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Sr isotopes in rivers of India and Pakistan: A reconnaissance study

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It is well established[1] that the isotopic composition of Sr in sea water has oscillated on different time scales during the past ~600 Ma. These oscillations result from changes in the relative contributions of dissolved Sr to sea water from its two major sources, continental weathering and hydrothermal interactions, with their characteristic $^{87}Sr/^{86}Sr$. The continental input via fluvial weathering is generally more radiogenic (average $^{87}Sr/^{86}Sr$ 0.7119 ref. 2) compared to the hydrothermal $^{87}Sr/^{86}Sr$ of 0.7035 (ref. 2). The Sr flux and $^{87}Sr/^{86}Sr$ of different river systems vary widely[2–4] and in some way are related to the lithology of the drainage basin, the intensity of weathering and the efficiency with which they transport their dissolved load. We have measured the dissolved Sr concentrations and $^{87}Sr/^{86}Sr$ of the major rivers draining India and Pakistan. These measurements provide data on the flux of Sr isotopes transported by these rivers to the ocean and their impact on the Sr isotope evolution of the oceans. Further, as the river basins sampled comprise a diverse set of lithologic, tectonic and climatic regimes, they provide an opportunity to study the controls of these factors place in determining the Sr isotopic systematics of rivers.

THIS work forms a part of our geochemical reconnaissance study of the Indian rivers. Major ions, Sr and U isotopes were the principal constituents measured in the samples, the results of some of our earlier work are published elsewhere[5–9]. Figure 1 shows the sampling sites.

The rivers sampled can be conveniently classified into two groups[10,11] in terms of their basin geology, tectonics and climate – the peninsular and the extrapeninsular (Himalayan). The peninsular region is a tectonically quiescent shield area that has several mountain systems such as the Aravallis, the western and eastern Ghats and the Nilgiris, most of which are geologically mature This shield is made of Pre-Cambrian rocks of diverse origin,

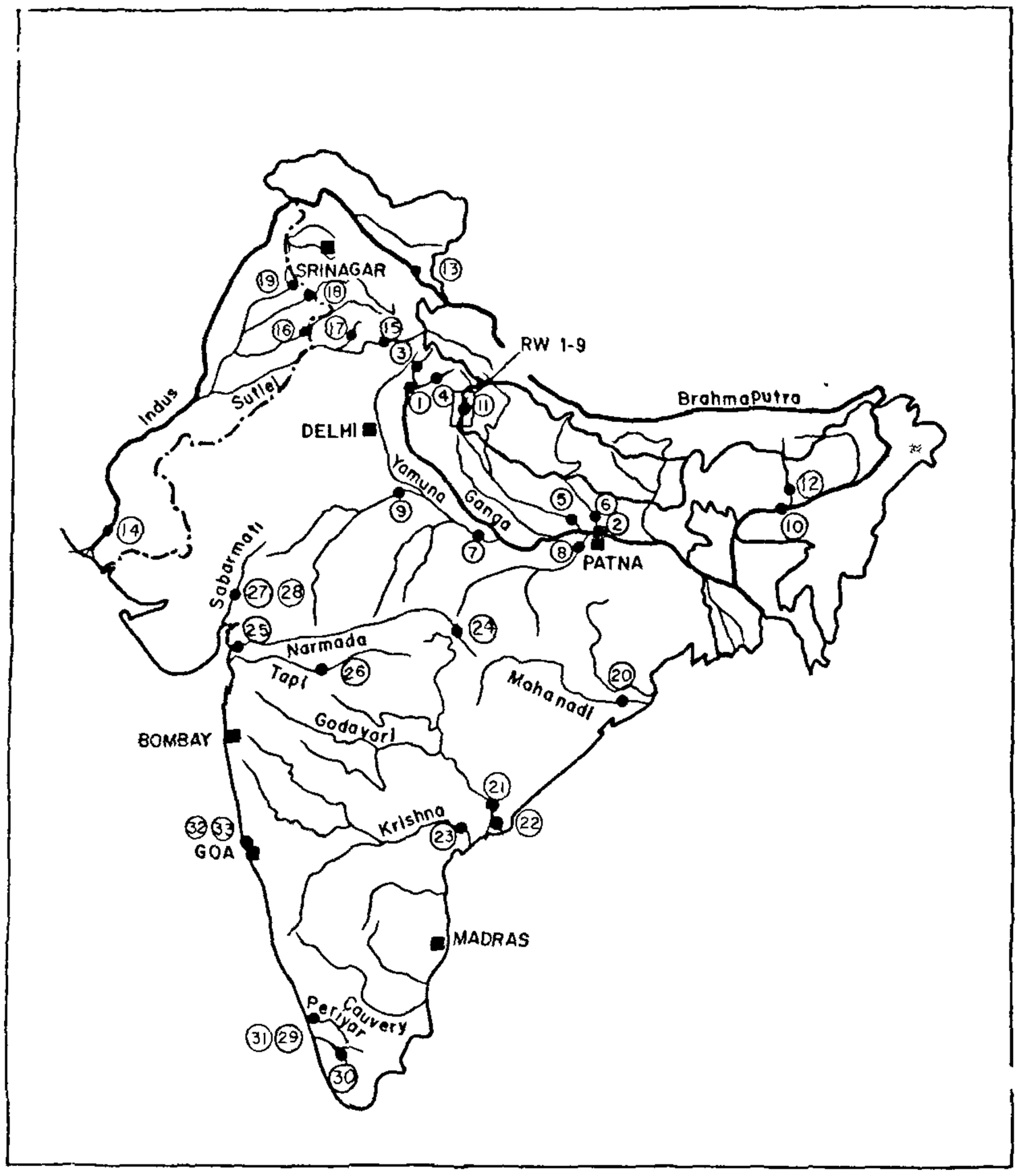

Figure 1. Sampling locations of rivers from India. The sampling location of Indus and its tributaries are given in ref 9. The locations of samples from the Kali–Sarju system (RW 1–9) are marked by rectangle.

most of which have been greatly modified and metamorphosed. These ancient rocks (gneisses, granite, charnokites, greenstones, granulites, etc.) are overlain in many areas by Pre-Cambrian and later sedimentaries (Cuddapah, Vindhyan, Delhis and Gondwanas) and by extensive sheets of lavas of the Cretaceous/Tertiary Deccan traps. Some Mesozoic and Tertiary sediments are also found along the coastal regions[10,11].

