deep as already described. The internal occipital protuberance is like that of ox.

KEY OF THE FIGURES

FIG. 1:—

SKULL OF CAMEL

Upper Jaw

Dorsal View

- (a) Nuchal Crest
- (b) Median parietal crest
- (c) Parietal bone
- (d) Frontal bone
- (d1, d2) Supraorbital foramina
- (e) Depression in the maxillary bone on the side of the posterior end of the nasal bone
- (f) Nasal peak
- (g) Palatine fissure
- (h) Incisive fissure

FIG. 2:—

Upper Jaw

Ventral View

- (a) Occipital Condyle
- (b) Basilar process
- (c1, c2) Basilar tubercles (Faint rough areas)
- (d) Condylod fossa
- (e) Paramastoid process
- (f) Hypoglossal foramen
- (g) Foramen for the vagus (Foramen lacerum posterius in the camel forms a series of foramina by the junction of bulla with basilar process for the 9th 10th and the 11th nerves)
- (h) Foramen lacerum anterius
- (i) Foramen ovale
- (j1, j2) Anterior palatine foramina
- (k) Accessory palatine foramina
- (l) Alveolus for the small canine
- (m) Large canine-like tooth
- (o) Alveolus for anterior small canine-like tooth
- (p) Palatine fissure
- (q) Incisive fissure
- (I to V) Molars

FIG. 3:—

Upper Jaw

Right lateral view

- (a) External acoustic meatus
- (b) Paramastoid process
- (c) External opening of the facial canal
- (d) Postglenoid foramen
- (e) Large depression for the hyoid process (Latter not seen)
- (f) Bulla tympana
- (g) Zygomatic process of squamous temporal
- (h & I) Zygomatic process of the malar, its short and long divisions
- (j) Perpendicular plate of palatine and
- (k) Its postero-ventral angle on which the jaw rest.
- (l) Edge of malar overhanging the maxilla
- (m) Defective part of the orbital rim with notches and foramina
- (n) Infraorbital foramen
- (o, p, q) Interdental spaces
- (r) Alveolus for the canine
- (s) Large Canine-like tooth

- (t) Alveolus for the small anterior canine-like tooth.
- (u) Nasal process of the premaxilla
- (v) Posterior extremity of the nasal bone
- (w) Superior maxilla
- (x) Nasomaxillary notch
- (y) Lacrimal fossa
- (z) External occipital protuberance

FIG. 4:—

MANDIBLE

Antero-Left-Lateral View

- (a1, a2, a3, a4) Alveoli for the four incisors of the left side: In the last one a large canine-like incisor is fixed.
- (b1, b2) Alveoli for the canines (right and left)
- (c) Body of the mandible
- (d1, d2) Mental foramina, anterior and posterior
- (e) Fossa behind the last molar
- (f) Coronoid process
- (g) Condyle and (g1) its posterior extension
- (h) Angular process
- (i) Mandibular foramen
- (I to IV) Molar teeth

FIG. 5:—

UPPER JAW

Longitudinal Median—Section

- (a) Junction of the external parietal and the nuchal crest forming the highest point of the skull
- (b) Internal occipital protuberance
- (c) Internal acoustic meatus
- (d) Floccular fossa
- (e) Mastoid foramen of
- (f) Internal opening of the temporal canal
- (g) Margin of the parietal bone separating the cerebral and the cerebellar compartments
- (h) Bulla tympana
- (i) Paramastoid process
- (j) Vertical plate of the palatine
- (k) Sphenopalatine foramen
- (l) Pterygoid bone
- (m) Hamulus of the pterygoid
- (n) Dorsal turbinate
- (o) Ventral turbinate
- (p) Great ethmoturbinate; through its accidental rupture, its cavity is seen.
- (q) Sphenoidal sinus
- (r) Frontal sinus
- (s) Hypoglossal foramen

FIG. 6:—

UPPER JAW

Longitudinal median section

(Most of the dorsal turbinate and the upper convolution of the ventral turbinate have been removed to show the maxillary sinus)

A —

- (a) Cavity of the dorsal turbinate
- (b to b1) A ridge marking the limit between the maxillary sinus and the nasal cavity
- (c) Maxillary sinus, c1—a part of the circular ridge dividing this sinus into two main compartments
- (d) Basal lamella of the ventral turbinate pressed downwards in its posterior half
- (e) Inferior convolution of the ventral turbinate; e1—its posterior half pressed to the lateral side

B—THE DETACHED UPPER CONVOLUTION OF THE VENTRAL TURBINATE**Lateral View**

- (a) Posterior extremity (spirally twisted)
- (b) Anterior extremity
- (c) Basal lamella sloping downward and backward because of compression from the great ethmoturbinate
- (d) A part of the bony plate of the inferior convolution

FIG. 7:— Vertical section through the cranium showing inside of its anterior two thirds as viewed from behind

- (a) Vertical plates of the palatine bone
- (b) Posterior nares
- (c) Right and left last molars
- (d) Temporal canal opened out
- (e) Foramen ovale
- (f) Foramina orbito-rotundum
- (g) Optic canals
- (h) Pituitary fossa
- (i) Ethmoidal crest
- (j) Ethmoidal fossae
- (k) Supraorbital processes
- (l) Median parietal crest

FIG. 8:— Vertical section through the upper jaw, half an inch behind the infraorbital foramen showing the interior of the nasal cavities

A.—Section viewed from in front. **B.**—Its counter part viewed from behind

- (a) Third molar
- (b) Hard palate
- (c) Palatine canal
- (d) Infraorbital canal
- (e) Maxillary sinus
- (f) Nasal septum
- (g) Twisted basal lamella of the ventral turbinate;
- (h) its inferior convolution pushed laterally and
- (i) its superior convolution occupying relatively a medial position
- (j) Cavity of the dorsal turbinate
- (k) Cavity of the great ethmoturbinate
- (l) Orbits

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Same as in part I of this series

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**ISOLATION OF PASTEURELLA SEPTICA OF LOW VIRULENCE
FROM CASES OF PARAPLEGIA IN CATTLE
IN ANDHRA PRADESH**

By

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Paraplegia in cattle had been drawing the attention of research workers in India for the past few years. Mohiyuddean (1956) recorded that in Malnad tracts of the Mysore State cerebrospinal nematodiasis had been responsible for bovine paraplegia. Iyer and Seetharaman (1953) reported that cases of bovine paraplegia in South Kanara district of the Madras State might be due to magnesium deficiency and that treatment of the affected cases with calcium and magnesium yielded satisfactory results. Biswal (1956) reported on the occurrence of bovine encephalomyelitis in a calf on the basis of histopathological examination of brain and spinal cord. Earlier, Harjas Rai *et al* (1950) recorded the occurrence of sporadic cases of encephalomyelitis diagnosed on the basis of histopathological studies. In this paper isolation of *Pasteurella septica* from cases of paraplegia in cattle in Andhra Pradesh reported to occur subsequent to mass immunization of cattle against rinderpest under the Rinderpest control programme as a part of the country's second Five Year Plan, is described.

History

Mass immunization of cattle against rinderpest was started in a few of the districts namely, Krishna, West Godavari, East Godavari, Visakapatnam and Srikakulam, north of river Krishna in Andhra Pradesh from April 1957. Freeze dried goat tissue vaccine obtained from the Institute of Veterinary Preventive Medicine, Ranipet was used for mass immunization. The first case of paraplegia occurred in Krishna district about a month after vaccination. In one village 15 animals were affected of which 11 died. It was said that in one of these animals trypanosomes were demonstrated in blood and in 3 out of 8 cases treated with antitrypanocide survived. In a second village 18 attacks and 15 deaths were reported of which 2 cases were said to have been vaccinated with G.T.V. A similar condition was reported later in Arkavellery in Vishakapatnam district involving 40 animals out of which 36 succumbed, and in West Godavari district 23 attacks and 15 deaths were reported. The worst affected area was Tuni taluk in East Godavari district in which the present investigation was carried out.

Vaccination was carried out in 71 villages including hamlets out of 75 villages. A total of 48,603 animals were vaccinated out of a cattle population of 5,54,710. The mass vaccination programme had to be suspended in East Godavari district due to the scare amongst villagers that the vaccination was responsible for paraplegia. Out of 71 villages in which vaccinations were carried out, the disease was reported from 28 involving 189 animals of which 135 (71.4%) died.

Vaccination was started in this district on 14-7-57 and the first case came to light in early August, 57. However, cases had been occurring upto about 40 days after vaccination.

Though the disease in Tuni Taluk was essentially in White cattle, a few buffaloes were also affected. Animals of both sexes as well as young and old ones were affected.

Symptoms noticed in the ailing animals were lameness in one of the limbs more often hind than fore limbs, followed by incoordination of movement and staggering gait; later the animals were unable to stand unless helped. Subsequently there was loss of control over the limbs leading to prostration, often ending in sudden death. Throughout the course of the disease, excepting for a day or so before death, the animals fed normally and no difficulty was experienced either in defaecation or micturition and they looked alert. Loss of sensation to pin prick was variable. No rise in body temperature was noticed in animals that were ailing.

Present investigation

The affected area was visited by one of us (P.R.N.) during the middle of October 1957. Two cases were available for post mortem and four more fairly fresh ailing cases were also available for investigation in Tuni area. A number of other places where the diseases had prevailed and also where work of rinderpest vaccination was going on were also visited and particulars about the disease were collected.

Animals that had been sick for 3 to 15 days were noticed. Symptoms varied from incoordination of movement and staggering gait to prostration. None of the ailing animals showed any rise in body temperature.

Blood smears from the ailing as well as a few of the recovered animals did not reveal any parasites. Cultural examination as well as intraperitoneal inoculation of blood in albino mice did not reveal anything significant.

