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Short Communications

PNEUMOCYSTOSIS IN PIGS

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Abstract: Three cases of pneumocystosis in pigs are presented. The animals were fed brewing yeast irradiated with UV- light, prior to the onset of illness.

The existence of pneumocystosis in domestic animals was reported in several older publications in the form of cursory notes. There is only one current note on the occurrence of pneumocystosis in pigs, quoted in a report by BONDY (1958), on a personal communication conveyed by JELÍNEK, namely that in piglets spontaneously affected with exsudative pneumonia, a simultaneous occurrence of pneumocysts was noted.

MATERIALS AND METHODS

Trying to answer the question of the occurrence of pneumocystosis in pigs, we examined 24 4-month-old piglets slaughtered because of pneumopathies, using in part histological methods, in part the complement fixation reaction. Histological preparations were stained after McManus, Masson and Grocott. Impression smears from fresh lung sections were stained with Pappenheim's panoptic method, short hot Giemsa and Gram. Serological examination was carried out by means of the CFR described for human sera(DVOŘÁČEK et al. 1953). As antigen we used the alcoholic extract from pneumocystic human lung prepared after the same authors. To determine the complement fixing antibodies in the swine sera, four different positive sera were used as positive controls: 1) serum from laboratory rat No 4/64 which – after cortisone treatment according to WELLER – was injected (intrapulmonally) the pulp of human pneumocystic lungs and after a month's incubation period, was bled under positive histological control. 2) Serum from laboratory rat No 5/62 inoculated intraperitoneally with a pulp from human lung containing pneumocysts. 3) Serum from F. K./63, a child from Kladno suffering from interstitial pneumonia. 4/ Serum from *Apodemus flavicollis* No 8/66 originating from the depopulated area Obrovice (Karlovy Vary district). Furthermore, for comparison purposes, we used 35 calf sera, all of them negative and 55 swine sera, 53 of them negative.

Of the 24 examined pigs, 12 were castrated males and 12 females, 4-months old and weighing from 45 up to 130 kg at slaughter-time. The animals came from the cooperative-farm at Vojkovice (Brno

district), from the local sows. At the age of 8 weeks they were weaned and moved from the delivery-box over to the local detached pig-sty. Here they were separated in boxes by tens. The boxes were made of wood, 3 | 2.5 m in size, had separate sinks and were kept clean as usual. They were well ventilated, the air being relatively damp. The door of the room containing boxes was always kept wide open to a groats stock room where mice had always been present. The pigs were divided in two groups — one being the experimental and the other the control group — and were subjected to a dietary experiment. This consisted in additional feeding brewing yeast, irradiated 2 to 3 times with UV-light. The quantity of the fed yeast amounted to a half of the weight percentage of the total amount of foodstuffs consumed. Otherwise the food consisted of barley and maize grits, oat flakes, dried milk and an admixture of kitchen salt and organic substances as specified in the prescription. In the beginning the experimental group consisted of 80 animals of which 16 were afflicted — at the age of 2 months — with an acute pneumopathia accompanied by cough, dyspnoea, elevated temperature and lack of appetite lasting about a fortnight. In addition symptoms of an acute intestinal affection appeared in 8 animals. Similarly in the control group 3 animals were afflicted with the same illness at the same age. The first animal fell sick on January 15, 1966. After the acute affection had receded, the animals continued to suffer from respiratory tract affections (cough, mild dyspnoea, fluctuating temperatures and lowered appetite) until slaughtered. During the acute infection two animals from the experimental group (♀) and one from the control group (♂) were slaughtered. Upon conclusion of the dietary test, also the other animals were killed; in March 1966 they were slaughtered at the slaughter-house in Brno. Here one of us (ŠLESINGR) performed the dissections, specifying the findings which can be summarized as follows: diffusely hypertrophied lung interstitium with a simultaneous occurrence of disseminated foci of lobular-like, red and grey infiltrations in both lungs, predominantly in the apical lung lobes.