There are a number of rivers traversing the peninsular India, the larger ones being Mahanadi, Godavari, Krishna, Pennar and Cauvery, which flow eastward into the Bay of Bengal, and Narmada, Tapi, Sabarmati and Periyar, flowing westward into the Arabian sea. Banas, Luni, Chambal, Sindh, Betwa and Son are the peninsular rivers (lowland rivers[5]) belonging to the Ganga system.

Similar to the peninsular region, the extrapeninsular (Himalayan) region also contains some Pre-Cambrian rocks. These old rocks in the Lesser and Greater Himalayas are comprised predominantly of granitic gneisses and crystallines[12,13]. In the Lesser Himalaya there are also extensive exposures of sedimentary sequences (carbonates, sandstones, shales). The peninsular and extrapeninsular regions are separated by the Indo-Gangetic alluvial plain consisting of massive beds of clay, sand and gravel. The clay zones of alluvial plains contain impure calcareous material in the form of irregular concretions called 'Kankar'. The calcareous material at places can be as abundant as 30%. A large part of the soils is impregnated by alkaline and saline salts[5]. In contrast to the peninsular shield area, the Himalayas are

Table 1. K, Ca, Rb and Sr isotopes in rivers from India–Pakistan

#	River	Location	K (µmol/l)	Ca	Rb (nmol/l)	Sr	$^{87}Sr/^{86}Sr$
Himalayan rivers							
Ganga-Brahmaputra system							
1.	Ganga	Rishikesh	38	353	29	580	0.7365
2.	Ganga	Patna	63	547	11	1017	0.7249
3	Bhagirathi	Devprayag	51	385	54	529	0.7589
4.	Alaknanda	Bagwan	51	429	40	644	0 7385
5.	Ghaghara	Ayodhya	59	528	23	756	0 7349
6.	Gandak	Hajipur	84	649	58	847	0.7400
7.	Yamuna	Allahabad	57	547	7	1509	0.7149
8.	Son	Ara	40	434	6	644	0.7200
9.	Chambal	Dholpur	53	829	5	2290	0.7127
10.	Brahmaputra	Goalpara	46	318	32	670	0.7197
11.	Kali	Jauljibi	39	551	70	1320	0.7276
Indus system							
13.	Indua	Loma	34	522	41	1394	0.7104
14.	Indus	Thatta	109	957	10	3689	0.7111
15.	Sutlej	Salapar	82	622	79	1962	0.7166
16	Ravi	Lahore	71	1070	30	1858	0.7295
17.	Beas	Hanogi Mata	25	148	31	169	0.7448
18.	Chenab	Gujrawala	63	1050	32	2155	0.7218
19.	Jhelum	Lala Musa	40	950	13	2839	0.7125
Peninsular rivers							
20	Mahanadi	Cuttak	40	303	11	704	0.7193
21.	Godavari	Dhavleswaram	59	350	24	1179	0 7163
22.	Godavari	Ravulapalam	63	400	26	1375	0.7152
23.	Krishna	Vijaywada	77	600	20	3742	0 7142
24.	Narmada	Amarkuntak	18	190	13	316	0 7144
25.	Narmada	Upstream Bharuch	46	742	6	2156	0.7114
26.	Tapi	Near Bhusaval	–	585	14	2083	0 7097
27.	Sabarmati	Kheroj	120	908	15	3358	0 7177
28.	Sabarmati	Sijaria	77	1388	10	5199	0.7159
29.	Periyar	Alwaye	(920)	90	36	365	0.7194
30.	Pambayar	Tallawadi	28	43	35	180	0.7230
31 .	Achankovil	Pathanamthitta	26	63	26	290	0.7149
32.	Mandovi	Near Valpoi	26	242	24	352	0 7196
33.	Zuari	Quepem	36	148	32	431	0.7235
8.	Son	Ara	40	434	6	644	0.7200
9.	Chambal	Dholpur	53	829	5	2290	0 7127

Data for Ganga–Brahmaputra from ref 7 and for the Indus system from ref 9 and for the peninsular rivers this study.
#Denotes sample location in Figure 1

Table 2. K, Ca, Rb and Sr isotopes in the Kali–Sarju system (headwaters of Ghaghra)

# Code/river		Location	K (µmol/l)	Ca	Rb (nmol/l)	Sr	$^{87}Sr/^{86}Sr$
RW-1	Sarju	Sheraghat	33	577	37	263	0 7585
RW-2	Ramganga	Thal	30	379	41	296	0 7757
RW-3	Ghat Gad	Near Patel	34	609	35	316	0.7508
RW-4	Kali	Jauljibi	39	551	70	1320	0.7276
RW-4 (R*)					–		0 7277
RW-5	Gori	Baram	41	456	63	768	0 7490
RW-6	Sarju	Rameshwar	34	551	44	311	0 7514
RW-7	Sarju	Near Rameshwar	33	551	36	286	0 7553
RW-8	Panar	Near Rameshwar	52	545	22	1245	0 7408
RW-9	Suyal	Lohali	39	211	17	413	0 7351

*Repeat analysis of RW-4.

tectonically active, still rising and being extensively eroded by the fast-flowing rivers. Glaciers abound the higher reaches and also contribute to the accelerated weathering The lithology of the suture zone in the Trans-Himalaya is dominated by granites and sediments[9,11].

