Parallel characteristics of extremely thermophilic acidophilic bacteria

	Sulfolobus acidocaldarius[3]	MT series[a]	BRIERLEY and BRIERLEY[2]	*Thermoplasma acidophila*[1]
Source (°C)	76–90	74–89	66–69	56
Source (pH)	1.5–2.5	1.4–2.6	2.6	2.0
Optimum (max)°C	70–75 (75–85)	75–87 (80–89)	60 (75)	60 (65)
Optimum pH	2.0–3.0	3.0–4.5	2.0	2.0
Nutrient tolerance	<0.25%	<0.20%	n.d.	<0.20%
Size (μm)	0.8–1.0	1.0–1.5	1.0–1.5	0.1–3.0
Form	Irregular spheres, (lobed), plastic	Irregular spheres, plastic	Irregular spheres, plastic	Spheres, plastic
Nuclear region	No	Only in dividing cells	No	No
Pili	Present, numerous	Present, numerous	n.d.	Present[9]
Coat	Sub-unit array	Sub-unit array	Amorphous	Absent
Peptidoglycan	Absent	Absent	Absent	Absent
Glucosamine	Present (low)	Present (low)	n.d.	Absent
Vancomycin	Resistant	Resistant	n.d.	Resistant
Novobiocin	Sensitive	Sensitive	n.d.	Sensitive
Lysis, Na dodecyl sulphate	Rapid	Rapid	n.d.	Rapid
Lysis, lysozyme	No	No	n.d.	No
Autotrophy utilizing	S, facultative	Fe, S, facultative	Fe, S, obligate	No
Heterotrophy utilizing	Aminoacids ±, sugars ± (strain-variable)	Aminoacids —, sugars +	Obligate autotroph	Requires complex media
Lipids based on	Glycerol diether of isopranoid C_{40}[a]	Glycerol diether of isopranoid C_{40}	n.d.	Glycerol diether[a] of isopranoid C_{40}[10]
GC content (%)	60–66, 70[a]	39–45, 48	54–60	24–29[1], 46[9]

n.d. = no data. [a] Present work.

character should be included in this group and not assigned to still further new genera; however, we have refrained from a formal assignment of nomenclature either to or within this group, taking the view that unless a change of nomenclature proves generally acceptable, it is better not proposed. Informally we propose the group-name *Caldariella*.

Riassunto. Si riporta l'isolamento di un nuovo microorganismo acidotermofilo per molti aspetti identico al *S. acidocaldarius*, ma nettamente diverso nella composizione in basi del DNA. Si discute dell'opportunita di classificare in un unico gruppo oltre ai due microorganismi gia menzionati, anche altri microorganismi acidotermofili simili.

M. DE ROSA, A. GAMBACORTA, G. MILLONIG[12] and J. D. BU'LOCK[13]

Laboratorio per la Chimica e Fisica di Molecole di Interesse Biologico, and Laboratorio di Embriologia Molecolare, C.N.R., via Toiano 2, Arco Felice, Napoli (Italy), and Microbial Chemistry Laboratory, Department of Chemistry, University of Manchester M 13 9 PL (England), 4 March 1974.

[12] Present address: Dipartimento di Anatomia Patologica, Laboratorio di Microscopia Elettronica, Ospedale Generale 'S. Andrea', Vercelli (Italy).

[13] Acknowledgments. We are particularly grateful to A. J. POWELL (Extra-Mural Department, University of Manchester) for guidance and stimulating discussion. We also thank T. D. BROCK and A. L. MOSSER for cultures of *S. acidocaldarius*, and E. ESPOSITO and S. SODANO for technical assistance.

Effect of Testes Removal and Androgen Replacement Therapy on Enzyme Levels in Hypothalamus and Pituitary of Frog (*Rana esculenta*)

The vertebrate hypothalamus and pituitary are intimately related, in as much as the hypothalamus controls many of the hypophyseal functions, and as such these two organs (hypothalamo-hypophyseal system = HHS) constitute the central feedback system[1–3]. The biochemical events which characterize the various phases in the regulatory mechanisms of the vertebrate HHS are, however, poorly known[4]. About the enzymic profile of this system under normal and experimental conditions, the literature is still more scanty[4,5].

