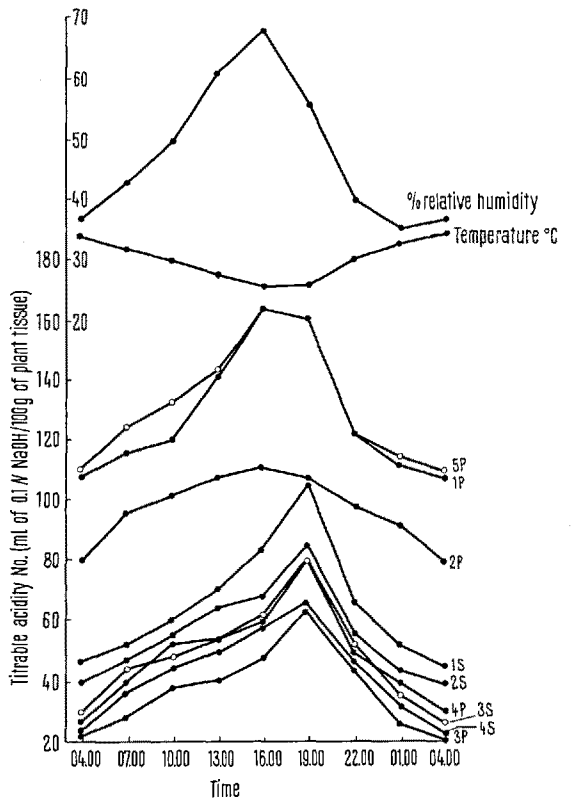
Preliminary Studies on Titrable Acidity in Xerophytic Plants: *Salvadora persica* Linn. and *Prosopis juliflora* D.C.

Organic acid metabolism occupies a central position in plant metabolism. Majority of plant acids are produced in respiratory cycle and take part in various metabolic activities like the maintaining of cell pH, intake of water and even control transpiration. Titrable acidity number (T.A.N.) gives a fair indication of organic acid metabolism in plant tissues[1-6]. In the present investigation, an attempt has been made to study the diurnal variations in T.A.N. in the photosynthetic parts of 2 arid zone trees before the onset of monsoonal rains when they are subjected to maximum soil moisture stress, at Jodhpur.

The climate of the region is arid with prolonged dessicating summer due to high temperature, high wind velocity, high rate of evaporation and a short rainy season with erratic rainfall. Nights are always cool. The year of study was a year of prolonged summer due to delayed monsoon. The study was conducted in July before the monsoon in 2 alternative 24 h periods. The averaged values of temperature and relative humidity of these 2 periods showing diurnal changes are given in the Figure.

Twigs of the plants growing near Rai Ka Bagh Palace Jodhpur were cut and brought to the laboratory in air-tight vasculum. Young and old leaves, stem and flowers were separated. The apical 12 leaves were taken as young and the basal 15 as old and their respective stem regions were considered as young and old. At the time of this investigation, *Salvadora persica* was not in flower, whereas *Prosopis juliflora* was at flower bud stage. The complete inflorescence of later was also analysed.



Diurnal variation in temperature, relative humidity and titrable acidity number (ml of 0.1 *N* NaOH/100 g of fresh plant tissue) in *Salvadora persica* Linn. and *Prosopis juliflora* D.C. during summer before monsoon. 1 S, young leaves of *S. persica*; 2 S, old leaves of *S. persica*; 3 S, young stem of *S. persica*; 4 S, old stem of *S. persica*; 1 P, young leaves of *P. juliflora*; 2 P, old leaves of *P. juliflora*; 3 P, young stem of *P. juliflora*; 4 P, old stem of *P. juliflora*; 5 P, inflorescence of *P. juliflora*.

Titrable acidity number was determined by the method of THOMAS and BEEVERS[7] twice within a week with 2 replications of each plant part and the results were averaged. The deviation for the highest value may be ± 5 T.A.N. Units and for the lowest ± 3 T.A.N. Units.

The crassulacean acid metabolism has been reported in different temperate and tropical parts of the world[2,4,5,7-13]. The photosynthetic parts of succulents belonging to family crassulaceae, cactaceae and a few others also, exhibit a special type of metabolism known as crassulacean acid metabolism. Under natural conditions it conduced to high titrable acidity during the night and decreased during the day.

It is interesting to record that in the present investigation while working with 2 arid zone plants: *S. persica* and *P. juliflora*, the leaves and stem of both the trees exhibit crassulacean acid metabolism before the onset of the rains (Figure). The studies on the inflorescence of *P. juliflora* also showed crassulacean acid metabolism. It is worth mentioning that in *P. juliflora* none of the plant parts is succulent. These results are in confirmity with the crassulacean acid metabolism in non-succulents like *Geranium*[12], *Lindenbergia urticifolia*[13] and *Ananas comosus*[14] and also support the view that the crassulacean acid metabolism is not an invariable attribute of succulence but may be dependent on other environmental factors[15]. All the succulents in which crassulacean acid metabolism is observed are either xerophytes or halophytes and succulence is their ecophysiological adoptation. Similarly non-succulents which exhibit crassulacean acid metabolism may also be either xerophytes or easily adaptable to xerophytic environments.