Ganga, Brahmaputra and Indus are the major river systems of the extrapeninsular region, the first two flowing eastward into the Bay of Bengal and the last into the Arabian sea. Ganga and its tributaries from the Himalaya, Yamuna, Kali, Gandak, Kosi and Ghaghara, drain the Pre-Cambrian crystallines and sedimentary sequences in the southern slopes of the Himalaya, whereas Brahmaputra flows along the Indus Tsangpo suture zone in Tibet before taking a turn at the syntaxial bend and entering the crystalline terrains of the Himalaya[5]. The main tributaries of the Indus system – Sutlej, Beas, Ravi, Chenab (Chandra and Bhaga) and Jhelum – drain the crystalline terrains of the Himalaya in their upper reaches (similar to Ganga and its tributaries), whereas Indus and its northern tributaries, Nubra and Shyok, drain a suture zone lithology in a monsoon shadow region[9].

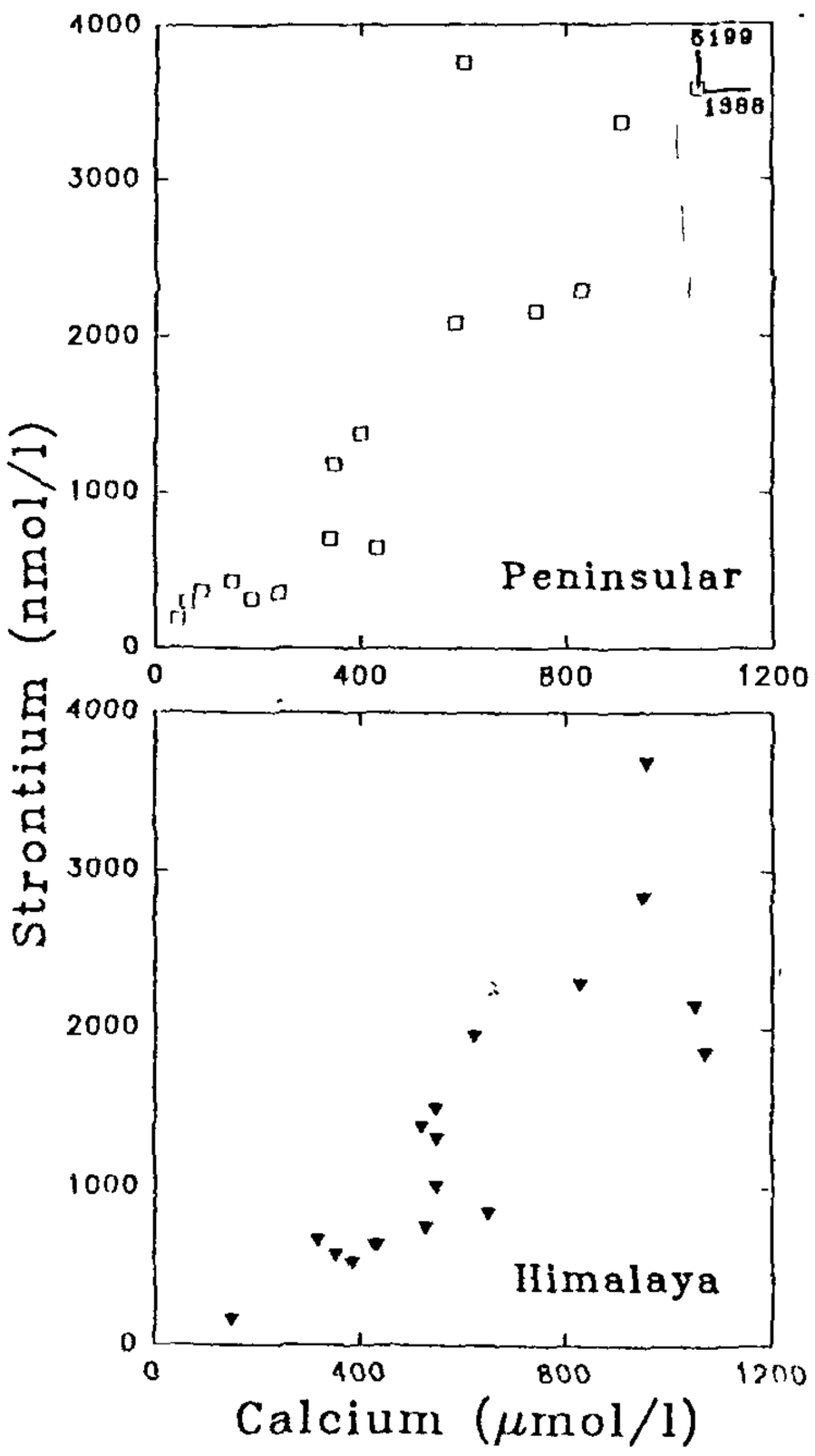

Figure 2. Variation of Sr concentration with calcium in the peninsular and Himalayan rivers The Sr concentrations generally increase with Ca

The peninsular rivers are seasonal (monsoonal) in contrast to the Himalayan ones, which are fed by glaciers and are perennial, though their water flux increases considerably during monsoon.

