Endemic presence of *Salmonella bongori* 48:z\_35::- causing enteritis in children in Sicily

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The genus *Salmonella* includes two species, *S. enterica* and *S. bongori*, that have been established on the basis of genetic relatedness and biochemical tests (Le Minor and Popoff, 1987; Reeves et al., 1989). *S. enterica* is biochemically divided into six subspecies: subsp. *enterica*, subsp. *salamae*, subsp. *arizonae*, subsp. *diarizonae*, subsp. *houtenae*, and subsp. *indica*. Independently of the species and subspecies, all *Salmonella* are serologically classified in the Kauffmann-White scheme, that presently contains more than 2,400 serovars (Popoff and Le Minor, 1997). Most of the serovars belong to *S. enterica* subsp. *enterica* (about 60%), followed by subspecies *salamae* (20%), *arizonae* (13%), *diarizonae* (3.8%), *houtenae* (2.8%) and *indica* (0.45%). Only 20 serovars (0.8%) belong to *S. bongori*. Furthermore, the serovars most frequently pathogenic for humans and other mammals belong to subsp. *enterica*, while those belonging to other species and subspecies are rarely found in humans and mammals. In particular, *S. bongori* strains are mainly isolated from reptiles and other cold-blooded animals.

The first strain of *S. bongori* was isolated in 1966 from a lizard in Chad. At that time, it was reported as a new serotype, "*S. bongori*" 48:z\_35::-", and was assigned to the subgenus I of Kauffmann as a biochemically atypical strain (Le Minor et al., 1968, 1969). Other strains with different antigenic formulas but showing the same biochemical pattern were successively identified and they were assigned to a newly named "bongor group" (Le Minor et al., 1992). Presently, all strains showing the biochemical characters of this group are classified in *S. bongori*, as proposed by Reeves et al. (1989).

Human infections are generally caused by strains of *S. enterica* subsp. *enterica*, which are responsible for more than 99.5% of salmonellosis cases in man (Popoff and Le Minor, 1997). Strains of *S. bongori* are only exceptionally isolated from human cases (Aleksic et al., 1996). In the last years several strains of *S. bongori* with antigenic formula 48:z\_35::-, the same as the original isolate, have been identified in hospital laboratories from the three major cities of Sicily (Italy).

Biochemical characters for identification of the studied *Salmonella* strains were determined using commercial tests (API 20 E, bioMérieux, La Balme-les-Grottes, France). Additional tests


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were performed for species differentiation (Popoff and Le Minor, 1997). O and H antigens were determined by slide agglutination with commercial O and H antisera (Biogenetics Diagnostics, Padova, Italy). The antigenic formula of four of these strains has been confirmed by the “Centre National de Référence pour les Salmonella et Shigella”, Institut Pasteur, Paris.

A total of 18 strains of S. bongori 48:z\textsubscript{35}:- were identified in Sicily between October 1984 and May 1997 in three different cities. Eight strains were isolated in Messina between October 1984 and May 1985 (Delia et al., 1987), one strain in Palermo in 1987 (Nastasi et al., 1988) and the remaining ones in Catania between 1986 and 1997. One strain only was isolated from stools of a pigeon in Messina, while the others were from human cases of acute enteritis. In all cases, illness occurred in infants and children aged 0 to 3 years with moderate to severe diarrhoea and fever. No history of recent travel to foreign countries (patients or family members) was found.

Most S. bongori strains have been isolated from reptiles in other countries. The first recognized isolate of this species was from a lizard captured in Chad and possessed the same antigenic formula 48:z\textsubscript{35}:- as the Sicilian strains. Apart from the Sicilian isolates, no others of this serovar have been received by the “Istituto Superiore di Sanità”, Rome, Italy (I. Luzzi, personal communication). This serovar is apparently very uncommon in other countries. Apart from the original strain, only four isolates from foodstuff sent for verification from England in 1985 have been reported at the WHO Collaborating Centre for Reference and Research on Salmonella and Shigella (M.Y. Popoff, personal communication) and at the “Centre national de Référence pour les Salmonella et Shigella”, Institut Pasteur, Paris (P.A.D. Grimont and P. Bouvet, personal communication). No isolate of this serovar has been identified at present at the Enteric Diseases Branch, National Center for Infectious Diseases, Centers for Diseases Control and Prevention (CDC), Atlanta USA (F.W. Brenner, personal communication), at the Laboratory of Enteric Pathogens, PHLS Central Public Health Laboratory, London, UK (L.R. Ward, personal communication), or at the National Reference Centre for Enteric Pathogens, Hamburg, Germany, in the period 1977-1992 (Aleksic et al., 1996).

S. bongori 48:z\textsubscript{35}:- seems endemic and widely distributed in our region. Unfortunately, we have no data to identify sources and routes of infection, but the isolation of a strain belonging to this serovar from an apparently healthy pigeon indicates the presence of the organism in the urban environment. Therefore, contamination from playground, garden or balcony cannot be excluded, though the occurrence of enteritis in infants is more likely to derive from person-to-person transmission. Moreover, although transmission of salmonellae from reptiles to children has been repeatedly observed (Ackman et al., 1995; Kelly et al., 1995), this modality of infection can be excluded in our population, since in Sicilian households, reptiles are not present either as pets or as food, which is the case in other cultures. While several rare and new serovars have been isolated in Sicily from wild reptiles, S. bongori 48:z\textsubscript{35}:- has never been identified in these animals (Örladdella, 1997). However, the prolonged endemic circulation in a relatively large population (more than five million residents in Sicily) of an uncommon pathogen, apparently absent in other western countries, is a noteworthy epidemiological peculiarity.

Key-words: Diarrhoea, Child, Salmonella bongori; Italy, Serovar 48:z35:-, Reptiles.

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Présence endémique
de Salmonella bongori 48:z\textsubscript{35}:-,
agent d'entérites chez des enfants en Sicile

Salmonella bongori est normalement isolée chez les reptiles. Entre 1984 et 1997, 17 souches de cette espèce identifiées au sérovar 38:z\textsubscript{35}:- ont
été isolées dans les hôpitaux de trois villes principales de Sicile à partir de selles d’enfants diarrhéiques âgés de 0 à 3 ans. Ce sérovar semblerait être endémique et bien représenté dans cette région d’Italie.


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**References**


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