Since castration has been found to produce remarkable morphological and metabolic changes in the HHS of green frog, *Rana esculenta*[6,7] it was our aim to study the effects of castration upon the enzyme activity in the hypothalamus and pituitary of this anuran and to establish if these changes could be corrected by testosterone propionate (TP).

[1] C. B. JØRGENSEN, in *The Hypothalamus* (Eds. L. MARTINI, M. MOTTA and F. FRASCHINI; Academic Press, New York & London, 1970), p. 649.

[2] J. P. SCHADE, in *The Hypothalamus* (Eds. L. MARTINI, M. MOTTA and F. FRASCHINI; Academic Press, New York & London 1970), p. 69.

[3] R. K. RASTOGI and G. CHIEFFI, J. exp. Zool. *181*, 263 (1972).

[4] J. A. MOGUILEVSKY, L. E. KALBERMANN, C. LIBERTUN and C. J. GÓMEZ, Proc. Soc. exp. Biol. Med. *136*, 1115 (1971).

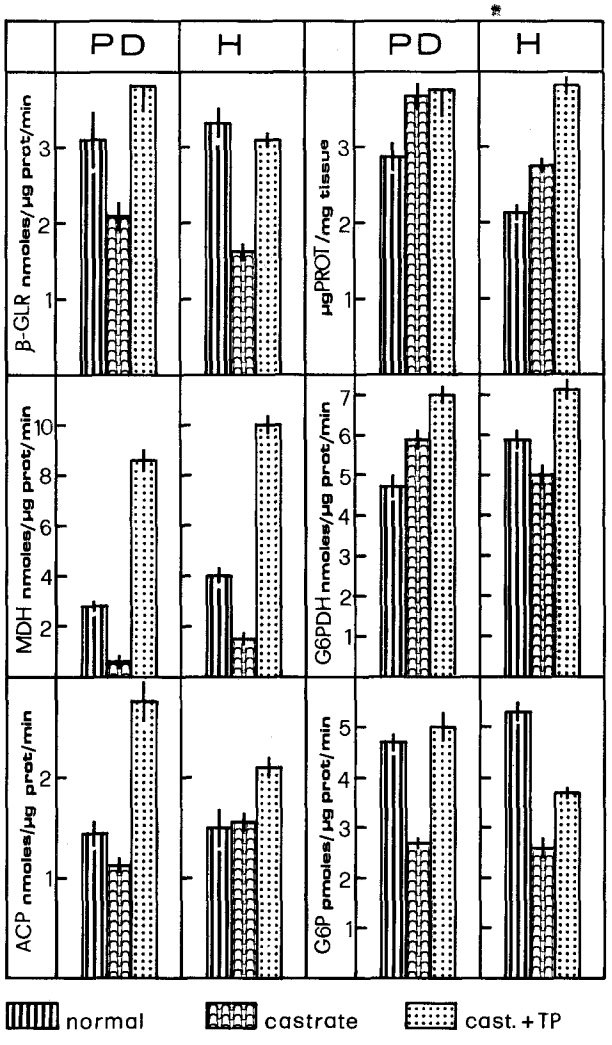
[5] P. M. PACKMAN and E. ROBINS, Endocrinology *87*, 13 (1970).

[6] R. K. RASTOGI and G. CHIEFFI, Gen. comp. Endocr. *15*, 247 (1970).

[7] R. K. RASTOGI and G. CHIEFFI, J. Endocr. *55*, 471 (1972).

Adult males (25–35 g) were castrated in September. 3 weeks later a group of castrates was injected with a dose of 30 µg TP/frog (3 fractions of 10 µg each) for 1 week. The rest of the castrates were inoculated with 0.02 ml almond oil/frog. A group of intact frogs served as normal controls. For each determination, material from 2 frogs was pooled and homogenized in cold deionized water. The methods to measure malic dehydrogenase (MDH), glucose-6-phosphate dehydrogenase (G6PDH), acid phosphatase (ACP), glucose-6-phosphatase (G6P) and β-glucuronidase (β-GLR) were modified from STROMINGER and LOWRY[8], BUELL et al.[9], CHIEFFI et al.[10], FREEDLAND and HARPER[11], and ROBINSON[12] respectively. Proteins were determined with the method of LOWRY et al.[13].