Most of the rivers were sampled during the past several years. The sampling of the Kali–Sarju system (headwaters of the Ghaghra) was carried out recently. The sampling procedures are discussed in detail elsewhere[5]. Briefly, the river waters were filtered through 0.4 μm Nuclepore filters within 5–6 h of collection, acidified to pH~2 with HNO_3 and stored in polyethylene bottles till the time of measurement. Rb and Sr isotope measurements were made in about 50 g of water following isotope dilution mass spectrometric procedures[14]. The weighed water samples were dried with HF/HNO_3, put in HCl and spiked with ^{87}Rb and ^{84}Sr tracers, and dried. The dried residue was taken in 2.5 N HCl and the Rb and Sr fractions were separated on a cation exchange resin (Dowex 50×8, 200–400 mesh). The Rb and Sr fractions were separately dried, taken in a drop of orthophosphoric acid and evaporated directly onto an outgassed tantalum filament of the ion source. The samples were run on a 9" radius single-focusing mass spectrometer fitted with a Faraday cup collector and the ion current was recorded digitally.

The Sr isotopic ratios were normalized to $^{86}Sr/^{88}Sr = 0.1194$. The long-term stability of the mass spectrometer was checked by measuring the ratio $^{87}Sr/^{86}Sr$ of the NBS-987 standard periodically. The mean $^{87}Sr/^{86}Sr$ of the standard based on nine runs during 1991–93 is 0.71025 ± 0.00005. In addition, to check on the accuracy of $^{87}Sr/^{86}Sr$ measurements we analysed a sea water sample from the Arabian sea and $CaCO_3$ from a living coral from the Lakshadweep. For these two samples $^{87}Sr/^{86}Sr$ are 0.7097 ± 0.0006 and 0.7092 ± 0.0002, respectively, in good agreement with contemporary sea water values. The total Rb and Sr blanks from reagents and chemical procedures are ~5 and ~50 pmol, respectively, much lower than the typical values of about 1 and 25 nmol for Rb and Sr in 50 g water samples. The overall precision on $^{87}Sr/^{86}Sr$ (two standard errors of the mean of about 50 ratio measurements) is about ± 0.0005. These errors are considerably smaller than the scale of Sr isotope variations observed in the river waters analysed. Ca and K measurements were made by atomic absorption spectrophotometry[5].

The dissolved Rb and Sr concentrations and $^{87}Sr/^{86}Sr$ of the water samples analysed are given in Table 1 along with their K and Ca abundances. Table 2 lists the same for the Kali-Sarju system (also known as Mahakali–Sarju) headwaters of Ghaghara, a major tributary to the Ganga. More detailed data on Sr isotopes, Rb and major

ions for the rivers belonging to the Ganga–Brahmaputra and Indus systems are published elsewhere[7,9].

The Kali–Sarju waters were sampled to test if $^{87}Sr/^{86}Sr$ for the headwaters of major tributaries of Ganga, are as radiogenic as of Bhagirathi and the Alaknanda, sampled by us earlier[7]. The results show that the Sr isotope ratios in all these waters are highly radiogenic, and as will be discussed later, such high values probably result from weathering of rich in radiogenic Sr silicates in the drainage basin.

A cursory look at the data in Table 1 reveals that the Sr concentration in the samples ranges between 169 and 5199 nmol/l, similar to that observed for rivers in other parts of the world[2-4].

The Sr concentration shows a general increase with Ca (Figure 2), the correlation being relatively tight for rivers from the peninsular region. The Sr/Ca molar ratios (nmol Sr/μmol Ca) of the peninsular and the Himalayan rivers overlap within the scatter of the data. The mean molar Sr/Ca ratio corresponds to a Sr/Ca weight ratio (g/g) of $\sim 7 \times 10^{-3}$ and $\sim 5 \times 10^{-3}$ for the peninsular and the Himalayan rivers, respectively. The Sr/Ca ratio in rivers is determined by the supply of Sr and Ca to the waters by various rocks and minerals, and their mixing proportions. An important source of Ca to these waters (Table 1) is the weathering of carbonates[5-9]. The Sr/Ca weight ratio in typical carbonates is $1 - 2 \times 10^{-3}$ (ref. 15). Congruent weathering of carbonates (for Ca and Sr) would yield Sr/Ca ratio in river waters significantly lower than that we have measured. Such an observation (Figure 2) would require that either Sr is mobilized preferentially over Ca from carbonates such that the Sr/Ca ratio in rivers is higher than that in carbonates or that these rivers receive Sr from other sources such as evaporites and silicates from the upper crust, which have Sr/Ca higher than that in typical carbonates. Basalts, granites and shales have Sr/Ca about 3 to 10 times higher than that in carbonates. As discussed below, $^{87}Sr/^{86}Sr$ for these river waters also requires that they derive some of the Sr from a more radiogenic source than typical carbonates, such as silicates of the upper crust.

$^{87}Sr/^{86}Sr$ for the rivers sampled (Table 1, Figure 3) lies in the range 0.7097–0.7589; almost all samples have $^{87}Sr/^{86}Sr$ exceeding the global average estimate of 0.7119 (ref. 2). The data also show that $^{87}Sr/^{86}Sr$ for the peninsular rivers falls within a narrow range of 0.71–0.72 and is generally lower than that for the Himalayan rivers draining the granite/gneiss crystallines. The contrast is more pronounced when the comparison is made with that for the headwaters of Ganga[7] and Ghaghara (Table 2, Figure 3). All the headwater samples analysed, except Kali, have $^{87}Sr/^{86}Sr$ exceeding 0.73, with Sr concentration in the range of 140–1390 nmol/l (Table 2, ref. 7)

$^{87}Sr/^{86}Sr$ of dissolved Sr in rivers is governed by the magnitude of Sr contribution from various source rocks