Intraperitoneal inoculation of albino mice with cerebrospinal fluid collected from 3 of the ailing animals did not reveal any trypanosomes nor did the direct smears of cerebrospinal fluid. Intracerebral

inoculation of mice with bacteria-free cerebrospinal fluid did not prove the presence of any virus. However, from mice inoculated with material from 2 of the cases, a strain of *Pasteruella sp.* was isolated after their death. *Pasteruella sp.* was also isolated by culturing and by mice inoculation of the centrifuged deposit of cerebrospinal fluid. The strains were identified as *Pasteruella septica* (Robert's type I).

Serum samples collected from four ailing cases gave positive quick agglutination test against a known strain of *Pasteruella septica* (Robert's type I) as well as against one of the strains isolated from the ailing cases. When tube agglutination was carried out, 3 of the samples of sera showed a titre of 1 in 80 and 1 in 160. The sera also protected mice against artificial infection with a known virulent strain of *Pasteruella septica* (P. 52).

Of the two cases on which post mortem examination was conducted, one was a buffalo and the other a cow. Both the cases presented a similar post mortem picture. Meninges were congested. Anterior one fourth of the cerebrum showed darkish blue discolouration. Congestion of the capillaries of the brain was also noticed. Cervical and lumbar portions of the spinal cord also revealed slight discolouration. Other organs, viz liver, spleen, lung, heart and kidneys did not show any abnormality.

Spinal cord impression smears stained by Giemsa revealed stray trypanosomes.

Examination of fresh and preserved brain and spinal cord proved negative for the presence of any nematode larvae.

Smears made from the scraping of the spinal canal and brain of the buffalo revealed bipolar stained organism.

Whereas mice inoculated with suspension of spleen, liver, and lung from both the cases remained alright, those inoculated with a suspension of brain and spinal cord died and a strain of *Pasteruella sp.* was isolated from them.

Histopathological examination of the tissues collected revealed the following:—

Spinal cord showed focal infiltration of meninges by mononuclear cells. perivascular cuffing, arteriosclerotic changes in some of the blood vessels, degenerative changes in neurons and marked neuronophagia. In one of the cases, infiltration with neutrophils was also seen. Brain showed perivascular cuffing by mononuclear cells, neuronophagia and focal necrotic areas with an infiltration of mononuclear and polymorphonuclear leucocytes.

No significant changes were seen in other organs.

Transmission Experiments

Subcutaneous inoculation of 1 ml. of an 18 hour old broth culture of *Pasteurella* sp. into hill bulls did not produce any untoward reaction excepting for a slight swelling at the site of inoculation which subsided in about a week and the organisms were not demonstrable either in the blood stream or in the cerebrospinal fluid. However, these animals were found to be resistant to subsequent challenge infection with a virulent strain of *Pasteurella septica*. (P. 52).

Intrathecal inoculation into hill bulls, of varying dilutions (10^{-1} to 10^{-6}) of the culture revealed the following:

Depending upon the dose of the culture administered, death occurred in 4 to 39 days. In acute cases there was a rise in body temperature within 24 hours after infection which dropped almost to normal in another 24 to 48 hours. Animals were somewhat depressed and just before death they were unable to stand. Cases in which the illness was somewhat prolonged, the body temperature was more or less normal throughout the course of the disease except for a transient rise within first 24 hours after inoculation. Initial symptoms seen were staggering gait and incoordination of movement. Later, there was weakness of loins and the animals had difficulty to get up especially on the hind limbs. This was followed by inability to stand even when helped. Death occurred more or less suddenly. All through the course of the disease the animals were otherwise bright and normal and fed fairly well excepting for a day or so before death. These symptoms resembled those seen in natural cases of the disease in the field.

On post mortem examination all the internal organs were almost normal. There was congestion of meningeal vessels, darkish discoloration of the substance of the brain and spinal cord with occasional haemorrhagic spots and increased fluid in the ventricles of the brain. The strain of *Pasteurella septica* could be recovered from brain and spinal cord but not from heart blood or spleen.

Histopathological examination of brain and spinal cord of experimentally infected hill bulls revealed changes which were similar to those observed in the natural cases, infiltration by mononuclear and sometimes polymorphonuclear leucocytes, perivascular cuffing, neurophagia and sclerotic changes in some of the blood vessels.

Examination of freeze dried G. T. V. used for vaccination:— Samples of freeze dried G. T. V. were available from two of the batches used in the field for mass vaccination where paraplegia in bovines subsequent to vaccination had occurred. Cultural examination of the reconstituted vaccine did not reveal any organism of pathogenic significance. Hill bulls inoculated subcutaneously and intrathecally

with the vaccine remained well for a period of over 6 months without showing any signs of ill health or symptoms of paraplegia. On bacteriological examination no organism was isolated from blood or cerebrospinal fluid of these animals. Guinea pigs and mice were also inoculated intracerebrally as well as intraperitoneally with suspension of G. T. V. and no bacteria, virus or protozoa of any pathogenic significance could be isolated from these animals.

The above investigation into the cause of paraplegia in bovines in Andhra Pradesh revealed that the disease was due to a strain of *Pasteurella septica* of low virulence. Rose and Rac (1957) recorded an outbreak of encephalitis in heifers due to *Pasteurella* Sp. in Australia somewhat similar to the condition described in this paper.

Summary

Occurrence of paraplegia in bovines in certain areas of Andhra Pradesh observed during mass immunization against rinderpest has been described.

Pasteurella Sp. of low virulence was isolated from brain and spinal cord of two animals that died of the disease and from cerebrospinal fluid of two other ailing animals. Smears of scrapings of spinal canal, brain and centrifuged deposits of cerebrospinal fluid revealed bipolar stained organisms. Sera from four ailing cases agglutinated in 1/80 to 1/160 dilution a known strain of *Past. septica* and protected mice against infection with the same strain.

Hill bulls infected intrathecally with the strain of *Pasteurella* Sp. revealed symptoms similar to those observed in natural cases and the causal agent could be reisolated from brain and spinal cord of experimental hill bulls.

Acknowledgments

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UTERUS BICORNIS BICOLLIS IN A DOMESTIC BUFFALO (*BOS BUBALIS*)

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Introduction

During the course of research work under the Cattle Sterility Scheme, Bombay State, a number of specimens of female genital organs from buffaloes slaughtered at the Bandra abattoir, Bombay were studied for the Biometry of genital organs. One thousand nine hundred and eighty organs were studied under the Scheme. The buffalo stock that comes to the Bombay abattoirs is mostly from the Bombay stables, wherefrom a number of animals are usually required to be disposed of due to udder troubles etc. The Bombay stables have selected stock for high yield and they are usually in very good condition when disposed of. One interesting specimen of uterus bicornis bicollis in a domestic buffalo *Bos bubalis* was encountered during the study of Biometry of genital organs. On scrutiny of the available literature, it is found that the findings are probably the first of its type in *Bos bubalis* and hence it is considered necessary to place this on record.

Literature

In cattle, Stuhlenmiller (1933) and Craig (1937) have frequently encountered Uterus bicornis bicollis. Demeter (1926) has recorded cases of uterus bicornis bicollis combined with Vagina sub-septa. Macrae (1935) recorded a case of double cervix in *Equus caballus*. This mare was examined alive and details regarding the exact state of uterus are not available. Clayton as cited by Craig (1937) encountered an abattoir specimen of bovine uterus wherein the body was absent and each horn had a separate cervix and os. The uterine cornua were normal in shape except that they were attached by a muscular band in the region of the body. The two cervixes were completely independent throughout and opened separately side by side into the vagina. Clayton concluded that the animal must have had previous calvings. Murray (1939) encountered three cases of cervix bifida in *Bos taurus*. However, none of these was uterus bicornis bicollis.

Lagerlof and Boyd (1953) observed cervix bifida only in 2% of the cases in a study covering 5,950 specimens of genitalia of the Swedish Highland Breed.

Senze (1958) recorded double cervix in heifers as well as double uterus and vagina — total and partial.

Kaikini (1959) during his course of studies in Sweden did not come across any case of uterus bicornis bicollis though he observed three cases of cervix bifida in abattoir specimens of genital organs of Swedish Cattle.

As regards the occurrence of this condition in buffaloes, no information is so far available. Bhim Reddy (1959) during the course of Biometrical studies encountered only one case of cervix bifida in a buffalo.

Description of the Specimen

History of the case is not known. The entire genital organ was collected from a murrha buffalo slaughtered at the Bandra abattoir. Casual examination did not reveal any abnormality but on examination of the cervix, two openings were found instead of one. These openings were wide apart of each other.

The external opening of the Os situated on the right side presented a thickened appearance and a fibrous feel. The left side opening appeared to be normal, though smaller. The cervical canal was therefore explored by introducing a probe through each of the two (portio vaginalis cervix) openings. Considerable resistance was encountered in passing the probe through the right opening, whereas that on the left side could be passed easily. Further it was observed that the probes did not cross each other at the region of the body of the uterus but instead went straight in the lumen of the respective cornua. This indicated that there were two cervical canals which were independent of each other, communicating with the respective cornua directly. In this specimen, the right cornua was better developed than the left, thereby suggesting that the animal had previous calvings. The broad ligament on the side of the right cornua appeared to be thicker and more fibrous than the left side, and there were also a few strands of adhesions therein.

Brief Account of the Development of Genitalia

The uterine tubes, the uterus and possibly the upper portion of the vagina are derivatives of the Mullerian (para-mesonephric) ducts. In the human embryo, the Mullerian ducts do not develop until the 6th week when it reaches a length of 10–12 m.m. The ducts fuse together at about the 9th week (Gray 1932) giving rise to Uterus simplex. According to Wells (1959), during foetal life the cervix uteri grows more

rapidly than the corpus in the Homosapians. Mullerian ducts in the lower vertebrates do not fuse and as a result the female genitalia consists of a bilaterally symmetrical set of tubes leading from the left and right ovary to the uro-genital sinus. A separate cervical opening to each horn and vagina is characteristic of marsupials. The fusion is less marked in the lower forms and uterus bicornis bicollis is seen in most of the Rodentia e.g., *Lepus cuniculus*. Duplex uterus is naturally present in rats, mice and rabbits (Nalbandov 1958).