Results are summarized in the Figure. The ACP activity of castrates was significantly reduced in the pituitary ($p < 0.02$), while in the hypothalamus it remained unaltered as compared to the normal value. Administration of TP more than doubled the pituitary ACP level as compared with the castrate value ($p < 0.001$), surpassing even the normal value; in the hypothalamus this stimulation was less intense. G6P level of castrate pituitary and hypothalamus was 40–50% lower than in the same tissues of normal frogs ($p < 0.001$). TP administration brought back to normal level the enzyme activity of pituitary, while that of hypothalamus, although significantly greater than in castrates ($p < 0.001$) was notably lower than that in normal frogs. Castration significantly reduced the MDH and β-GLR levels of both pituitary and hypothalamus ($p < 0.01 < 0.001$) while TP administration brought back these values to normal levels as in the case of β-GLR or to a still higher level as seen for MDH. The G6PDH activity in pituitary showed a significant rise following castration; this stimulation continued even after TP-treatment. In the hypothalamus, however, castration elicited a significant diminution in the G6PDH level and TP restimulated this enzyme ($p < 0.001$). As far as protein concentration is concerned, both castration and TP-treatment exercised a positive effect. That castration stimulates the protein content of frog pituitary and hypothalamus, irrespective of the period of castration, has already been demonstrated[7].



Enzyme levels in the pituitary (PD) and hypothalamus (H) of frog following castration and testosterone propionate (TP)-treatment.

A considerable amount of literature is available upon the effects of orchiectomy and androgenic steroids on enzyme levels in various organs (for literature see PITOT and YATVIN[14]). It was noted that many enzymes in the prostate, seminal vesicle and kidney of mammals decrease after castration and replacement of steroid, i.e. testosterone brings back the enzyme to control level representing a significant increase over the castrate level. HHS of males is also sensitive to testosterone, since this system, through the feedback mechanism, controls the testicular functioning In fact in the frog castration and TP administration manifest similar effects upon the activity of many enzymes studied in the HHS, as those reported for other tissues in mammalian species. The results probably furnish us good reason to believe that those enzymes of frog HHS which diminish after castration are induced by TP.

Although at present it is difficult to assign a precise functional significance to these enzyme changes, it seems logical to suppose that they are correlated with the hormonal variations (synthesis, release, degradation) in the HHS[15].

Riassunto. La castrazione provoca una diminuzione significativa nella attività di alcuni degli enzimi studiati (ACP, G6P, MDH, β-GLR) sia nell'adenoipofisi che nell'ipotalamo di *Rana esculenta*. Invece la G6PDH (solo nell'adenoipofisi) e le proteine aumentano. Il propionato di testosterone causa un aumento notevole del livello enzimatico dei castrati.

L. IELA, M. MILONE and R. K. RASTOGI

Il Cattedra di Anatomia Comparata, Facoltà di Scienze dell'Università, Via Mezzocannone 8, I–80134 Napoli (Italy), 19 March 1974.

[8] J. L. STROMINGER and O. H. LOWRY, J. biol. Chem. *213*, 635 (1955).
[9] M. V. BUELL, O. H. LOWRY, N. R. ROBERTS, M. W. CHANG and J. I. KAPPHAHN, J. biol. Chem. *232*, 979 (1958).
[10] G. CHIEFFI, L. BELLINI-CARDELLINI and A. POLZONETTI-MAGNI, Ricerca scient. *36*, 283 (1966).
[11] R. A. FREEDLAND and A. E. HARPER, J. biol. Chem. *230*, 833 (1958).
[12] D. ROBINSON, Biochem. J. *63*, 39 (9156).
[13] O. H. LOWRY, N. J. ROSEBROUGH, A. L. FARR and R. J. RANDALL, J. biol. Chem. *193*, 265 (1951).
[14] H. C. PITOT and M. B. YATVIN, Physiol. Rev. *53*, 228 (1973).
[15] This work was supported by Population Council (grant No. M72.150) of New York and National Research Council of Italy.