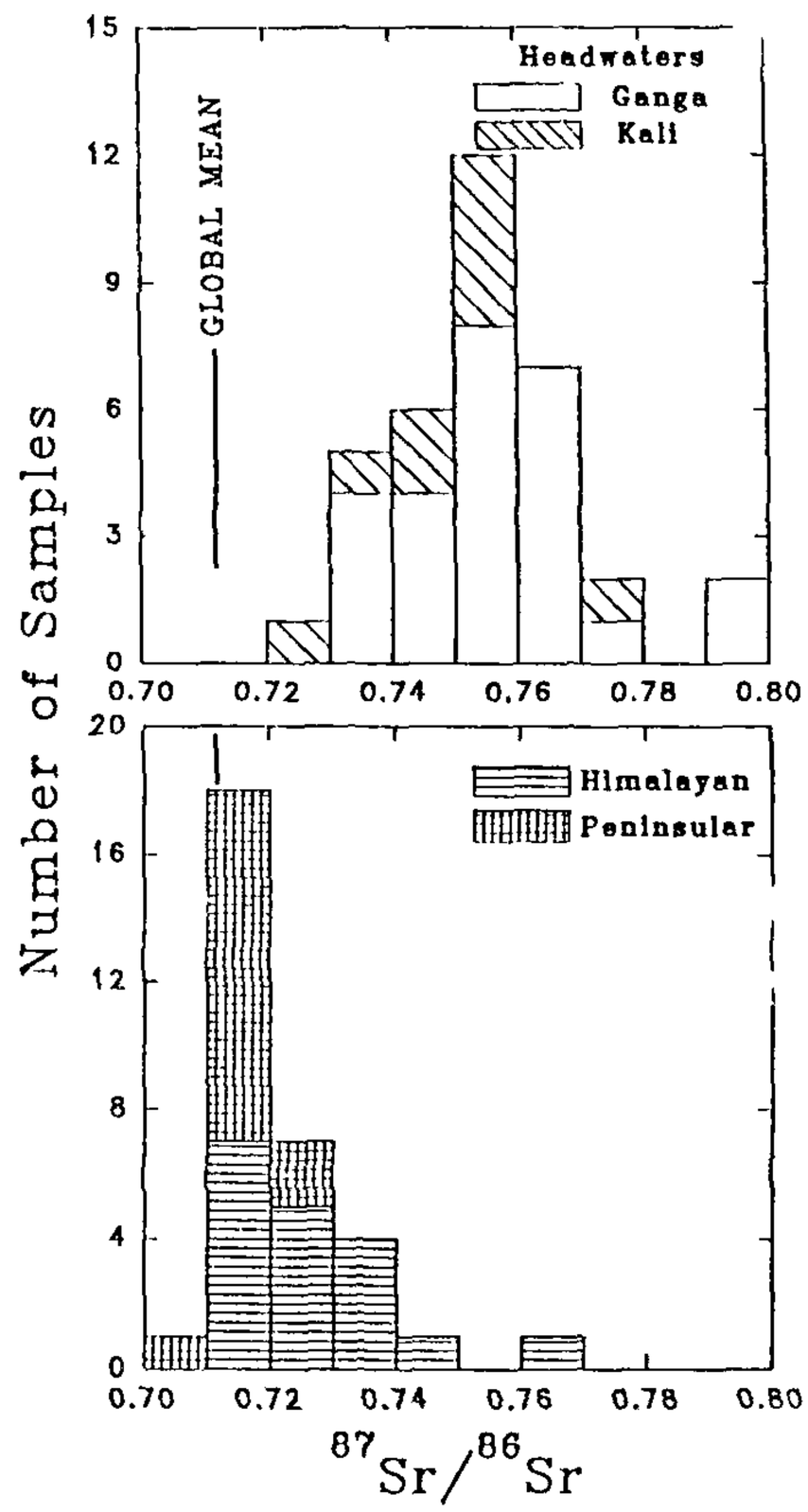

Figure 3. Frequency distribution of dissolved $^{87}Sr/^{86}Sr$ in the rivers sampled Data for Ganga headwaters from ref. 7 and Kali River (this study) For comparison the data for Himalayan and peninsular rivers from Table 1 are also shown. The distinctly higher radiogenic $^{87}Sr/^{86}Sr$ of the headwaters is evident.

(e.g. carbonates, silicates, evaporites) to the effluent waters and their respective $^{87}Sr/^{86}Sr$. For typical carbonates and evaporites this ratio is constrained within a narrow range of 0.706 – 0.709, whereas that for silicates it can vary widely both within and among various drainage basins. Basaltic terrains set a lower limit on $^{87}Sr/^{86}Sr$ for crustal silicates with values of ~ 0.705. The upper limit on $^{87}Sr/^{86}Sr$ in silicates is less constrained, though values exceeding 1.0 are encountered in individual rock suites, such high values are unlikely to be representative of river basins as a whole.

For all the river waters sampled in this study (Tables 1 and 2) $^{87}Sr/^{86}Sr$ is higher than that for typical marine carbonates, suggesting that at least a part of the Sr in