During the course of an extensive study of the embryology of genital organs of *Bos taurus* conducted by Bissonette (1924), it was observed that the Mullerian ducts became apposed to each other but not fused at the 3.8 cm. stage foetus. Fusion in the regions of future vagina and uterus excepting an intermediate section-presumably the future Cervix-started in the 5.1 cm. stage foetus. In the 7.5 cm. foetus, Bissonette found the corpus uteri and vagina as single chamber with double channels between. He mentions that the cervical region in 15 cm. stage foetus was examined by him. However, details regarding the presence of duplicity in that area are not mentioned by him.

Discussion

According to Roberts (1956) failure of the Mullerian ducts to fuse is an inherited non-lethal character. Bonfert and Mai (1958) incriminated five bulls of the black spotted breed as transmitting a recessive character, a double cervical canal to their daughters associated with relative or absolute infertility. In an interesting study of the development of the genital organs in *Bos taurus* foetus, Bissonette (1954) observed that upto the 7.5 c.m. stage the Mullerian ducts remained separate in the region of the future cervix uteri whereas they fuse cranially and caudally to it. The fusion is probably complete at the 15.0 c. m. stage of foetus. In the present specimen, the degree of of duplicity seems to be complete as a result of which there is a thick muscular band separating the uterine cornua completely. The uterine body is absent. The present specimen of uterus bicornis bicollis in *Bos bubalis* appears to be allied to the one described by Craig (1937) in *Bos taurus*.

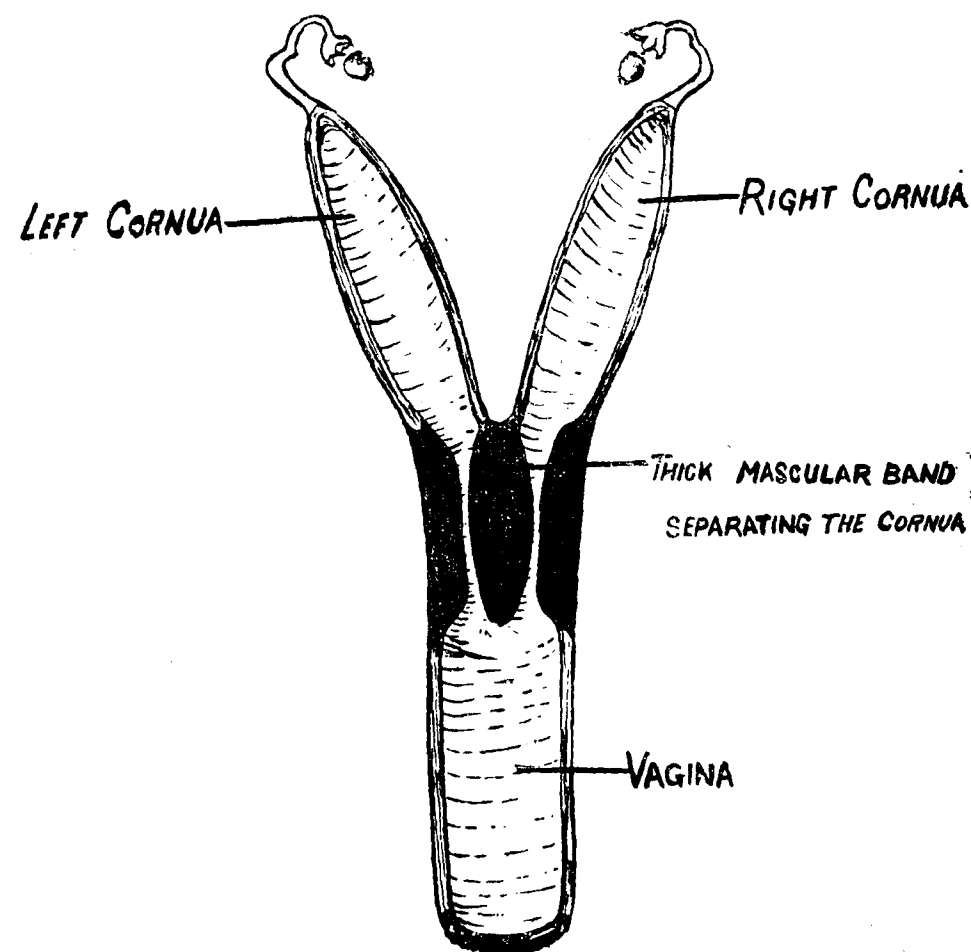
The right uterine cornua is wider and well developed than the left which is suggestive of previous calvings. The development of foetus therefore has been independent in the right cornua. Normally, even though foetal development takes place in one of the horns the foetal membranes and fluids extend considerably in the non-pregnant cornua. According to Fleming (1952), the chorion extends to the extremities of both horns. In the present case due to the complete separation of the two cornua by a thick muscular band, such an extension of the chorion in the non- gravid cornua via the uterine body is not

possible and hence the entire foetal membranes and their contents seem to have been accommodated in the gravid cornua itself. The uterine musculature can adjust to the increase in volume-so caused. Further the external os at the right side is thick, fibrous and enlarged and its lumen is wider as compared to the left external os. This is highly suggestive of possible strain and injury during parturition. These observations however differ from those of Craig (1937) wherein he observed similarity in the size of uterine cornua whereby he concluded that each horn was occupied by a foetus at least in the last pregnancy.

The present specimen of uterus bicornis bicollis is the first of its type to be recorded in the domestic buffalo *Bos bubalis*.

Summary and Conclusions

A case of uterus bicornis bicollis in the domestic buffalo *Bos bubalis* is placed on record. This is similar to the one recorded by Craig



(1937) in *Bos taurus*. The right cornua was found to be more enlarged and well-developed than the left and possibilities of former pregnancies therein are discussed. This inherited non-lethal condition of uterus bicornis bicollis may be the result of the persistence of the incomplete fusion of Mullerian ducts beyond 7.5 cm. stage foetus. This is probably the first recorded case of its type in *Bos bubalis*.

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SPECIFIC GRAVITY OF BLOOD AND SERUM IN RELATION TO PACKED CELL VOLUME IN BUFFALOES

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Introduction

The Specific Gravity of blood depends upon several factors, especially the number of R.B.C., the Haemoglobin content and the protein content of plasma. Studies were made on the comparative estimation of the Specific gravity of blood and serum along with the P.C.V. Local buffaloes of nondescript breed, of age groups ranging between 3 years to 6 years were selected for the study. A survey of literature revealed little information on the comparative estimation of the specific gravity of blood with that of serum in relation to the packed cell volume. As the comparative study was made in relation to the P.C.V., the number of R.B.Cs. was not taken into consideration.

Materials and Methods

Blood was collected from apparently healthy buffaloes of non-descript breed. The animals were examined thoroughly for body temperature, pulse rate and rate of respirations. Only animals showing normal temperature, pulse rate and respiration were selected for the study. Two samples of blood each of 5 cc were collected at the same time from each one of the selected animals. One sample was collected in a vial containing anticoagulants, Potassium and Ammonium oxalates. The anticoagulant vials were prepared by drying 0.15 cc. of a 10% oxalated solution (containing 4 parts of Pot. oxalate and 6 parts of Ammn. oxalate) in 5 cc. vial at 70°C. The other sample of blood was collected in a small test tube for separating serum. The blood was allowed to coagulate and after about 30 minutes the test tube was centrifuged at low speed for 10 minutes for a clear separation of serum from the clot.

The Specific gravity of whole oxalated blood and serum was estimated with copper sulphate solutions of known Specific gravities. The tests were done in about 60 minutes after the collection of the blood samples.

To prepare the Standard solution of Copper Sulphate 170 grams of chemically pure copper sulphate ($\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$) was taken in a one litre bottle, and dissolved in 1000 cc of distilled water. The temperature of the copper sulphate solution was noted and more distilled water was added to correct the temperature factor to 20°C . From this stock solution 16 standards were prepared covering the range of 1.016 to 1.076 in gradation of 0.004. The solutions were filled in sixteen 60 cc. wide mouth glass stoppered bottles.

The Specific gravity of blood was estimated by dropping one drop of blood in each of the bottles containing the copper sulphate solution of a known specific gravity. A 5 cc fine graduate pipette (20°C .) was taken to drop uniform sized drop of blood in all the estimations. The blood was dropped from a height of about 5 cm. from the surface of the copper sulphate solution in the bottle. Before determining the specific gravity of blood particular care was taken to ensure uniform mixing of the corpuscles and the plasma by inverting slowly the vials containing oxalated blood 10-12 times.

The rise or fall of the drop in the copper sulphate solution after the delivery of the drop of blood from the pipette reveals its specific gravity in relation to that of the standard solution. Readings were taken when the drop was seen uniformly suspended inside the solution instead of sinking to the bottom or floating on the surface of the solution immediately. The same procedure was adopted for estimating the specific gravity of the serum of the same animal.

For Packed Cell Volume a Wintrobe Hematocrit tube was filled with blood from each animal using a 5 cc syringe equipped with a 6" 18 gauge needle. The Wintrobe tubes, after being filled with blood, were centrifuged at 3000 r.p.m. for 30 minutes. After 30 minutes the tubes were taken out, recordings made and the tubes centrifuged again for 10 minutes. This procedure was continued till two successive readings were identical.

Results

1. The Specific gravity of blood in the nondescript adult buffaloes ranged as per the present study from 1.052 to 1.064. The lowest recording made was 1.052 and the highest 1.064.