RESULTS

Of the 24 sera examined, the CFR with alcoholic extract from pneumocystic lungs gave a positive outfall in three instances, i.e. in case No. 9, 19 and 22. Other sera were negative. Unspecific inhibition of the hemolysis was not observed. In all positive cases sporadic doublecontoured cysts of *Pneumocystis carinii* were found in the lung impression smears together with different kind of bacteria. Most of these cysts were already displaying deformations and signs of disintegration (Plate II., Figs. 1—4). On histological sections the remnants of honeycombed masses, stained pink by the McManus's method, were revealed in single alveoli (Fig. 1, Plate I. Figs. 2—3). Otherwise most of the alveoli were filled with a cellular exudate of lymphocellular character, containing scanty polymorphonuclears. The peribronchial examination revealed dense, extensive, predominantly lymphoid infiltrations; the neighbouring alveoli were mostly atelectatic. We can consider the affection as pneumocystis pneumonia in a stage of advanced regression and complicated by a further pneumonic process of different etiology.

DISCUSSION

Above all it is conspicuous that the first three results, indicating the existence of pneumocystosis in young pigs, were obtained in a comparatively small group of examined animals. This is at varience with the fact that in pigs this affection has

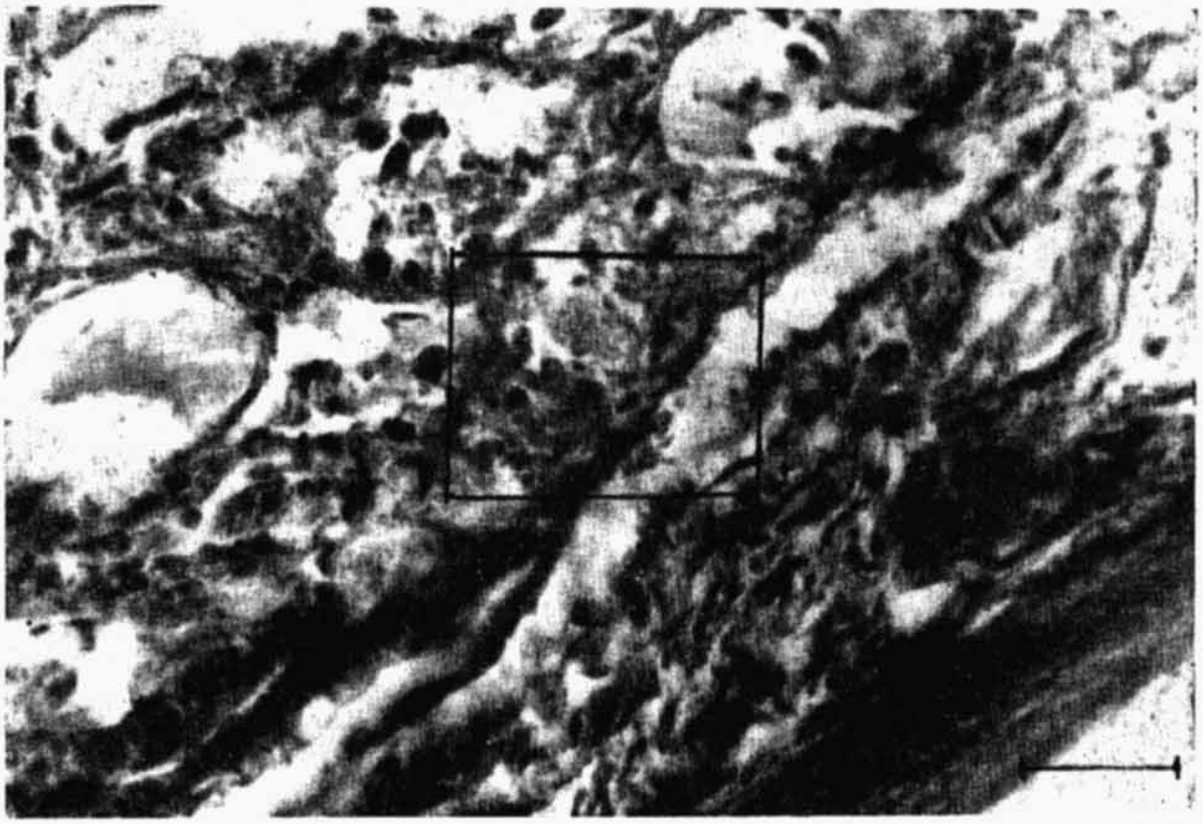

Fig. 1. General picture of the lung section in pig No. 22 with regressing pneumocystis pneumonia A remnant of honeycombed mass. Other alveoli filled with dissolved masses, macrophages and lymphoid cells. The right lower corner shows a thickened and inflammated pleura. Mc Manus stain. Homal 4. Obj. 10 apochrom. Zeiss. Scissa 50 microns.