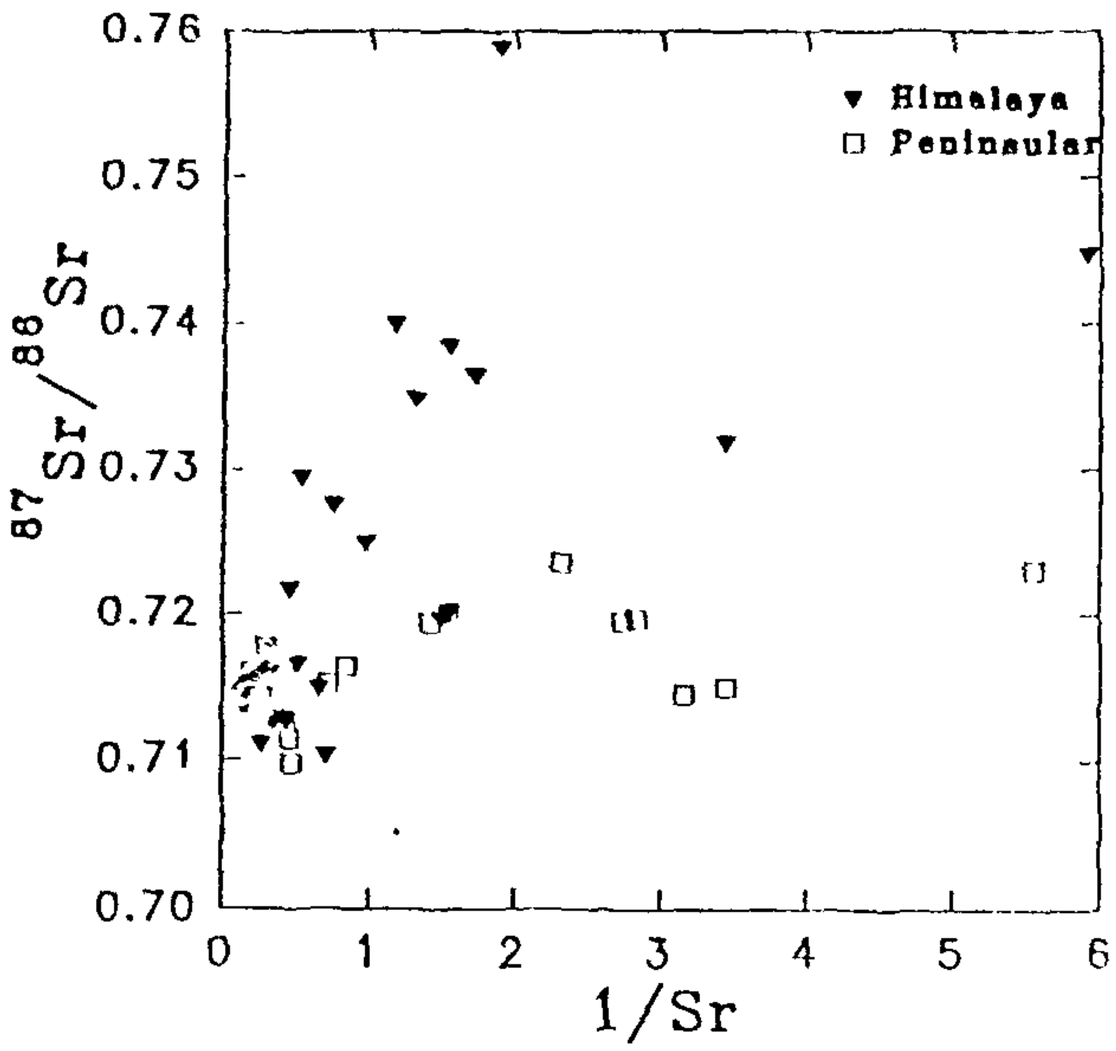

Figure 4. Sr isotope systematics in the rivers sampled. The $^{87}Sr/^{86}Sr$ increases sharply with decreasing Sr concentration in the Himalayan rivers. The peninsular rivers also show a similar trend, but with a gentler slope

these rivers is derived from a source having more radiogenic $^{87}Sr/^{86}Sr$. The plot of $^{87}Sr/^{86}Sr$ versus 1/Sr (Figure 4) reveals that for the Himalayan rivers there is a steep increase in $^{87}Sr/^{86}Sr$ as the Sr concentration decreases. The peninsular rivers also seem to show an increase in $^{87}Sr/^{86}Sr$ as Sr decreases, but with a much gentler slope. The broad trend in Figure 4 can be interpreted in terms of mixing of Sr between a high $^{87}Sr/^{86}Sr$ end member with a low $^{87}Sr/^{86}Sr$ component (e.g. typical carbonates/evaporites). The relation between $^{87}Sr/^{86}Sr$ and Sr concentration for the Himalayan rivers, particularly those belonging to the Ganga system, are distinctly different from other global rivers, in accordance with our earlier observations and other studies[2,7,9,16,17]. Many of these rivers are characterized by high $^{87}Sr/^{86}Sr$ and high Sr concentrations (Figure 4). The source of such high $^{87}Sr/^{86}Sr$ in these rivers is not clear. Weathering of Pre-Cambrian granites and gneisses[7,9] and rocks and minerals enriched in radiogenic Sr due to regional metamorphism, such as the leucogranites and gneisses[16] and carbonates[17], have been suggested as possible sources of high $^{87}Sr/^{86}Sr$ in these rivers. Studies[18] of $^{87}Sr/^{86}Sr$ in sediments from the Bay of Bengal indicate that the dominant source of these sediments for the past ~17 Ma is the higher Himalayan crystallines. Available data from the drainage basin of the Ganga headwaters and its tributaries show that whole-rock $^{87}Sr/^{86}Sr$ are quite radiogenic, with the bulk of the samples clustering around 0.76 and a significant fraction of the samples having values in excess of 0.90 (Figure 5). Such high $^{87}Sr/^{86}Sr$ in the silicates can account for the high $^{87}Sr/^{86}Sr$ in the headwaters of the Ganga system. However, data on Sr isotope composition of carbonates from the drainage basin are needed to confirm this. Whatever be the source of $^{87}Sr/^{86}Sr$ to Ganga, its high value has considerably influenced the Sr isotope evolution of the oceans since the Cenozoic[7].

The data in Figure 4 show an overall increasing trend in $^{87}Sr/^{86}Sr$ with decreasing Sr, but there is a significant scatter. The scatter within each trend probably reflects heterogenity in the Sr isotope composition of the silicate end member. Such a heterogenity can arise as the Himalayan and the peninsular regions are large geographical areas having lithologically distinct sub-basins which the different rivers drain. The wide range of $^{87}Sr/^{86}Sr$ for the silicates from the drainage basin of the Ganga system headwaters (Figure 5) attests to this hypothesis.