(ii) The Specific gravity of serum ranged from 1.024 to 1.032. The lowest recording made was 1.024 and the highest 1.032.

(iii) The P.C.V. of the animals under study ranged from 22% to

Discussion

The specific gravity of blood and serum in relation to the packed cell volume was estimated. The present study reveals that the Packed cell volume has a direct bearing on the Specific gravity of blood. The Specific gravity of serum when taken along with these two data has given an interesting information that it is almost half of the last two decimal points plus 1.000 of the specific gravity of blood. As an example reading in animal no. 1 is cited, where the specific gravity of blood is 1.064 and that of the serum is 1.032, which is exactly half of the last two decimal points in blood plus 1.000. In other cases the difference between the Specific gravity of blood and serum ranged within plus or minus 0.004 of half of that of the last two decimal points as shown above.

The Packed cell Volume ranged from 32-41% in blood having a specific gravity of 1.064, with an average of 37.7%, and 30-39% with an average of 33.4% in blood having a specific gravity of 1.060. It ranged from 23-34% in blood having a specific gravity of 1.056 with an average of 28%, and 22-32% in blood having a specific gravity of 1.052 with an average of 26.6% as given in Table II.

TABLE I

KZ m2, N24

Animal No.	Sp. Gravity of Blood.	Sp. Gravity of Serum.	P.C.V.%
1	1.064	1.032	32
2	1.064	1.032	41
3	1.064	1.032	40
4	1.064	1.032	38
5	1.060	1.028	30
7	1.060	1.028	36
6	1.060	1.032	38
8	1.060	1.032	30
9	1.060	1.032	39
10	1.060	1.028	32
11	1.060	1.032	35
12	1.056	1.032	23
13	1.056	1.028	28
14	1.056	1.028	33
15	1.056	1.028	25
16	1.056	1.028	25
17	1.056	1.028	34
18	1.056	1.028	28
19	1.052	1.028	25
20	1.052	1.028	22
21	1.052	1.028	32
22	1.052	1.024	28
23	1.052	1.024	26

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TABLE II

Specific gravity of blood.	Packed cell volume range.	Packed cell volume Average.
1.064	32 to 41%	37.7%
1.060	30 to 39%	33.4%
1.056	23 to 34%	28.0%
1.052	22 to 32%	26.6%

The above data have revealed that the Packed cell Volume is correspondingly less in those samples which have a low specific gravity of blood and *viceversa*.

Summary

The variations which occur in the Specific gravity of blood of buffaloes in relation to that of the serum and the packed cell volume are described and a close relationship has been drawn out between the Sp. gravity of blood and that of the serum and the Specific gravity of blood and the P.C.V. The study showed that the Specific gravity of blood ranged from 1.052 to 1.064 and that of the serum 1.024 to 1.032. The P.C.V. ranged from 22% to 41% in the animals under study. Higher Specific gravity of blood has a higher p.c.v. and *viceversa*. Further work is in progress.

Acknowledgments

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A STUDY ON THE USE OF CHLORPROMAZINE HYDRO-CHLORIDE (LARGACTIL - M & B) AND PROMETHAZINE HYDROCHLORIDE (PHENERGAN - M & B) FOR EXAMINATION OF THE PENIS IN BULLS AND BUFFALOES

By

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Examination of the male organ forms an essential item in the andrological investigation of bulls. In view of more and intensive work on the selection of bulls, as well as its subsequent periodical investigations in the A. I. and other stud centres for sexual health control, there should be accurate clinical examination of the health of the penis and as the bulls resent the handling of the penis and also as there is an impossibility in the drawing of the same out of the sheath, efforts are undertaken to apply sedative medication to help in the relaxation of the musculature of the penis for its easy withdrawal out of the sheath for proper examination for ulceration, granulations, or any such unhealthy conditions.

So far as the medication for sedation is concerned, parenteral administration of the M & B product - Largactil, has during recent times taken a significantly important position both in the field of medicine and surgery. The reason of the popularity of this product is perhaps due to the fact that it is practically non-toxic with little or no side effects.

There is another M & B product, antihistaminic and sedative in character-Phenergan, which combined with Largactil, gives a profound sedation with practically no side effects.

So far as the use of Largactil in the examination of the penis of bulls is concerned, Lundavall and Campbell (1957) suggest 0.2-0.3 mg. per lb. to bulls to be given intravenously. They claim good results by using the drug in two animals only - the 1st animal, a 900 lb. Herford bull aged 2 years given 180 mg. I.V., with protrusion of the penis in 10 minutes and the 2nd animal, a 2000 lb. Shorthorn bull was given 250 mg. I.V., and protrusion occurred in 5 minutes.

Matera and Stopiglia (1957) working with bulls found satisfactory results in 10 animals by the use of Largactil and Phenergan combined at a dose of 50 mg. of either drug per 100 kgm. of body weight. Administered intravenously the drugs produced relaxation of the retractor muscles of the penis in about 10 minutes thus permitting complete

exposure of the same by simple traction and in no case there was any complication or disturbance related to the use of these drugs.

An experiment was undertaken to find out the action of (i) Largactil alone and (ii) combined with Phenergan towards relaxation of the musculature of the penis in bulls for its complete withdrawal out of the sheath for sexual health control.

The 1st experiment using Largactil alone in a dose of 0.2–0.3 mg. per lb. body weight, was undertaken in 5 Bulls and the results are shown in Table I.

A study was also made to find out if the drugs produce any adverse effect towards spermatogenesis. The work is summarised and is shown in Table IV.

Discussion

In the first experiment with Largactil alone, (0.2-0.3 mg/lb.). Five bulls were given the drug with positive result in two animals one allowing handling of penis on the 14th minute and another on the 30th minute.

In the 2nd experiment 11 animals were given the drugs (Largactil and Phenergan combined at 50 mg/100 kgm. of each drug) and positive result could be obtained in 7 animals. The time taken was 13 minutes in the minimum and 50 minutes in the maximum. Majority however took 30 minutes on an average. Severe reaction was noticed in one animal (Tharparkar 17) with highly coloured urine. Another animal (Sahiwal 94) also lied down with pronounced salivation, and could be made to stand on the 50th minute. Except these no other untoward effect however was encountered.

The dose (50 mg./100 kg.) seems to be insufficient so far as the sedation of buffalo bulls are concerned as the experiment in case of two buffalo bulls proved negative.

It is also significant perhaps to note that the drug has no ill-effect towards spermatogenesis as is revealed from the morphological study.

The difference and variation in reaction as noted in both the experiments in contrast to the finding of the American workers, in foreign breeds of bulls, may perhaps be due to environment or other factors which is very difficult to explain.

Summary

Experiment was undertaken to find out the effect of (i) Largactil alone and (ii) Largactil and Phenergan combined towards sedation for withdrawal of the penis out of the sheath for examination. Combined use of Largactil and Phenergan (Intravenously) at a dose of 50 mg./100

TABLE I

Sl. No.	Breed of Bull	Age of the Bull	Body Weight	Drug used	Dose	Mode of Administration	Result
1	Red Sindhi 7	13 Yrs.	737 lb.	Largactil alone	@ 0.2 mg/lb. total 150 mg.	Intravenous	Penis manipulated out after 14 minutes. +
2	Hariana 667	9 Yrs.	1209 lb.	"	@ 0.2 mg/lb. total 250 mg.	"	The animal lied down after 10 minutes. Made to stand on the 20th minute. Penis could not be taken out owing to violent opposition. —
3	Hariana G.F. 188	11 Yrs.	1012 lb.	"	@ 0.3 mg/lb. total 300 mg.	"	Did not allow handling of Penis. —
4	Hariana 8	6 Yrs.	1198 lb.	"	@ 0.3 mg/lb. total 350 mg.	"	do. —
5	Hariana 2071	5 Yrs.	1254 lb.	"	@ 0.3 mg/lb. total 375 mg.	"	Penis taken out on the 30th minute without any resistance. +

The second experiment was taken up with Largactil and Phenergan combined and the result is tabulated below :

TABLE II

Sl. No.	Date	Breed of Bull	Age of the Bull	Body weight	Drug used	Dose	Mode of administration	Result
1	7-7-59	Red Sindhi 7	13 yrs.	334 kg.	Largactil and Phenergan combined	@ 50 mg. each per 100 kgm. weight total 150 mg. of each drug	Intravenous	Penis taken out after 13 minutes +
2	9-7-59	Hariana G.F. 118	11 yrs.	440 kg.	"	"	"	Penis taken out after 30 minutes +
3	10-7-59	Tharparkar 17	5 yrs.	380 kg.	"	300 mg. of each drug	"	The animal lied down on the 10th minute. Could be made to stand after 3 hrs, when he passed high coloured urine. Penis could not be taken out —
4	14-7-59	Hariana 2071	6 yrs.	490 kg.	"	250 mg. of each drug	"	Trials made earlier failed till the 20th minute when the penis could be taken out +
5	15-7-59	Hariana 667	11 yrs.	538 kg.	"	"	"	Penis taken out on the 35th minute and trials made before failed +
6	24-7-59	Sahiwal 85	5 yrs.	488 kg.	"	"	"	Penis could not be taken out —

7	7-8-59	Sahiwal 88	5 yrs.	416 kg.	"	200 mg. of each drug	"	Penis could be taken out on the 30th minute. Trials made earlier failed +
8	8-8-59	Sahiwal 29	4 yrs. 4 months	478 kg.	"	250 mg. of each drug	"	Penis could be taken out on the 50th minute. Trials made earlier failed +
9	18-8-59	Hariana 695	11 yrs.	471 kg.	"	"	"	Penis taken out on the 46th minute and earlier trials failed +
10	9-9-59	Hariana 3	6 yrs.	451 kg.	"	200 mg. of each drug	"	Penis could not be taken out —
11		Sahiwal 94	5 yrs.	502 kg.	"	250 mg. of each drug	"	The animal lied down on the 8th minute with profuse salivation. Efforts to make him stand failed till 50th minute, when he could be moved to rise and penis could be taken out. +

The experiment was taken up in case of two buffalo bulls with the result given below :

TABLE III

Sl. No.	Date	Breed	Age of the Bull	Body Weight	Drug used	Dose	Mode of Administration	Result
1	12-8-59	702	6 Yrs.	682 kg.	Largactil and Phenergan combined	300 mg. Largactil and 200 mg. Phenergan	Intravenous	Penis could not be taken out.
2	24-12-59	506	10 Yrs.	580 kg.	"	300 mg. of each drug.	"	do.

kgm. body weight of each drug seems preferable to Largactil alone used at a dose of 0.2-0.3 mg./lb. body weight and the usual time as found in Indian bulls is 30 minutes on an average for manipulation of the penis out of sheath. In buffalo bulls Largactil and Phenergan combined at a dose of 50 mg/100 kgm. each, were of no value for this purpose. The drug is also found to have no ill-effect on spermatogenesis

TABLE IV
Morphological abnormality of sperm.

