0·04 mm. Intestinal caeca cyclocoelid, margins crenated, in median body region. Ventral sucker behind the pharynx, 0·028–0·030 mm in diameter. Ventral sucker half the size of pharynx.

Testes lobed, post-acetabular, intercaecal. Left testis 0·05–0·07 × 0·04–0·06 mm. Right testis 0·05–0·06 × 0·06–0·07 mm. Cirrus sac absent. Vesicula seminalis S-shaped, near left testis. Ejaculatory duct narrow, opening in genital atrium, at anterior body region. Ovary small, oval, diagonal to right testis, 0·050–0·054 × 0·05–0·06 mm. Laurer's canal not visible. Oviduct short, opening at ootype. Vitelline follicles extracaecal, confluent anteriorly. Two long yolk ducts, one from either body side, opening into vitelline reservoir. Uterus passing towards right, over intestinal caeca, parallel to ejaculatory duct, opening into genital atrium through short metraterm. Eggs, two, 0·030–0·033 × 0·025–0·029 mm. Excretory bladder short, tubular, opening outside through excretory pore. The genus *Transversotrema*, with *T. hassi* as the type, was erected by Witenberg[5] for worms, collected from an unidentified piscine host from Red sea. Subsequently, *T. patialensis* Crusz, Ratnayke and Sathananthan[1]; *T. larui* Velasquez[4]; *T. licinum* Manter[2] and *T. soparkari* Pande and Shukla[3] were described under the genus.

The present form differs from *T. hassi* in the presence of eye spots (absent in *T. hassi*) and diagonal ovary which is above right testis in *T. hassi*. In *T. licinum*, *T. soparkari* and *T. patialensis*, the vitelline follicles are not confluent in anterior region and are intercaecal also but in the present form they are confluent anteriorly and are extracaecal. In *T. lauri*, the body is oval and the pharynx and acetabulum are of same diameter but in the present form, it is semilunar and the pharynx is nearly double the size of acetabulum.

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## ROLE OF THYMUS AND BONE MARROW CELLS IN IMMUNITY TO *NEMATOSPIROIDES DUBIUS* IN MICE*

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Singly sensitized thymus and bone marrow cells from donors infected with 100 *Nematospiroides dubius* larvae were injected into three groups of recipients A ($40 \times 10^4$ thymus cells), B ($40 \times 10^4$ bone marrow cells) and C ($20 \times 10^4$ each of thymus and bone marrow cells mixture) and then challenged 14 days after cell transfer. It was found that recipients with mixture of thymus and bone marrow cells (group C) produced significant immunity in comparison with those with either cell population, alone.

*Introduction*

Transfer of adoptive immunity in recipients through different cell populations from infected donors concerning parasitic infections have been reviewed by Larsh[1]. Recently several workers[2–6] have successfully transferred immunity through a variety of cell populations in several infections.

In the case of *Nematospiroides dubius*, Cypess and Sanghvi, Vyas and Johri[8–10] transferred adoptive immunity in mice through spleen, peritoneal exudate, mesenteric lymph node and thymus cells respectively. Since thymus cells from sensitized donors were successfully employed to transfer delayed hypersensitivity in mice[11,12], it was, therefore, thought worthwhile to investigate whether thymus and bone marrow cells singly or together would transfer immunity in the *N. dubius* model.

*Materials and Methods*

Infective larvae of *N. dubius* were cultured according to the method of Van Zandt[13]. Thirty female Swiss albino mice of approximately 20–23 g wt. and 6–8 week old were inoculated per os with 100 *N. dubius* larvae; after 14 days thymus and bone marrow cells were collected and suspended in Ringer's solution and approximately $40 \times 10^4$ cells were injected intraperitoneally into 3 separate syngeneic groups within 4 hours after their collection. Group A received $40 \times 10^4$ thymus cells, group B $40 \times 10^4$ bone marrow cells and group C mixture of thymus ($20 \times 10^4$) and bone marrow ($20 \times 10^4$) cells. Groups D, E and F with unsensitized cells collected from a batch

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TABLE I

*Percentage of* N. dubius *larvae/adult recovered from experimental and control groups of mice at 1st, 5th, 9th and 14th days after a challenge dose of* 100 N. dubius *larvae*

(Readings are based on mean derived from 3 animals)

| Duration of Infection at necropsy (days) | Recipients with sensitized cells (experimental) | | | Recepients with non-sensitized cells (control) | | |
|---|---|---|---|---|---|---|
| | Group A T cells | Group B B cells | Group C T + B cells | Group D T cells | Group E B cells | Group F T + B cells |
| 1st | 64* | 60 | 47* | 76 | 68 | 62 |
| 5th | 60* | 55 | 42* | 75 | 62 | 59 |
| 9th | 45 | 51 | 35* | 52 | 59 | 55 |
| 14th | 40 | 49 | 32* | 50 | 59 | 54 |

* Statistically significant.

of 30 uninfected mice served as counterpart controls. Each recipient mouse was challenged with 100 *N. dubius* larvae 14 days after cell transfer and immune response was assessed by counting larvae on 1st and 5th day and adults on 9th and 14th day from gastro-intestinal tract of mice necropsied. The results were submitted to Chi-square test[14].

*Results and Discussion*

The results of worm recoveries from experimental and control mice are shown in Table I. The worm recovery declined in all experimental groups from 1st to 14th day after challenge. Recipients with bone marrow cells alone did not show statistically significant expulsion (40%, 45%, 49% and 51%) when compared to those of recipients with mixture of thymus and bone marrow cells (53%) 58%, 65% and 68%) on 1st, 5th, 9th and 14th days respectively. Moreover, recipients with sensitized thymus cells alone caused significant expulsion of worms only on 1st (36%) and 5th (46%) day after challenge.

Recipients with a mixture of thymus and bone marrow cells therefore produced measurable amounts of immune response throughout the experimental period as compared with those with either of the cells alone. These findings are similar to those of Claman, Chaperon and Triplett[15] who suggested that one cell population is capable of inducing antibody formation (effector cells) only in the presence of cells from a different population (auxillary cells). Claman *et al.*[16] also demonstrated that suspensions containing adult marrow and thymus cells were far more active in producing anti sheep-red cell hemolysins, when transferred to irradiated syngeneic recipient mice, than each cell population alone.

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