The Sr isotope composition of the peninsular rivers is similar to that reported for rivers from other continental shield areas. The source of high radiogenic Sr to Zuari and Mandovi rivers could be the granites and gneisses in their basin, some of which have $^{87}Sr/^{86}Sr$ of 0.713–1.13 (ref. 19). Periyar and Pambayar flow mainly through granulites; the Sr isotopic analysis on these rocks are meagre, and those which are available are in the range 0.78–0.89 (refs. 20 and 21). Mahanadi and Godavari traverse through Deccan trap basalts, unmetamorphosed sedimentary sequences and the high-grade metamorphic terrain of the eastern Ghats. The measured $^{87}Sr/^{86}Sr$ for these river samples integrates the contributions from all these lithologies. Tapi, flowing mainly through the Deccan trap basalts, has the lowest $^{87}Sr/^{86}Sr$ among all the samples (Table 1).

Based on the Sr concentration and $^{87}Sr/^{86}Sr$ in the peninsular rivers (Table 1) and those reported earlier by us[7,9] for Ganga, Brahmaputra and Indus, the discharge-weighted mean Sr concentration in these rivers is calculated to be ~ 1.5 μmol/l, with a $^{87}Sr/^{86}Sr$ of 0.716. The mean Sr concentration in the rivers of India–Pakistan is higher than the global average value of 0.89 μmol/l[-2]; our sampling of some of the rivers (e.g. Indus) during their lean flow may be a likely cause for the high mean concentration. The discharge-weighted Sr/Ca molar ratio of these rivers is 2.7×10^{-3}, which compares with a value of $\sim 2.2 \times 10^{3}$ for the world rivers (based on Sr and Ca concentrations of 0.89 and 398 μmol/l, respectively). The annual flux of Sr transported by the rivers from India–Pakistan to the ocean is ~2200 million moles if our measurements can be considered representative of these rivers. These calculations show that the rivers from India–Pakistan account for ~6.5% of the global riverine Sr flux to the oceans, with a $^{87}Sr/^{86}Sr$ marginally more radiogenic than the global average.

The influence of anthropogenic effects in modifying the natural Sr flux and its isotopic composition is diffi-

Table 3. Rb, Sr concentrations and $^{87}Sr/^{86}Sr$ in fertilizers

Code	Type	Source	Rb (ppm)	Sr (ppm)	$^{87}Sr/^{86}Sr$*
NPK	Potassium ammonium phosphate	RAMBAN Co. (Dehradun)	24	15	0.7087
MOP	Muriate of potash	–	122	6 4	0 7494
DAP	Ammonium phosphate	SPIC (Dehradun)	2 0	130	0.7080
GUUREA	Urea	KRIBHCO (Ahmedabad)	3 1	0 05	–
NBPHOS	Ammonium phosphate	NARMADA Fertilizers (Ahmedabad)	1 3	554	0 7080
GUJDAP	Ammonium phosphate	IFFCO	3 6	12	0 7091