It is evident from the Figure that the highest titrable acidity number was during the coldest and most humid period at night, i.e. between 04.00 and 07.00 and minimum during the hottest and dryest period of the day, i.e. 13.00 till 16.00. It decreased with an increase in temperature and fall in relative humidity and vice versa. The increase

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in titrable acidity at night may be attributed to more accumulated starch during the day becoming converted into organic acids at night at the lowering of temperature[4,5,16].

The higher titrable acidity in young parts of both the plants showed higher concentration of organic acids in young parts than the old and confirms the findings of earlier workers[4,6,17,18]. This could be due to the reason that the young parts were actively associated with the growth and respiration[19,20].

Zusammenfassung. Zwei Baumarten der ariden Zone zeigen den Crassulaceen-Säurestoffwechsel, obwohl sie keine Sukkulenten sind. Dieser Säurestoffwechsel hängt also von der Anpassung an gewisse Umweltfaktoren (Temperatur, Luftfeuchtigkeit) ab.

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Recovery Cycles of Primary Evoked Potentials in Cat Sensorimotor Cortex

Convincing evidence of recurrent collateral inhibition in sensorimotor cortex has recently been obtained by studying the inhibitory effects of antidromic pyramidal tract stimulation on pyramidal tract neurons[1,2]. Presumably the effect would be exerted via inhibitory interneurons analogous to the Renshaw cells of the spinal cord[3]. However, it has not been possible to record from single cells in the cerebral cortex whose properties correspond to the Renshaw cell; that is, cells which are most active during the period of inhibition[1,4]. This note demonstrates the presence, in the primary evoked response of sensorimotor cortex, of neural activity which may have been recorded from such interneurons.

For a study of the effects of sleep on evoked somatosensory activity, cats were prepared with chronic electrodes under pentobarbital anesthesia[5]. Stimulating electrodes in or adjacent to n. ventralis posterolateralis were placed stereotaxically[6] and their location later verified in Klüver-stained sections. The resulting evoked activity was recorded by small screws in skull overlying primary somatic cortex, displayed on an oscilloscope and photographed with a kymograph camera. The electroencephalogram, eye movements, and neck muscle activity were recorded electrographically to determine phase of sleep. Recording was begun several days postoperatively. Evoked activity relevant to the present study was large enough to measure adequately in 3 of 6 animals studied.

Figure A shows the evoked response recorded in these experiments. The various waves of the response are numbered following the convention used for the visual cortex response[7,8]; several lines of evidence show that visual and somatic responses are equivalent[5,9,10]. Figure C shows the recovery cycle of waves 2 and 4 when conditioning and test stimuli were given at the intervals shown. Wave 1, the afferent radiation volley, was fully recovered at an interval of 5 msec and showed no change in amplitude at longer intervals. Recovery of waves 3 and 5 was similar to that of wave 4. Wave 4 showed an early peak of recovery at 6 msec followed by a phase of inhibition lasting about 200 msec. The inhibitory phase was interrupted by a facilitory peak at 30–50 msec. The time course of inhibition was very similar to the recurrent collateral inhibition of pyramidal tract cells[1,2], which also show a peak of facilitation at about 40 msec[1]. Thus it is reasonable to assume that the inhibition shown in the Figure is due at least in part to recurrent collateral inhibition.

In contrast, an increased excitability of wave 2 mirrors fairly well the inhibition of wave 4 (Figure B, C). During waking (W) a maximal inhibition of wave 4 was associated with a maximal enhancement of wave 2; during 'slow wave' sleep (SS) and 'rapid' or 'rhombencephalic' sleep (RS) decreased inhibition of wave 4 was associated with decreased enhancement of wave 2. Furthermore, in test responses at a given interstimulus interval there was a good correlation between enhancement of wave 2 and depression of wave 4. Since wave 2 is maximally excitable during the period of maximal depression of waves 3–5, it is proposed that wave 2 is the summated activity of interneurons on the pathway for recurrent collateral inhibition.

The peak latency of wave 2 is about 1.0 msec, or about 0.6 msec after the arrival of the afferent volley. It is therefore probably evoked monosynaptically by the afferent volley. That the presumed interneurons on the recurrent pathway are activated monosynaptically by the radiation volley might be expected from the fact that the specific thalamic afferents end mainly among 'stellate' cells,

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