Bull	Before Expt.	3 days after	7 days after
Haryana 695 ...	10 - 12%	8 - 12%	8 - 12%
Sahiwal 88 ...	7 - 9%	8 - 10%	9 - 14%
Haryana 1639 ...	10 - 11%	7 - 10%	7 - 11%

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ERYTHROCYTE SEDIMENTATION RATE IN CATTLE - THE INFLUENCE OF SEX AND AGE

By

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and

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Introduction

The authors (1960) have reported the advantages of determining the ESR in cattle at an angle of 45 degrees using the technique adopted by Washburn and Meyers (1957). The ESR obtained by this method was 6.5 m.m. per hour in cattle. This value was the mean obtained from 25 blood samples collected from 16 cows, 6 bullocks, 2 bull calves and one bull.

The influence of sex and age on the ESR is well recognised in human beings. Sturkie and Textor (1958) observed significant variation in the ESR values of the chicken, in males, females and capons. Sastry (1953) studied the ESR in cows and bulls by Wintrobe method with the tubes in vertical position and observed a mean value of 11.7 m.m. and 11.2 m.m. respectively, at the end of 24 hours. Greatorer (1957) reported a mean E.S.R. of 3 m.m. in 24 hours in cattle by the same method, and stated that variations occurred with age, the ESR increasing up to the age of forty four weeks and then falling as the age advanced. Hoffman and Morales (1956) studied the influence of age, sex, gestation, lactation and dry period on the ESR in cattle. They used the Westergren method and kept the tubes at an inclination of 30 degrees from the horizontal and observed values at the end of one hour, two hours, and twenty four hours. The values given by the authors revealed that the ESR was increased only in the case of cows, and that maximum values were obtained in dry cows. No age difference was observed in these values.

Methods and Materials

The method adopted was the same as described by the authors (1960) in their earlier paper. Samples of blood were obtained from clinically healthy animals consisting of 10 adult breeding bulls, fifteen adult bullocks, ten bull calves, twenty five adult cows, and fifteen heifer calves. ESR values were recorded at the end of one hour, two hours, three hours, four hours and twenty four hours in each case. The values obtained were analysed statistically.

Erythrocyte Sedimentation in millimeters.

S. No.	Class of Animal	No. of animals	One hour		Two hours		Three hours		Four hours		Twentyfour hours	
			Range	Mean C.V. %	Range	Mean C.V. %	Range	Mean C.V. %	Range	Mean C.V. %	Range	Mean C.V. %
1	Breeding Bulls (Four years and above)	10	5-6	5.7	8-12	9.4	15-2	11.5	10-19	13.2	21-50	35.5
2	Bullocks (Four years and above)	15	5-6	5.6	8-12	9.6	14.4	11.6	9-20	14.0	28-40	34.9
3	Bull Calves (Three months to Two years)	10	5-6	5.9	8-13	10.5	15.0	13.2	15-21	16.5	33-45	38.9
4	Heifer Calves (Three months to two years)	15	4-6	5.5	6-15	8.8	27.2	11.3	10-18	13.8	27-41	34.8
5	Cows (Four years and above)	25	5-7	6.2	8-15	11.8	18.8	15.2	13-24	19.4	20-46	37.8

Results and Discussion

The mean E.S.R. obtained in all classes of animals showed some difference, but on being subjected to "F" test (Snedecor, 1956) the variation was found to be not significant although the "F" value was very high.

In the case of cows a slight increase in the mean of the values was noticed at the end of one hour. This increase was appreciable, at the end of second, third and fourth hours, but not at the end of twenty-four hours. Analysis of variance of the values obtained in all classes of the animals at the end of second, third and fourth hours showed a significant overall variation ($P < 0.01$). The variation in the mean of ESR values of cows and that of breeding bulls and heifer calves at the end of second, third and fourth hours was found to be significant ($P < 0.01$). The E.S.R. of cows and bullocks also significantly differed at the end of third and fourth hour ($P < 0.01$).

This showed that the sex difference in the E.S.R. observed in other species, exists in cattle also. This may be due to the influence of sex hormones as suggested by Sturkie and Textor (1958) in the case of chickens. It requires further work to confirm this.

Difference in age of animals was also found to influence the E.S.R. But this difference was noticed only in the case of the female of the species.

When the readings were taken at the end of twenty four hours the above variations induced by sex and age, decreased and were not statistically significant. This may probably be due to closer packing of the cells slowing down the sedimentation.

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A SIMPLE METHOD OF DESPATCHING SERUM IN FILTER PAPER STRIPS

By

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During recent years the despatch of serum samples for serological tests against several infectious diseases has been considered as an important aspect of diagnostic work by Veterinarians in the field. The routine method of despatch of serum samples consists of collection of blood, separation of the serum, sealing the samples in some suitable containers, labelling and packing them carefully before despatch. Unless the first three procedures are carried out under strict conditions of bacteriological asepsis the addition of some preservatives like 0.25 to 0.5% phenol or 1: 10,000 to 25,000 merthiolate, etc. for the prevention of bacterial growth during storage and despatch is yet another important step that cannot be ignored. These preservatives, though capable of preventing growth of bacteria, when contamination is at minimum, fail to yield desired result when gross contamination takes place in absence of sterile instruments and glassware. Such difficulties are often encountered in the field and the hot climate, lack of refrigeration facilities at all places and the long distances which these samples have to travel, make the collection and despatch of serum samples a difficult task. In order to overcome this, a method has been evolved at Wisconsin in which large number of serum samples are sent to the testing laboratories by dipping small-size filter paper discs or blotting papers (see *Vet. Med.*, 54, (6) 284, 1959). The technique has been successfully used with Vesicular stomatitis, Newcastle Disease and Equine Encephalomyelitis. This paper describes the results of similar trials with sera from known positive and negative *Brucella* reactors to assess the usefulness of the method in despatching serum samples for Laboratory diagnosis.

Materials and Methods

Since details of the technique adopted at Wisconsin were not available, attempts were made to evolve a technique locally, keeping in view its suitability for field workers, though the principle followed was materially the same. Ordinary filter paper (Whatman 100) strips were cut to different sizes and trials with *Brucella* positive serum samples showed that strips of the size 5.9 x 2.1 cms. would completely absorb 0.5 ml. of serum when dipped into the sample or placed on the strip drop by drop from a pipette. The strips were allowed to dry at room temperature for 3 to 4 hours and labelled at one

end of the strip with a lead pencil. For extraction of the antibodies, the strips were cut into small pieces, transferred into centrifuge tubes containing (1.0, 2.5 and 5.0 ml. quantities of 5% saline and left for 2, 4, 8, and 18 hours at 4°C at the end of which they were centrifuged at 1,500 rpm. for 15 minutes and the supernatants transferred into separate tubes for test. The final dilutions of extracted antibodies were taken as 1:2, 1:5 and 1:10. Usual techniques of plate and tube agglutination tests (Dhanda and Rajagopalan, 1949; Stableforth, 1959) were followed using standard *Brucella abortus* antigens of I.V.R.I. Filter paper strips, prepared as described above and kept at room temperature, were tested at intervals of 2, 4 and 8 days after their preparation in order to find out if storage had any deteriorating effect upon the antibody content.

Results

With 1:2 dilution of the serum obtained from the strips, attempts to recover 0.5 ml. of antibody suspension were not met with success and out of the small quantities, usually 2 to 3 drops, recovered with some difficulty, plate agglutination tests were conducted but without the desired results. The agglutination was delayed (2 to 2.5 minutes) and the resultant particulations were powdery indicating a weak (one plus) reaction, as compared to a strong (three plus) reaction seen with the original serum sample. Other dilutions *viz.*, 1:5 and 1:10 were obviously unsuitable for the plate test.

With the latter two dilutions, tube agglutination tests, set up from 1:10 to 1:640, 50% agglutination was detected at 1:160 and this compared well with the titre of the original serum sample. Trials with strips kept for 2, 4 and 8 days after preparation revealed no significant loss in the antibody titre in any of the samples tested. For complete extraction of the serum antibodies from the strips, it was found that they should remain in contact with saline for 18 hours at 4°C, though samples tested after 8 hours revealed titres less by one step only. These observations have been confirmed by repeating the test, under identical conditions, on 24 positive, 21 doubtful and 18 negative serum samples obtained from villages and one local farm.

