Chromosome number in the genus *Salvia*

Taxon	Voucher	Origin	*n* Number
**Salvia castanea* Diels	Gill U.S.P.L. 480.65	Suni	11
	Gill 1646	Solan	11
**S. coccinea* Fuss. var. Crimson King	Gill 3205	Chandigarh	22
S. coccinea Fuss. Pink Pearl	Gill 7458	Sutton Seed Calcutta	11
S. farinacea Benth		Sutton Seed Calcutta	10
S. glutinosa L.	Gill 7394	Khurpatal	8
	Gill 7482	Gulmarg	8
**S. hains* Royle ex Benth	Gill 7484	Khilanmarg	8
**S. involucrata* cav.	Gill 3202	Kasauli	7
S. lanata Roxb.	Gill 7382	Nainital	11
	Gill 1644	Solan	11
**S. leucantha* cav.	Gill 3192	Kasauli	11
	Gill 7388	Nainital	11
**S. moorcroftiana* Wall. ex. Bth.	Gill 7583	Solan	8
	Gill U.S.P.L. 480.36	Sirinagar	8
S. officinalis L.	Gill 3196	Rupar	7
S. plebeia R. Br.	Gill 3207	Chandigarh	8
	Gill 1645	Jeolikot	8 + 1B
**S. pseudococcinia* Jacq.	Gill 7401	Khurpatal	11
S. splendens Kev. Gawt.		Sutton Seed Calcutta	8

of Panjab University, Chandigarh, India. Counts for species indicated by an asterisk are being reported for the first time.

A perusal of literature reveals that the frequency of polyploidy in the genus *Salvia* is about 21.7%. All the presently investigated taxa except *S. coccinea* var. Crimson King, are at diploid level. EPLING et al.[3], studied *Salvia* species from California and established a new base number of $x = 15$. The commonest base numbers in *Salvia* are 6, 7 and 8. However, base numbers of 9, 10 and 11 are also not uncommon. From the literature it appears that the genus *Salvia* is highly polybasic and having base numbers $x = 6$, 7, 8, 9, 10, 11, 13, 15, 17 and 19. The basic numbers of 6, 7 and 8 may be considered as primary base numbers and the higher numbers seem to be of secondary origin.

Résumé. Détermination de nombres chromosomiques dans des Sauges (*Salvia*) encore non étudiés du Himalaya.

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Adequate Stimulus of the Insect Tympanic Organ

The most important characteristics of sound stimuli that excite the insect tympanal organ have been considered variously to be amplitude modulation[1], rise time of song pulses[2], and starting and terminal transients of pulses[3]. There is little evidence that the tympanal organ analyses sounds in terms of their frequency[4,5] but only the pulse structure of the stridulations is reflected in the discharge along the auditory nerve. HASKELL[6] showed that the ear of the grasshopper *Chorthippus brunneus* responded in an inconsistent fashion to the species song played from a tape loop and detected only the general features of the amplitude modulation pattern.

Orthopteran songs, which are usually produced by a series of tooth strikes that set the wings vibrating, consist almost entirely of very brief transients with wide frequency ranges. Nevertheless, we know of no experiment on the insect ear in which provision has been made for reproduction of transients over the full frequency range met with in the species song. We have found that a normal response cannot be elicited in the auditory nerve of the tettigoniid *Metrioptera brachyptera* unless ultrasonic elements of the song transients are adequately reproduced.

The tympanal organ of *M. brachyptera* responded very well to the song of a live conspecific singing in a cage close by (Figure 1a). The song was then recorded at 15 i.p.s. (38 cm/s) on a good audiofrequency tape recorder (Akai X-300) and played back to the preparation through a moving coil loudspeaker. A synchronous response in the nerve was barely detectable, even at an intensity of 85 dB (monitored on the 'A' scale of a Bruel and Kjaer sound level meter operating up to 20 kHz) compared with 45 dB from the live insect (Figure 1b). The insect song, on subsequent analysis, was found to have its main energy in the range 15–85 kHz.

Similarly, the calling song of the grasshopper, *Chorthippus parallelus*, evoked a powerful synchronous response in the tympanal organ of *M. brachyptera* when produced by a caged insect (Figure 2), but a comparatively poor response was obtained to an audio-frequency