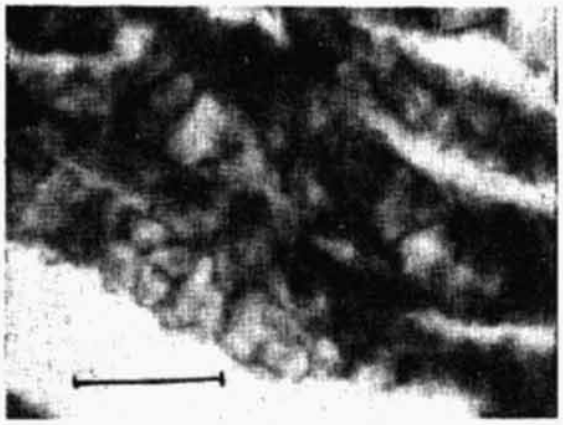

Fig. 2. Detailed picture of a section through a partially corrugated honeycombed structure in the lung of pig No. 9. Mc Manus stain. Ocul. Homal 4. Obj. imm. 90 apochr. Zeiss. Scissa 10 microns.

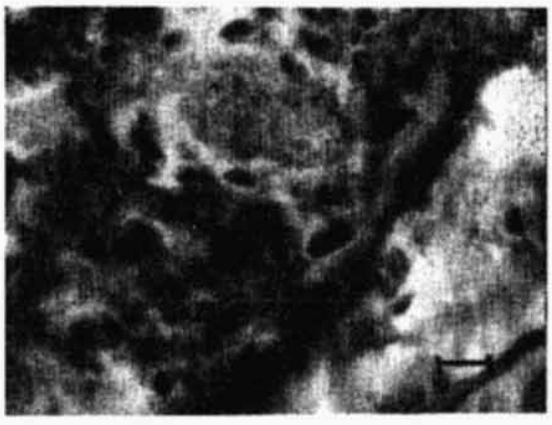

Fig. 3. Detailed picture of the honeycombed masses of the lung section in pig No. 22. McManus stain. Ocul. Homal 4. Obj. 20 apochr. Zeiss. Scissa 10 microns.