Discussion

The simple method of preparing filter paper strips, soaking them in serum samples, labelling and despatching after drying, need no discussion. Observations of this trial would indicate that strips, soaked in a definite quantity of serum can be used after drying atleast up to 8 days for serological tests, provided sufficient saline, 5 to 10 times the original quantity of serum soaked, is applied to these strips in a cool place for 18 hours. Quantities less than these may fail to extract the antibodies completely resulting in lower titres. It is unfortunate

that this limitation precludes the opportunity to test serum samples by this method in the plate test, since undiluted serum is preferred for correct appraisal of results in the test. However, in moderately equipped laboratories the tube test can be easily performed, the results of which are more dependable than the plate test. The filter paper strip method has several advantages which is expected to make it popular under field conditions *viz.*, the materials required are available in any dispensary, no preservative need be added to the serum, dried and labelled strips can be despatched inside ordinary covers, their handling and sampling is very easy and the chances of bacterial contamination are completely avoided. Since the strips are fully potent atleast up to 8 days, they can be conveniently made to reach the laboratories in 4 to 5 days time by post, leaving another 3 to 4 days time for the laboratory worker to process and test the samples without keeping them inside a refrigerator. If, however, they cannot be processed within this time limit, they may have to be stored at 4°C. For all practical purposes, our observations are in accordance with those reported from Wisconsin and cited above. Needless to state that there is scope to extend this technique to other bacterial and viral diseases.

Summary

A method of despatching serum samples under field conditions for Brucellosis test in filter paper strips has been described. Laboratory trials have shown that the strips could be used, after extraction of the antibodies, for the tube agglutination test with satisfactory results. The technique, however, could not be adopted for the plate agglutination test.

Acknowledgment

The authors wish to express their grateful appreciation to Sri B. N. Patra, Principal of the College and Dr. G. Biswal, Director of Animal Husbandry and Veterinary Services, Orissa for useful suggestions and facilities provided.

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**A PRELIMINARY NOTE ON THE INCIDENCE AND
INVESTIGATION OF FOWL CHOLERA IN POULTRY AT THE
LIVESTOCK RESEARCH STATION, HOSUR CATTLE FARM
(MADRAS STATE)**

By

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Introduction

Pasteurellosis or Fowl Cholera is well known to cause heavy loss in poultry. Vancheswara Iyer (1948) met with out-breaks of this disease in ducks at the Hosur Cattle Farm and the disease has been investigated. It has been reported that *Pasteurella avicidia* was isolated from the heart blood of ducks that died in the out-breaks. The culture isolated was sent to the Indian Veterinary Research Institute Mukteswar. It was said that the culture sent to the Indian Veterinary Research Institute was found to be a variant of *Pasteurella avicidia* and was found to be non-pathogenic to fowls, ducks and pigeons but pathogenic only to rabbits. Balasubramanian (1958) had reported incidence of Fowl Cholera in 2½ to 3 month old chicks in a poultry farm in Kanyakumari district. He reported that heart blood smears showed bipolars indistinguishable from *Pasteurella multocida* and the heart-blood swab and bone-marrow emulsion proved pathogenic to rabbits.

In October 1960, an out-break of Fowl Cholera in the Livestock Research Station, Hosur Cattle Farm has been investigated. The source of infection of this out-break could not be definitely traced out except to believe that it might have been through susceptible wild birds and infection disseminated through their droppings.

Symptoms Exhibited by the Affected Birds

During the course of my investigations I noticed 2 or 3 adult exotic birds suddenly going drowsy and depressed once in 2 or 3 days developing thermal reaction to 110°F. The affected birds had no inclination to move or to eat. They staggered in their gait when forced upon to move. An exceptional thirst was characteristic. The head, the comb and the wattles became dark coloured and marked intestinal disturbance was indicated by watery blood stained diarrhoea and the feathers round the vent were soiled. The affected birds manifested laboured breathing and signs of pain. Some hours before death which took place in 2 to 3 days complete prostration and coma set in.

A few chronic cases also were met with wherein the affected birds manifested emaciation, persistent diarrhoea, swollen leg joints contain-

ing purulent material and such birds died after a duration of about 10 to 15 days.

Post-Mortem Findings

While conducting post-mortem examination on dead birds, characteristic lesions suggestive of Pasteurellosis was encountered in two adult birds, White Leghorn Hen No. 534 and White Leghorn Hen No. 209. The post-mortem examination in these two birds revealed severe congestion and consolidation of lungs, numerous haemorrhagic spots on the heart, abdominal fat and intestines. Cheesy material was present in the oviduct and in the peritoneal cavity also. The heart-blood of the two birds on examination revealed numerous bipolar organisms morphologically indistinguishable from *Pasteurella aviseptica*. Materials have been collected from the dead birds for further biological and cultural confirmation.

Laboratory Tests

Cultures made directly from the heart-blood of the two dead birds in broth and incubated for 24 hours at 37°C were intraperitoneally injected into 2 rabbits on 26-10-60. These two experimental rabbits developed thermal reaction, remained very dull and died in 24 to 30 hours. Post-mortem examination conducted immediately on the two dead rabbits, revealed congestion of lungs and the heart-blood smears contained numerous bipolar organisms indistinguishable from *Pasteurella aviseptica*.

The experiment was again repeated and the culture was injected into a rabbit and to a pigeon intraperitoneally on 8-11-60. Both of them died on 9-11-60. The post-mortem examination conducted on the rabbit and the pigeon revealed again numerous bipolar organisms in the heart-blood smears morphologically indistinguishable from *Pasteurella aviseptica*.

Cultures isolated from the heart-blood of the experimental rabbit and the pigeon which proved pathogenic have been studied with reference to the morphological characters of the organism and the biochemical reactions obtained have been as follows:—

- (1) Gram negative organism with bipolar staining.
- (2) Non-motile.
- (3) Produced indole.
- (4) Positive for Methylene blue reduction test.
- (5) Fermentation was seen in the following sugars viz., Glucose, Saccharose, Galactose and Mannite, while no fermentation was seen in Maltose and Dulcitol and no gas production was seen in any of these sugars.

From the above cultural, biological and biochemical tests conducted, the organism has been determined to be *Pasteurella multocida*.

Specimens of heart-blood cultures pertaining to the White Leghorn birds No. 534 and 209, the rabbits and the pigeon together with the long bones of the two birds, rabbits and the pigeon tightly packed in charcoal powder were sent to the Head of the Division of Pathology and Bacteriology, Indian Veterinary Research Institute, Mukteswar and to the Principal, Madras Veterinary College, Madras for confirmation.

It has been reported from the Head of the Division, Pathology and Bacteriology, Indian Veterinary Research Institute, Mukteswar in their reference No. V. 1915 dated 30-12-60 that *Pasteurella multocida* Robert's type II was isolated from the specimens received and that the experiments were under way to evaluate the immunogenicity of the Hosur strain of *Pasteurella multocida* Roberts type II which is a well known aetiological agent of Fowl cholera throughout the world.

The Principal, Madras Veterinary College, Madras has reported in his reference R.O.C. No. 31240/60 dated 17-12-60 that the cultural examination conducted on the specimens received revealed *Pasteurella multocida*.

Control Measures Adopted

The affected birds have been destroyed and suitably disposed of and all hygienic measures have been adopted towards the control of the disease. The whole flock was dosed with Sulphamezathine at 0.5% level mixed in feed and at 0.1% level mixed in water. The Fowl Cholera vaccine prepared in the Institute of Veterinary Preventive Medicine, Ranipet was used to protect the birds against the disease. Eight hundred and thirty adult birds and 32 ducklings have been vaccinated with Fowl Cholera vaccine and the disease was brought under control.

Findings

(1) The incidence of Pasteurellosis in poultry was recorded and confirmed in Madras State.

(2) The course of the disease in the affected birds ranged from 2 to 3 days and in a few chronic cases the course of the disease ranged from 10 to 15 days.

(3) The disease has been confirmed as Pasteurellosis microscopically, culturally and biologically.

(4) The organism has been typed out as *Pasteurella multocida* Robert's type II by the Head of the Division Pathology and Bacteriology, Indian Veterinary Research Institute, Mukteswar and as

Pasteurella multocida by the Principal, Madras Veterinary College, Madras.

(5) The out-break has been successfully controlled through vaccination of all healthy birds with Fowl Cholera vaccine.

Conclusion

The occurrence of Pasteurellosis in poultry was recorded and confirmed in Madras State.

Acknowledgment

The author is grateful to the Director of Animal Husbandry, Madras for all the encouragement given while carrying out this investigation; to the Superintendent, Livestock Research Station, Hosur Cattle Farm and his staff for all the assistance rendered during the investigations done at Hosur Cattle Farm; to the Principal, Madras Veterinary College, Madras and the Head of the Division, Pathology and Bacteriology, Indian Veterinary Research Institute, Mukteswar for having conducted a detailed study of the organisms and furnishing him with their findings.

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Clinical Article

TEMPORARY CYSTOPHLEGIA IN CANINE PYOMETRA

By

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Introduction

Pyometra is defined as a collection of pus in the uterus. Pyometra is regarded by De Gita (1939) as being "a Symptom complex of the mature female sex apparatus characterised by abnormal hyperplastic changes in the ovary and uterus, and apparent endocrine dysfunction". Various atypical symptoms have been manifested in this condition. Richter (1961) reported recently pharyngitis associated with pyometra in a dog. In the case presented below paralysis of the bladder was associated with pyometra.

Case History

An Alsation bitch aged 12 years and weighing 23.6 kilograms was admitted in the Small Animal Clinic as an In-patient on the 5th of March 1961 with a history of anorexia and paralysis of the hind limbs since 2 days.

The temperature was 101°F. The abdomen was distended and on percussion ripples could be noticed. The hind limbs responded to pin pricks, but the animal was unable to stand or even sit up. There was a purulent discharge from the lips of the vulva. The vagina on examination revealed hyperaemia. The Os was dilated.

The bitch was catheterised and 3000 ml of urine with an offensive smell was collected. The urine, faeces, blood smears and citrated blood from the animal were sent for routine examination. She was given Hexamine and Salol internally. Her appetite however appeared normal.

