Mesenterine 11-11 RISTOV, P. VELINOV\*, S. DANCHEV, D. DIMITROV and S. SINHA

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The microstructural changes occurring in the muscular tissue as affected by the en-cymes of microstructural changes occurring in the muscular tissue as affected by the en-The solution of microbial origin protease 15, rosim P-11, rosim A-4, NT proteolytic fer-Ment, hydrolase D, hydrolase TR, suptilopeptidase E-30 and P-90, telrsin and rimo hotelin house D, hydrolase TR, suptilopeptidase S, Weir, C. E. et al., 1958; <sup>hydrolase D</sup>, hydrolase TR, suptilopeptidase E-30 and F-50, terror. 1958; <sup>volovey</sup>, have been studied by Wang, H. et al., 1958; Weir, C. E. et al., 1958; <sup>volovey</sup>, have been studied by Wang, H. et al., 1972. Skalinsky, E.I. and Beloussov A.A.1 Noterin, have been studied by Wang, H. et al., 1958; Weir, C. E. et al., 1978. The enzymes of the studied by Wang, H. et al., 1958; Weir, C. E. et al., 1978. The enzymes of microbial origin degrade to a great extent the protein structures of Muscular fillence on the fibrous elements of the compared by the structure of the compared by the structure of the structure o of muscular fibres and exert a slight influence on the fibrous elements of the conhective tissue. They cause no apparent changes in the structure of collagen but they affect the main substance which results in relax (1078) they affect the mucopolysaccharides of the main substance which results in relaxa-tion of the mucopolysaccharides of Skalinsky E.I. and Beloussov A.A., 1978). tion of the mucopolysaccharides of the main substance which results in the microsite connective tissue layers (Skalinsky E.I. and Beloussov A.A., 1978). The microstructural changes occurring in mutton as affected by the microbial pro-tease Mesont the source described by S. Singha et al., 1981). tease Mesenterine 11-11 have been described by S. Singha et al., 1981). The objective of the present work was to investigate the effect of the microbial protease More of the present work was to investigate the effect of the microbial to ultra-structure of mutton. Protease Mesenterine 11-11 on the ultra-structure of mutton.

Aderial and Methods les were carried out using mutton muscles longissimus dorsi. The test samp-were inicotal with Maconterine 11-11 0.35% in 2% salt solution while the contles studies were carried out using mutton muscles longissimus corsi. The the cont-rols were injected with Mesenterine 11-11 0.35% in 2% salt solution while the cont-pent were tracted with Mesentering of the colution in the ratio of 10% to their weight. The e <sup>vols</sup> were carried out using matter of 2% salt solution while the the ex-<sup>vols</sup> were injected with Mesenterine 11-11 0.35% in 2% salt solution while the solution while the ex-<sup>periments</sup> were treated with 2% salt solution in the ratio of 10% to their weight. The ex-<sup>and ments</sup> were treated with 2% salt solution in the ratio of 10% to their weight. The ex-Periments Were conducted with muscles taken immediately after the slaughtering of the standard animals (leated with 2% salt solution immediately after the staughter the he enzyme t group) and with muscles subjected to cooling for 48 hours (IInd group). The enzyme-treated samples and the controls of the first group were sterilized for the second samples and the controls of the first group were sterilized for the second with the second samples and the second seco <sup>2 hours</sup> on the 48th and on the 120th hour. The Materia processed on the 120th hour.

The materials for the electron microscopic studies were taken after sterilization. After fixation in 5% glutar aldehyde for 1-2 hours, postfixation with osmium tetro-promiter fixation in 5% glutar aldehyde for 1-2 hours, postfixation with osmium tetro-promiter for 1-2 hours and passing over Vide fixation in 5% glutar aldehyde for 1-2 hours, postfixation with Usmium toto propylene 1-2 hours, dehydration by an ascending series of alcohols and passing over by the ne Ovide the dehydration by an ascending series of alcohols and lead citrate propylene Oxide the samples were introduced in durcupan. Ultra-thin sections made verb ultra is and contrasted with uranyl acetate and lead citrate <sup>yupyl</sup>ene oxide the samples were introduced in durcupan. Ultra-thin sections were examined were LKB-III and contrasted with uranyl acetate and lead citrate Vere examined using the electron microscope TESLA BS-613 at 80 kV.

Recults and Discussion aughtering of output of the sterilized 48 hours alaughtering of animals.

The ultra-structural changes in mutton troated after ing of animals. the treatment with colution (electron microscopic photograph 1) showed that the myofibrile but the fibrillar character and the myosin protofibrils converting the treatment with salt solution (electron microscopic photograph 1) showed that the treatment with salt solution (electron microscopic photograph 1) showed the ted wofibrils had lost their fibrillar character and the myosin protofibrils conver-strong a homograph of the thermal denaturation. The Z-lines were ted myofibrils had lost their fibrillar character and the myosin protofibrils served in a homogeneous mass as a result of the thermal denaturation. The Z-lines were lines fragmentation is a consecutive of this the separate sarcomers were outlined. strongly fragmented while irrespective of this the separate sarcomers were outlined. The provide the separate sarcomers were outlined. Traces of the H-zones were slightly observed. The electron microscopic picture of that the corresponding test samples (electron microscopic photos that

destructive changes occurred in the isotropic and the anisotropic discs under the influence of the microbial protease Mesenterine 11-11. The modified sections were characterized by the formation of characterized by the formation of a granular mass and by the complete lysis of se