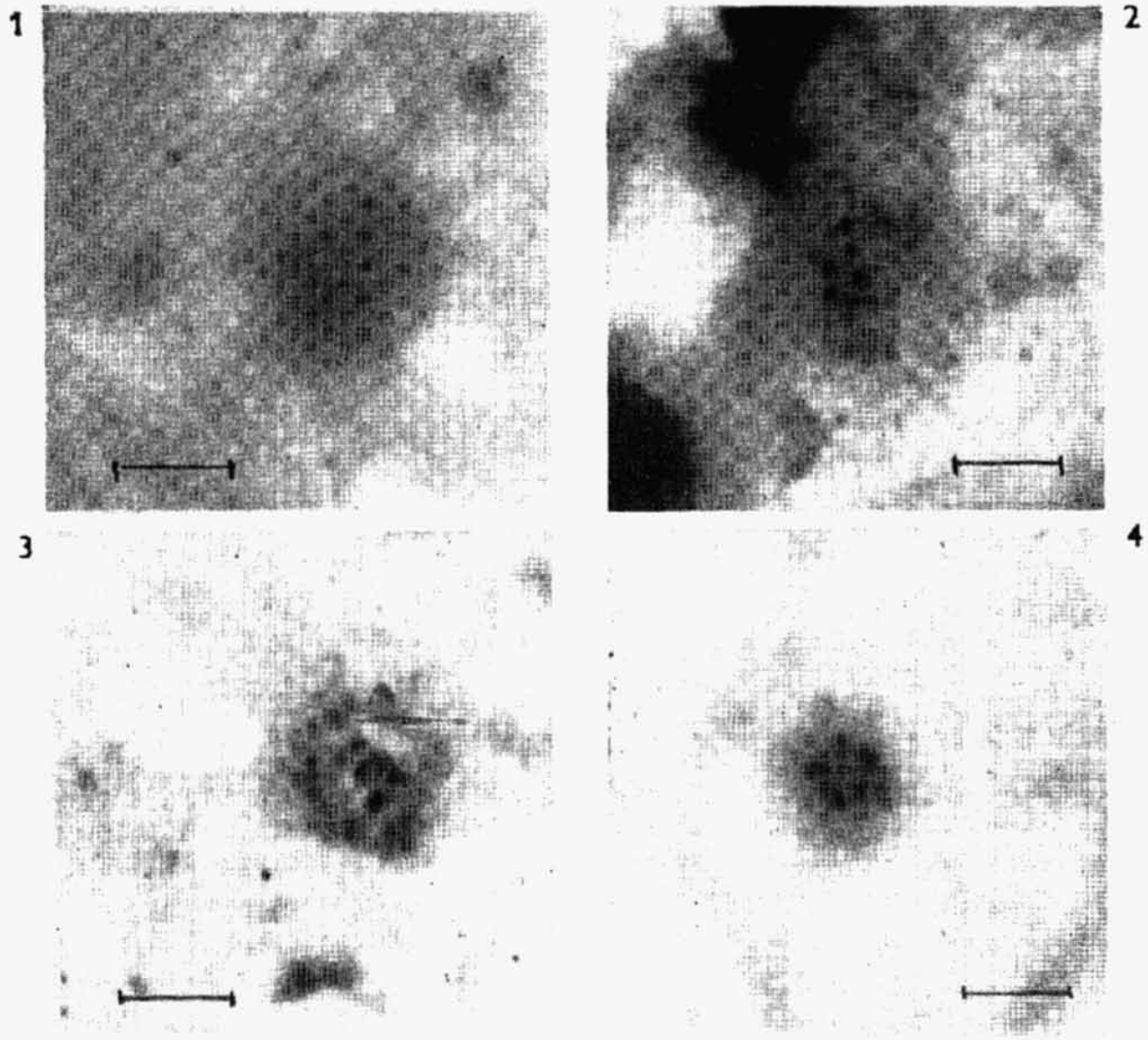

Fig. 1. A thickwalled cyst of *Pneumocystis carinii* from the lung impression smear of pig No. 22. **Fig. 2.** A thickwalled cyst of *Pneumocystis carinii* from the lung impression smear of pig No. 22, partially dammaged by lysis. **Fig. 3.** A thickwalled cyst of *Pneumocystis carinii* from the lung impression smear of pig No. 19, partially dammaged by lysis. **Fig. 4.** A thickwalled cyst of *Pneumocystis carinii* from the lung impression smear of pig No. 9, partially dammaged by lysis. Giemsa stain. Ocul Homal 4. Obj. imm. 90 apochr. Zeiss. Scissa 5 microns.

not yet been described. We suppose this discrepancy can be ascribed in part to the fact that the animals observed by us belonged to a special experimental group suffering probably from D-hypervitaminosis due to the diet received, in which susceptible individuals may have occurred. On the stimulating effect of high doses of vitamin D in the origin and course of human pneumocystosis numerous papers have been published (from BRIEGER 1949 to BOSMAN 1965), but objections appeared as well (LADSTÄTTER and BRIEGER 1953—54 f.ex.). According to some other opinions this problem is to be considered as unsolved (PLIESS 1958). Our experiment was aimed in another direction than to solve this question. Pneumocystosis was revealed only after the experiments were concluded. It is therefore impossible for us to adopt a view as regards the problem of D-hypervitaminosis in pneumocystosis, since we did not perform the necessary exact clinical observations and a current specification of the microflora as well as microfauna of the upper respiratory tract during the whole course of the illness. We can only state that in this case the animals were afflicted with pneumocystosis spontaneously neutralized by the host organism, with a simultaneous production of antibodies. Their level was reaching the ratio 1 : 8 still at slaughter-time in all three animals. VIVELL did not find any antibodies in 21 pigs observed (VIVELL ET AL. 1956).*)

It remains obscure for the present, from which source the animals became infected. During autumn 1966 and in spring 1967, we cought 3 mice in the same pig-sty. In one of them *Pneumocystis carinii* was found in the lungs. A human source of the infection seems to be excluded, because, as reported by the District Health Office, no case of pneumocystosis has been noted at Vojkovice during the last years. A certain local relation of the occurrence of the parasite in pigs to the findings of pneumocysts in rodents may be taken into consideration.

CONCLUSIONS

This is the first report drawing attention to the occurrence of pneumocystosis in pigs, which was briefly mentioned before (KUČERA 1966). A brief description is given of three cases of this affection within the South Moravia region in spring 1966.

ACKNOWLEDGEMENT

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*) While our paper was waiting for press, we came across a short communication by NIKOLSKYI and SHCHETININ on 12 cases of pneumocystis pneumonia in pigs at Stavropol, USSR (December 1966).

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