Diagnosis

As the animal failed to urinate the whole day, she was again catheterised on the 6th and 2500 ml of urine was removed. The result of the urine, faeces and blood smears examinations revealed nothing abnormal. The W.B.C. count however was 57,200/mm and the R. B. C. count 4.7 million/mm. A diagnosis of pyometra was made and it was decided to perform Ovario-Hysterectomy.

Anaesthesia

The abdomen was prepared for a midline incision and Nembutal was given intravenously. Normal aseptic techniques were adopted throughout.

Operative Technique

A midline incision about 14 cm long was made. Following opening of the Peritoneum, the uterine horns, were found highly corded and thick. All major vessels were ligated and the ovaries, uterine horns and most of the cervix were removed. The cervical stump was wiped painted with Tr. Iodine and returned into the peritoneal cavity. Internal sutures were made with Vetafil 0/40. The peritoneum and muscles were also sutured with Vetafil and the skin with interrupted wire sutures. The excised tissue revealed bilateral cystic ovaries, the left side cyst being thrice the size of the right.

Post Operative Care

As the breathing became irregular after the operation, Oxygen was administered through Boyles Apparatus. The temperature which was 100.8°F before the operation came down to 99.8°F at 12.30 p.m. Coramine 1cc in 50cc. of 5% Glucose saline solution was injected intravenously. At 2 p.m. the temperature was 102°F. At 8 p.m. the temperature rose to 103.6°F. Streptopenicillin $\frac{1}{2}$ gm was injected 1/M and at 2 a.m. the next morning the temperature fell to 102°F.

After Treatment

At 8 a.m. on the 7th the temperature was 101.2°F. The animal was catheterised and the urine removed. Streptopenicillin was discontinued from the 9th, as the temperature had reached normal. The bitch was able to sit up from this day.

The bladder had to be relieved, only with the catheter, till the 12th, from which date she started micturating of her own accord. Till the 12th, Salol and Hexamine were continued to be given internally. The Haemogram on 21.3.61 revealed 18,200 W.B.C./mm.

The skin sutures were removed on the 17th. The dog was able to get up and walk from 10th March onwards although still weak on the hind limbs.

A course of Electric massage and Liver Extract injections were given. With this treatment the gait improved considerably.

Discussion

The diagnosis was easy because of the visible discharge from the vagina. A tentative diagnosis of pyometra could be arrived at from the Leucocytosis, the white cell count being as high as 57,200/mm. So high a count, in open pyometra is rare. The temporary paralysis of the bladder was either due to over retention of urine, toxæmia from the pyometra or pressure of the horns of the uterus on the neck of the bladder. Over retention could be ruled out since catheterisation had to

be done daily. The size and volume of the uterine horns could not have produced temporary occlusion. Hence the toxins absorbed from the uterus could only have brought about the temporary paralysis of the bladder.

Summary

1. A case of temporary bladder paralysis in a 12 year old bitch with open pyometra is recorded.
2. The operative technique is described.
3. Pan-hysterectomy effectively cured the Cystophlegia.

Acknowledgments

I wish to thank the M.V.Sc., students in this Department who had assisted me. I also wish to thank the artist of this college for the photograph and Principal of the college for his keen interest.

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Abstracts

Toxicity and Anthelmintic Efficiency of 'Neguvon' for sheep:—By SOUTHCOTT, W. H. (1961). *Aust. Vet. J.* 37, 55-60.

The series of experiments undertaken by the author confirmed the high efficiency of the organic phosphorus compound 0,0 — dimethyl 2,2,2 — trichloro — 1 — hydroxyethylphosphonate (Bayer's L 13/59, Neguvon) against *Hemonchus contortus* in sheep. The drug was administered orally at the rate of 2.5 g/100 lb. body weight. At this dosage rate the chemical had no effect on *Trichostrongylus sp.* and *Oesophagostomum sp.* though some activity was noticed against *Ostertagia sp.* At a dose rate of 5 g/100 lb. body weight the drug was found toxic to sheep.

V. S. A.

A Summary of Anthelmintic and Toxicity results from field trials with Methyridine:—By GROVES, T. W. (1961). *Vet. Rec.*, 73, 196-201.

A new anthelmintic against gastro-intestinal nematodes of sheep and cattle has been introduced by Imperial Chemical Industries Ltd. The chemical 2 (β-methoxy ethyl) pyridine referred to in the title of the article as Methyridine is marketed by them under the trade name of

'Promintic'. The author has summarised the results of the extensive field trials undertaken with this preparation. The drug was administered subcutaneously as a sterile solution of 90% Methyridine in water at a dose rate of 200 mgm/kgm body weight to about 2500 cattle and sheep suffering from acute parasitic gastro-enteritis. A marked clinical improvement was evident within 48 hours of treatment. An appreciable reduction in egg count was simultaneously noticed. Post-mortem examination revealed the excellent activity of the drug against the adult as well as immature *Ostertagia sp.*, *Trichostrongylus sp.*, *Nematodirus sp.* and *Cooperia sp.* In some animals a slight swelling at the site of injection developed; but eventually the reaction subsided in most cases. No other ill-effect was observed following treatment.

V. S. A.

Aspergillosis in a Calf:—By NAG, P. C. and MALIK, B. S. (1961). *Canadian Vet. J.*, 2, 30-32.

Aspergillus fumigatus was found to cause an acute systemic infection in an one month old calf. While alive the patient evinced symptoms of laboured breathing. Greyish patches of consolidation in the lungs and thickening of pleura were observed on autopsy. Smears from lungs, spleen, liver and heart blood showed spores of fungus. Culture in Sabouraud's medium and inoculation into rabbits and fowls of the heart blood revealed the specific identity and pathogenicity of the fungus.

V. S. A.

Ten Points in Better Feeding:—

1. Growing animals make best use of feed: keep them growing.
2. Weaning time is a critical period; start feeding before weaning.
3. Balance rations supply animals' need with least feed.
4. Water and salt should always be accessible.
5. Legumes, pastures, and succulent feeds aid production and profit.
6. Feed liberally for large production; mere maintenance yields no profit.
7. Breeding animals should be kept thrifty; but not overfat.
8. Good feeding equipment prevents waste of feed and labour.
9. Parasites, exposure, and overcrowding retard growth and waste feed.

10. Feed costs are important; not all balanced rations yield equal profit.

(Better Feeding of Livestock, Oct. 1960, USDA)

B. PANDA.

Antibiotic Feeding:—The USDA now recommends feeding of antibiotics to broilers and turkeys, but not to adult chickens. The recommendations are as follows;

For layer type chicken — Growth is stimulated to 20 weeks of age, but antibiotics have little or no effect at age of sexual maturity. Feed efficiency and utilization are increased to 20 weeks of age, but increase after 10 weeks is so small that it would not justify their use.

For adult laying birds:—Feeding antibiotics to adult birds is not recommended because they do not stimulate egg production, improve hatchability or benefit the progeny.

Antibiotics are recommended in broiler feed because they induce about a 10% increase in growth to 10 weeks of age and a 10% increase in efficiency. Similar recommendations are for turkey starting and growing rations because of favourable effects on growth to 26 weeks of age.

One to four milligrams of antibiotic per pound of feed (2 to 8 gm. per ton) are needed for the desired effect.

(The Poultryman, January 13, 1961)

B. PANDA.

The Unidentified Growth Factors:—The existence of possibly seven different unidentified growth factors is reported by Dr. M. L. Scott, Cornell University. They include a factor associated with proteins, especially vegetable proteins, and another in fish solubles, which is also present in other animal products, such as liver, whey and other milk by-products.

A fermentation soluble factor is present in dried distillers' solubles, dried brewers' yeast and other fermentation products.

A grass juice factor in the juice of fresh grasses and legumes is also present to some extent in milk by-products and in dried brewers' yeast, but not in dehydrated grass or alfalfa meal.

A vegetable factor appears to be present in all of the highly unsaturated vegetable fats, in egg yolk fat, and in limited amounts, in lard, but it is not present to any great degree in coconut oil or tallow.

A growth factor capable of improving utilization of dietary zinc appears to be present in liver, distillers' dried solubles, fish solubles and whey, and may be substituted for by the chelating agent, ethylenediamine tetracetic acid.

A factor which improves the utilization of arginine is present in liver and peanut meal. Evidence indicates that unidentified growth promoting activities still remain in such materials as fish solubles, liver, dried whey, dried brewers' yeast, corn distillers' dried solubles, other fermentation products and vegetable and egg yolk fats.

(Poultry Digest, March, 1961)

B. PANDA.

Dairy Heifers Like Several Meals: Dairy heifers fed grains four and eight times a day gained weight faster than heifers fed twice daily, in tests conducted at the University of Arkansas, Holstein heifers fed four and eight times a day gained 1.99 and 2.05 pounds a day, respectively. Those fed twice daily during the 90 day test period gained 1.7 pounds a day. Each heifer received 6.25 pounds of grain throughout the day. The total amount of grain was equally divided into two, four, and eight feedings and fed to three heifers in each feeding interval groups.

(Better Farming Methods, March, 1961)

B. PANDA.

News and Views

World Treasure:—Sir Paul Gore-Booth, U. K. High Commissioner in India said recently "English is not a national possession of the United Kingdom, but a World treasure, and not a world treasure stored away in a treasure-house, but a world treasure in every day use". Should India lose this World treasure?

* * *

1961:—The year 1961 marks the centenary of the birth of four great Indians — Rabindranath Tagore, Motilal Nehru, Madan Mohan Malaviya and Profulla Chandra Ray! A grateful posterity celebrated each occasion in a fitting manner. We pay our homage to these great men, who gave their all in the cause of the country.

* * *

Sri Kamaraj, the Chief Minister of Madras, has a knack of saying things in a pointed manner. Recently he said "To-day there is much respect for money and less respect for work in our society and such a situation should change".