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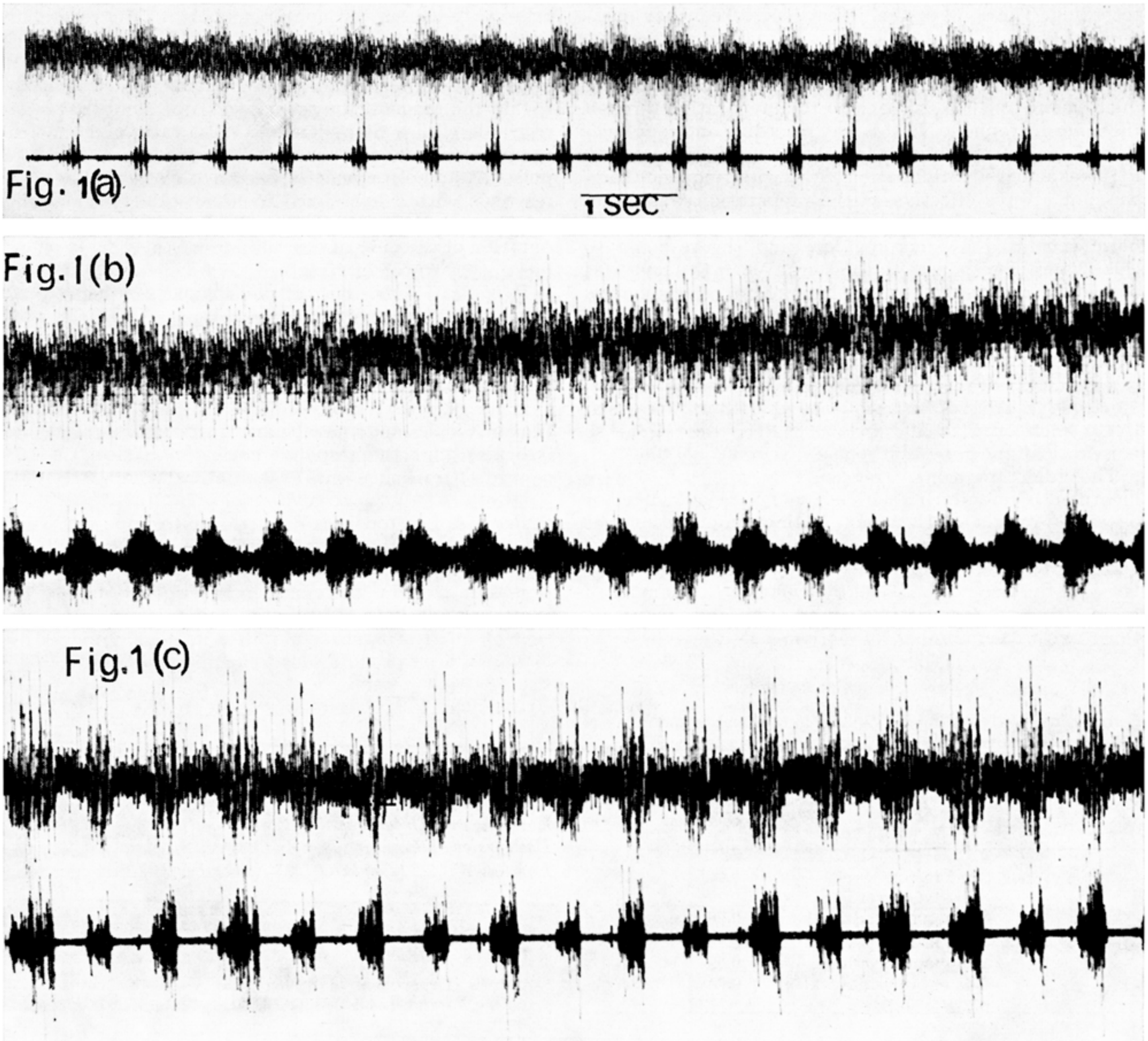

Fig. 1. a) Response of a tympanal nerve preparation of *Metrioptera brachyptera* (upper trace) to the song of a caged conspecific (lower trace) at a distance of 50 cm and an intensity of 46 dB(A) at the preparation. The lower trace was monitored at 35–45 kHz. b) Response (upper trace) to the song of *M. brachyptera* played from an audio-frequency tape recording (lower trace) with an intensity of 85 dB (A) at the preparation. The lower trace is the tape recorder line output. c) Response (upper trace) to the song of *M. brachyptera* played from a high speed recording through filters set at 65 kHz (lower trace) at a distance of 7 cm. The lower trace was monitored at the filter frequency. 1 sec scale for all traces.