*Error ($\pm 2\sigma$) is ~0 0005

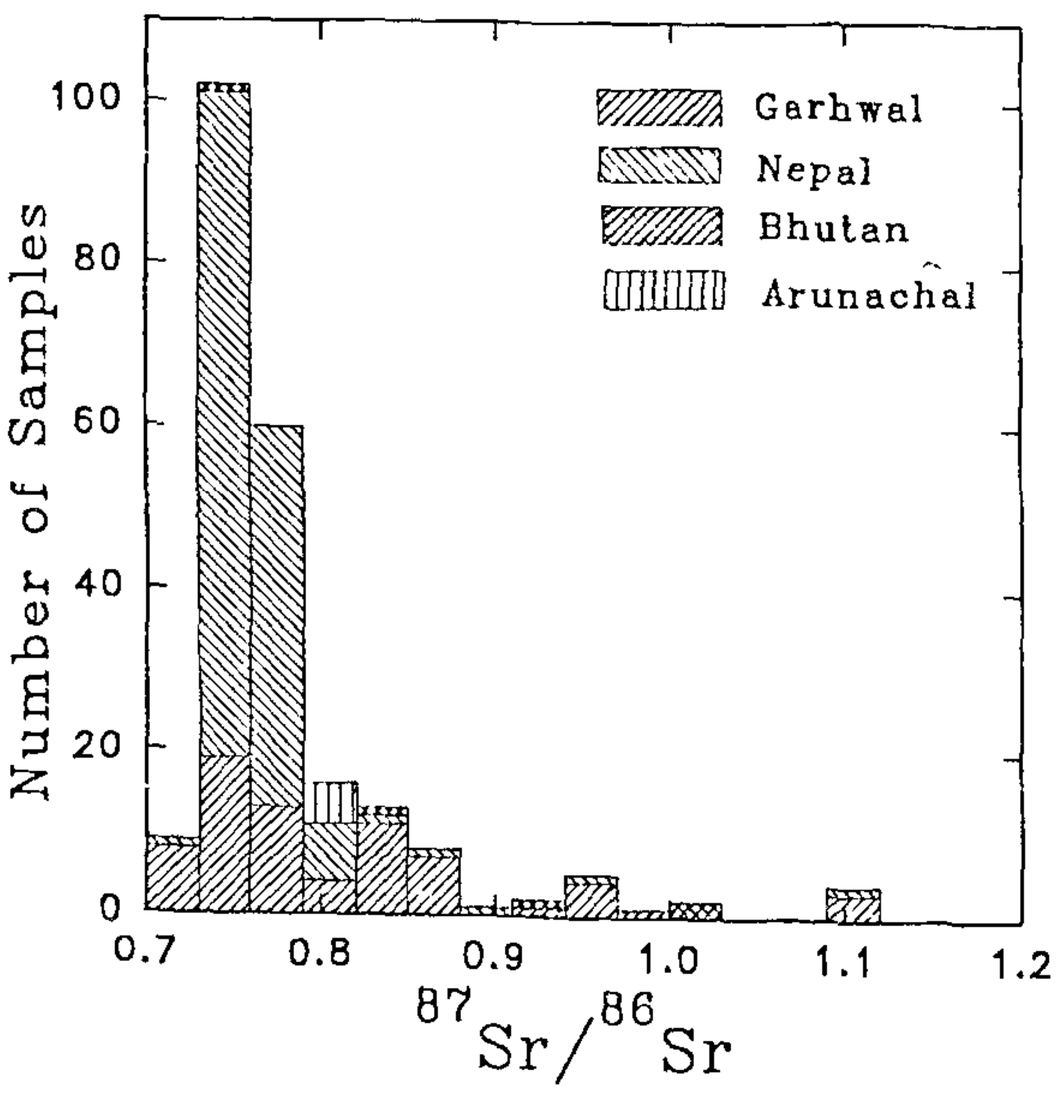

Figure 5. Frequency distribution of $^{87}Sr/^{86}Sr$ in whole-rock samples from the drainage basins of the headwaters of Ganga and its tributaries (Garhwal and Nepal) and Brahmaputra (Bhutan and Arunachal) Data compiled from refs 14, 23–32. The rocks from this region have highly radiogenic $^{87}Sr/^{86}Sr$.

cult to assess. Damming and impounding of rivers may reduce their water discharge, whereas the use of fertilizers may alter the natural Sr concentration of rivers and their $^{87}Sr/^{86}Sr$. We measured the Sr concentration and $^{87}Sr/^{86}Sr$ in a few fertilizer samples used in northern and western India. The results (Table 3) show that all the samples, except for the muriate of potash (MOP), have $^{87}Sr/^{86}Sr$ of ~0 708, consistent with that expected, as bulk of Sr in fertilizers is derived from limestones and phosphates of marine origin. The muriate of potash, which is abundant in potassium and rubidium, has a highly radiogenic $^{87}Sr/^{86}Sr$ of ~0.749 (Table 3). This high value raises concern about the impact such fertilizers can have in enhancing the natural $^{87}Sr/^{86}Sr$ of rivers. Our earlier observation[7] that $^{87}Sr/^{86}Sr$ for Ganga and many of its tributaries varies only marginally during different river stages is an indication that contamination, if any, of natural Sr by fertilizer may not be significant. Moreover, the most radiogenic Sr isotope composition is in the headwaters of Ganga and Ghaghara, where agricultural influences are minimal.

Summing up, our results on the Sr isotope systematics of rivers from India and Pakistan show that almost all the rivers sampled have $^{87}Sr/^{86}Sr$ in excess of the global average, with the headwaters of Ganga and its tributaries having the most radiogenic Sr isotope composition. Studies on the source of radiogenic Sr to the Ganga system (i.e. silicates or metamorphosed carbonates) would help in understanding better the coupling between Himalayan tectonics, weathering and climate change[22].

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The non-induction of HSP70 in heat shocked Malpighian tubules of *Drosophila* larvae is not due to constitutive presence of HSP70 or HSC70

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To understand reasons for the earlier reported non-induction of any of the common heat shock polypeptides in Malpighian tubules of *Drosophila* larvae, we examined the levels of the 70 kDa heat shock polypeptide (HSP70) and of its cognates (HSC70) in control and heat shocked larval tissues, including the Malpighian tubules, by ^{35}S-methionine labelling in conjunction with Western blotting or by immunocytochemical localization using appropriate antibodies against the heat inducible and constitutively expressed members of the HSP70 family. The HSP70 was totally undetectable in western blots of control as well as heat shocked Malpighian tubules of *Drosophila* larvae; the levels of different HSC70 in untreated Malpighian tubules were comparable to those in other larval tissues and also did not increase following heat shock. Immunocytochemical localization of HSP70 showed that none of the highly polytenized cells of Malpighian tubules showed induction of HSP70 after heat shock. The non-induction of the common heat shock proteins in Malpighian tubules of *Drosophila* larvae, therefore, is not due to autoregulation by constitutively high levels of HSP70 or HSC70.

CELLS of virtually every organism respond to a sudden exposure to elevated temperature (heat shock) by transiently increased synthesis of a specific set of polypeptides, commonly referred to as heat shock proteins (HSPs) or stress proteins, which help cells survive the thermal and other damages[1–3]. This response, first discovered in *Drosophila*[4, 5], is a highly conserved biological phenomenon. However, contrary to the general dogma that all cells of an organism respond more or less uniformly to heat shock[1–3], Lakhotia and Singh[6], using ^{35}S-methionine to label the newly synthesized proteins, found that none of the well-characterized HSPs, including the most abundant 70 kDa heat shock protein (HSP70), was induced in heat shocked Malpighian tubules of *Drosophila* larvae. However, the basal levels of HSPs in the Malpighian tubules were not examined in that study[6]. Since synthesis of HSPs is autoregulated, particularly by HSP70 levels[2, 3, 7], the lack of induction of HSPs in heat-shocked Malpighian tubules[6] could be due to a constitutive presence of these proteins in threshold quantities so that further synthesis was inhibited. We have examined this possibility in the present study. Using ^{35}S-methionine labelling in conjuction with HSP70-specific antibodies, we reconfirm the earlier observation[6] on non-inducibility of the common HSPs in this tissue of *Drosophila* larvae and further show that the HSP70 is totally absent, before as well as after heat shock in this tissue; the levels of the various forms of 70 kDa