* * *

An Eminent Scientist passes-away:—Dr. K. S. Krishnan "a leading light of Indian Science" has passed away. His main subject was

Physics and he rose to such eminence in that subject that it did not take him long to attain an international status. Scientific bodies all the world over vied with one another to honour this great son of India. To mention only a few, he was Chairman of the Scientific Advisory Council of UNESCO in 1955; Vice-President of the International Council of Scientific Unions from 1955, he was Fellow of the Royal Society of London; Foreign Associate, National Academy of Sciences, U.S.A., etc., etc. He went to the U.S.A., in 1955 as the guest of honour of the National Academy of Science, Washington. In the words of Sri C. Rajagopalachari ex-Governor-General of India, Dr. Krishnan's demise is "the saddest event of the year; he was one of the most lovable, most eminent and best of men in Modern India". The country mourns his loss and we join with the rest of India and pay our humble homage to this Scientific giant.

Expert International Panel on Veterinary Education:—The Director General of F.A.O., has formed an International Panel on Veterinary Education, "which would advise on many subjects to be dealt with to foundations and other bodies interested in supporting Veterinary Education." The panel consists of eleven members and we are happy to find the name of Dr. L. Sahai, Animal Husbandry Commissioner with the Government of India, on the panel.

Prof. Robert T. Leiper:—Professor Emeritus of Helminthology in the University of London, was honoured at the London School of Hygiene and Tropical Medicine, on his eightieth birthday. He received a *Festschrift*, published by *Journal of Helminthology*, which he founded and edited for many years and a Bernard-Nocht Medal of the Hamburg Tropeninstitut for his outstanding merits in the field of Tropical Medicine.

The *Festschrift* carries 137 signatures of his admirers gathered from many parts of the world.

(Vet. Record 22-4-61).

World's Oldest Veterinary School at Lyons in France which was founded in 1762 is busy preparing for its by-centenary celebrations on the 26th and 27th May 1962. We wish the School many more years of useful life!

The 12th World's Poultry Congress will be held in Sydney from 10th to 18th August, 1962.

Dr. Bertie A. D'Souza:—We are happy to note that the Madras University chose Dr. Bertie A. D'Souza, G.M.V.C., B.V.Sc., M.S., Principal, Madras Veterinary College to deliver the Maharaja of Travancore Curzon Endowment Lecture in Agriculture for 1960-61 and Dr. D'Souza delivered two lectures at the Agricultural College, Coimbatore, in March 1961 on Animal Husbandry.

Parasites of Society:—Mr. Khrushchev, while speaking to an audience in Russia, urged them "to work, work, work" "We are building our communist edifice" he said "which must last for centuries. Those who prevent us from building must be grabbed by the ear and dragged outside. Such persons are the parasites, whom Society's contempt does not succeed in correcting". Yes, slackers are a menace in any country.

A New Anaesthetic:—A message from Michigan reads "Doctors are testing a new anaesthetic called G-29 which works so quickly and is so free from side effects that patients don't know they have been put to sleep. Patients who were given the drug intravenously in the middle of a sentence completed it when they woke up." It is a novel description in a way but this is an age of surprises and we seem to be in the thick of it.

Cambridge Prize for an Indian:—Dr. V. S. Hazurbazar, Professor of Mathematics, University of Poona, has been awarded the Adams Prize for research in Mathematics by the Cambridge University. The subject of research was the "Theory of probability". It is considered to be the greatest honour that can be conferred by Cambridge University for research in Mathematics. All honour to him!

Integrity:—"An incorruptible civil servant is an asset to any country. The compulsion to be that and remain that must come from inside. The traditions, the *esprit de corps* must ensure that no member of the service dare stray from the path of rectitude".

(Madras Mail dated 8-7-61).

Yet Another Generous Donation:—Messrs. Imperial Chemical Industries (India) Private Limited, Madras. The Madras Branch of this reputed firm has sent us a magnificent donation of Rs. 500/- towards our Reserve Fund, as a token of their "Goodwill to the

Veterinary Profession". "Superb" is the only word we get in reply. The manner of their doing it is even more superb. We are very much touched by their covering letter. They say "The very useful work that your journal has been doing to the cause of Veterinary Science in India needs no emphasis and our appreciation of your efforts has prompted us to send this token contribution to you unsolicited. We wish the Veterinary Journal all prosperity and we have no doubt that it will continue to do the good work it has been doing for several years now".

What a noble example to the members of our profession some of whom are still reticent to come out with their donations. The Imperial Chemical Industries (India) Private Ltd., has been serving the profession in more ways than one and to their long list they have added one more in the form of this noble gesture towards the *I.V.J.*

Association News

The Indian Veterinary Association

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and Science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the *Journal* both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the follow-

ing scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of ours should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.

Jai Hind!

T. VINAYAKA MUDALIAR,
Editor, *The Indian Veterinary Journal*.

THE I. V. J. RESERVE FUND

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	Rs.	RP.
Amount acknowledged (May 1961 issue)	...	5673.05
Dr. R. L. Deb, Aijal, Assam, (3rd instalment)	...	10.00
„ M. L. Uniyal, Trisuli, Nepal (2nd instalment)	...	10.00
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In Memoriam

PROFESSOR EMERITUS DR. JAMES DANIEL GROSSMAN
FATHER OF VETERINARY ANATOMY
PASSES AWAY. (1884 - 1961)

Mrs. Lillie Carr GROSSMAN, who was accompanying her husband Dr. James D. GROSSMAN on a holiday trip on the European Continent, writes from Istanbul (Turkey) to inform that Dr. Grossman went to take a shower in the morning of 19-5-1961, slipped and fell, striking his head a terrific blow on the bath-tub. He was immediately taken to the American Hospital in Istanbul and at 8-30 that night the doctors there decided to operate upon him, but such severe damage to the brain had been done that he was not able to overcome it, and he passed away on the night of 24th May, 1961. Mrs. Grossman left alone for the States on 26-5-1961 and her husband's body was flown over on the 30th of May, 1961.

To the veterinary world, Dr. Grossman's name is linked with the Anatomy of Domesticated Animals just as Gray's name is associated with human anatomy. His last assignment was at the Rajasthan College of Veterinary Science and Animal Husbandry, Bikaner, as Expert Veterinary Anatomist under the T. C. M., for a period of 2 years, which he successfully completed in 1958, and returned to the States to write out the next edition of his "Sisson's Anatomy of Domesticated Animals" and "Anatomy of the Camel" which he had worked out while at Bikaner. For Indian Veterinarians he introduced the latest technique of the embalming of animal-bodies for anatomical purposes, invented an anatomical table for working on camels, organised a seminar in veterinary anatomy (the first seminar ever in veterinary world in India) and coached the teachers and students in the best way of teaching this comparatively dry and lifeless subject. He was an extremely hard-working man with padre-like missionary habits, wide spread sympathies and very broad outlook on life. Although 77 years old and a little hard of hearing, Dr. Grossman otherwise enjoyed good robust health, and was now travelling over the European Continent and holidaying when Death snatched him away unawares.

Heartfelt condolences are hereby extended to Mrs. Grossman and other members of the bereaved family on behalf of all who had the honour and privilege of coming in contact with him in India. May the departed soul rest in peace !!!

"God is our refuge and strength, a very present help in trouble."
Psalm 46 : 1.

A. C. AGGARWALA.

Review

Marketing Livestock and Meat:—F. A. O. Marketing guide No. 3
BY R. F. BURDETTE, F. A. O. Marketing Adviser and J. C. ABBOTT,
Chief, Marketing Branch, Economic Analysis Division F. A. O. —
Published by Food and Agriculture Organization of the United
Nations, Rome, 1960, Pp. 209 Price \$ 2.00 or 10 s.

This F. A. O. Marketing guide is the third of the F. A. O. series of publications designed to meet the general demand for information on methods of improving the handling of livestock and meat between the producer and consumer, of avoiding wastage and of reducing costs.

This guide indicates how successful marketing begins with the planning of production to meet market requirements and points out some of the difficulties to be overcome. It discusses alternate ways of transporting livestock and meat, the conditions under which such methods are advantageous and their implications for market and slaughter house planning. Various types of marketing organisations and channels are analysed and stress is laid on the need for modification to suit changing conditions. The costs of alternative systems are compared and some general conclusions attempted. Pricing and selling methods and the development of Government Services to improve marketing are other important topics treated.

The F.A.O. has to be congratulated for securing the services of these two eminent workers who have made this publication a valuable guide.

The book should be of particular interest to private and cooperative enterprises and public bodies facing decisions on livestock and meat marketing methods and development policy.

The get up and presentation are very good as is usual with F.A.O. publications.

M. R.

ERRATA

Vol. 38, No. 5 (May 1961).

Page 230, para-5, 5th line — Read 37°C for 30°C.

Page 230, para-5, 8th line — Read Milk medium for meat medium.

Page 232, para-4 Read "Four more toxins (*viz.* gamma, delta, eta and theta) are considered to be minor toxic factors and the remaining four (*viz.* kappa, lambda, mu and nu) are considered to be auxillary factors in pathogenesis in *Cl. welchii* infections" instead of as published.

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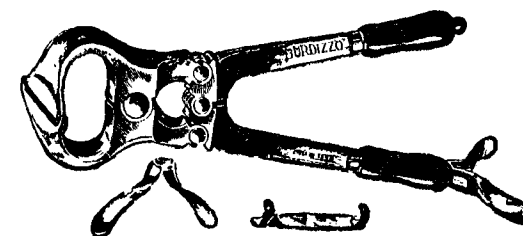
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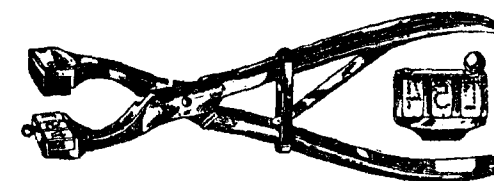
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