The ultra-structural changes in the muscular fibres of the controls sterilized 100 hours after the treatment with salt colution (1) hours after the treatment with salt solution (electron microscopic photograph 3) resembled to some extent those described in the solution (electron microscopic photograph 3) resembled to some extent those described in the electron microscopic photograph However, the strongly fragmented 7 lines being line being and the strong strong to the strong of the strong strong to the strong str However, the strongly fragmented Z-lines being located in the middle of the considerably larger bright bands appeared on the relation of the considerably larger bright bands appeared on the relation of the derably larger bright bands appeared on the places of the isotropic disks. Few sat comers revealed strongly expressed thermal destructive changes in the protofibrile. The H- zones and the M-lines were better marked. The The H- zones and the M-lines were better marked. The electron microscopic picture of the muscular fibres of test smalles (electron microscopic picture) the muscular fibres of test smples (electron microscopic pic<sup>tur</sup>d) indicated that the longer storage time of meat treated with cated that the longer storage time of meat treated with enzymes was character<sup>12ed</sup> by more significant changes in the mustionile. The by more significant changes in the myofibrils. The enzyme-affected fragments were either converted in granular mass on completely is a second either converted in granular mass or completely lysed. The sarcoplasmatic proteins were entirely lysed.

Ultra-structural changes in cooled mutton treated with enzyme solution 48 hours

The muscular fibres of controls sterilized 120 hours after application of the  $_{\rm fib}^{\rm sali}$ solution (electron microscopic photograph 6) revealed the disappearance of the the firmular structure of myofibrils, the conversion of microscopic homogener. rillar structure of myofibrils, the conversion of myosin protofibrils in homogene of the disks and the changes in the Ledisks. ous mass and the changes in the |-disks. It is worth noting that some sarcomers of the tained a tubby shape due to the changes occurred. The 7 lies that some sarcomers are the electronic tained as tubby shape due to the changes occurred. tained a tubby shape due to the changes occurred. The Z-lines were broken. The comers is the muscular fibres of technic of of techni tron microscopic picture of the muscular fibres of test samples (electron microscopic picture) showed that the muscilar signal and the muscular fibres of test samples (electron microscopic picture) and 8) showed that the muscilar signal and the m pic photographs 7 and 8) showed that the myofibrils were torn and granularly degraph

under the influence of the microbial protease Mesenterine 11-11. It is seen on the spots that the enzymic action has started in the instant of the instant of the second to the second spots that the enzymic action has started in the isotropic disks and spread to the muscular protection of the action of the spread to the muscular protection of the spread to the spread anisotropic disks. In the studies on the action of the enzyme terizin on the muscular fibres E.I. Skalinsky and A.A. Beloussov (1979) action to the moteoly is lar fibres E.I. Skalinsky and A.A. Beloussov (1978) established that the protection is a spectrum to the more than the protection of the Z-lines and passed through the actin protofibrit to the interior of the A-disks of the sarcomers

The microbial protease Mesenterine 11-11 showed proteolytic activity on the myofile rillar and the sarcoplasmatic proteins. Mesenterine 11 11 rillar and the sarcoplasmatic proteins. Mesenterine 11-11 showed proteolytic activity on the  $my_{mo}$  difications and granular degradation of actin and methods and granular degradation of actin and difications and granular degradation of actin and myosin protofibrils to their off The destructive changes and the granular degradation of the myofibrils were strong interview of the st

ly marked in the treatment of mutton with Mesenterine 11-11 carried out immediaten after slaughtering of animals as compared with mutton to mutton the mutton of the second se after slaughtering of animals as compared with mutton treated for 48 hours after cooling.

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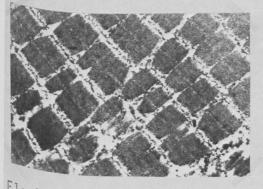
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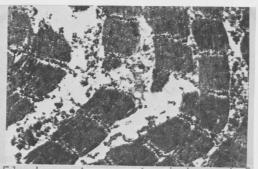
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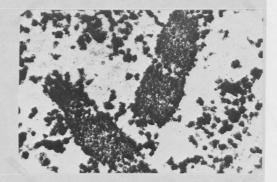
Electron microscopic photograph enlarged 14000 times



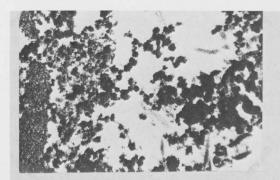
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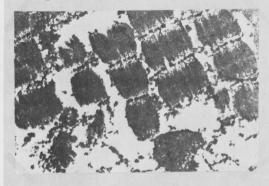
Electron microscopic photograph 2 enlarged 10000 times



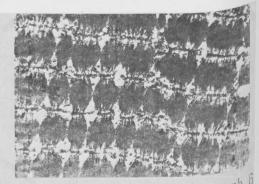
Electron microscopic photograph 4 enlarged 14000 times



Electron microscopic photograph 5 enlarged 14000 times



Electron microscopic photograph 7 enlarged 10000 times



Electron microscopic photograph <sup>6</sup> enlarged 10000 times



Electron microscopic photograph <sup>8</sup> enlarged 14000 times

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