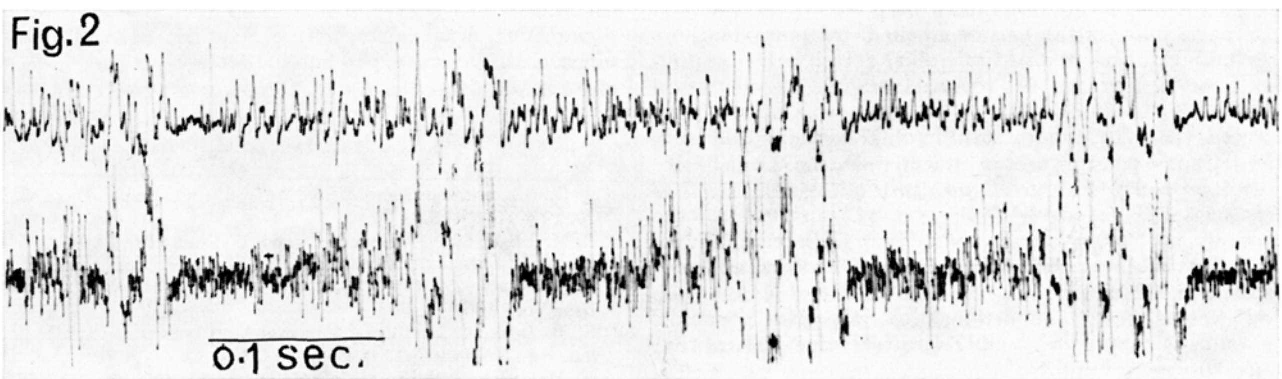

Fig. 2. Response of a tympanal nerve preparation of *M. brachyptera* (upper trace) to the stridulatory pulses of the calling song of the grasshopper *Chorthippus parallelus* produced by a caged insect and monitored at 35–45 kHz (lower trace).

recording. The song of this insect has a frequency spectrum of about 7–80 kHz.

The songs of *C. parallelus* and *M. brachyptera* were next recorded at 37.5 i.p.s. (95 cm/sec) through a condenser microphone and played back to the preparation through the same microphone. In this way recording and reproduction of song elements with frequencies up to at least 150 kHz was achieved. Stimulation with a wide frequency band was not always effective as the preparation was found to be highly sensitive to any high frequency background noise generated by reproduction, and the response to this swamped responses to the song. When the song was played back through electronic filters set to give a narrow frequency band of emission with slopes of 24 dB/octave either side of selected frequencies, responses comparable with those obtaining from the song of a caged insect were elicited within the range of centre frequencies from 35–100 kHz. Above this frequency the filters were relatively ineffective, while below 25 kHz the signal to noise ratio of the nervous response was greatly diminished.

The high frequency transients in the songs were identified by monitoring with a tuned ultrasonic detector operating over a 5 kHz band. A direct comparison was possible between these records and the sequence of action potentials on the nerve (Figure 2). The relationship between the two was assessed by counting the number of large ultrasonic 'spikes' in a sound pulse and comparing these with the number of action potentials over an arbitrarily chosen but consistent height. The results are shown in the Table.

It is evident from the correlations and from visual inspection of high speed oscillograms that at frequencies within the range of the species song the tympanal organ responds with a high signal to noise ratio and that the response reflects the number of transients in the song pulse. At audio-frequencies, on the other hand, the organ responds with a low signal to noise ratio; the response is relatively disordered and reflects the approximate duration of the pulse (or amplitude modulation envelope) but not its transient structure.

It is clearly essential, in physiological or behavioural experiments on insect hearing, to ensure that the transient characteristics of the species song are adequately produced at the appropriate frequencies, otherwise the results may have little biological significance. The theory that the nervous response follows the amplitude modulation envelope should now be disregarded, for our evidence indicates that the response normally mirrors the succession of transients within the natural song pulse.

Correlations between ultrasonic 'spikes' in song pulses and numbers of large action potentials

Stimulus		Corr. coefficient	No. of pulses
Chorthippus song,	caged insect	0.97	15
	audio tape recording	0.74	24
	tape recording at 25 kHz	0.98	7
Metrioptera song,	caged insect	0.75	27
	audio tape recording	0.03	14
	tape recording at 65 kHz	0.73	18

Résumé. Les réponses du nerf tympanique des Tettigonides sont conformes à la structure actuelle des transmetteurs du chant naturel mais non pas si le chant est reproduit par enregistrement magnétique ordinaire. On a montré que les constituants ultrasoniques sont essentiels et que les réponses parfaites ne sont obtenues que lorsqu'on a pu produire des fréquences très hautes.

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The Antimicrobial Activity of Citral

The antimicrobial activity of essential oils has been the subject of numerous publications, and many of the constituents of these oils have been tested for activity. In particular, citral has been cited by many authors as having substantial antimicrobial activity. BALAKHOVSKIĬ and MEĬSEL[1] in 1945 reported on some fragmentation products of vitamin A, one of which was citral. They stated that citral had antimicrobial activity and suggested some possible uses in clinical medicine. The activity of citral isolated from lemon grass oil against *Bacillus typhosus* was reported by BOSE et al.[2], in 1949. Of the compounds tested, citral was the most effective, having a Rideal-Walker coefficient[3] of 20.0. The same authors[4] stated in 1950 that the germicidal power of lemon grass oil was directly proportional to the citral content. MASHIMO, SERISAWA, and KURODA[5] have shown that citral strongly inhibited *Micrococcus pyogenes* var. *aureus* but was ineffective against *Salmonella enteritidis* and *Pseudomonas aeruginosa*. Likewise, OKAZAKI and OSHIMA[6] reported that citral (along with other compounds) was effective against fungi. They tested *Epidermophyton inguinale*, *Achorion gypseum*, and *Trichophyton interdigitale*. It was fairly active against *Mycobacterium tuberculosis* (avian type) but ineffective against *Escherchia coli*, *B. dysenteriae*, and *Staphylococcus aureus*.

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