perimental details see fig. 2). The GC-MS findings are summarized by the 2 gas chromatograms shown in figure 2 and by the mass spectrum of the new metabolite in comparison to the spectrum of the ^{14}C-TCDD-standard (fig. 3). These data clearly indicate the presence of a compound of the formula $C_{12}H_4O_3Cl_4$ which, according to the molecular ion pattern, is labelled with ^{14}C identically with the starting TCDD and is eluted, under the given experimental conditions, some 3–4 min after TCDD on a nonpolar glass capillary column.

In a separate experiment it was demonstrated that most of the radioactivity contained in the TLC-band B could be extracted into a basic water phase (2 moles/l sodium hydroxide) and re-extracted into isooctane after acidification (1 mole/l sulfuric acid). It was shown by TLC that the re-extracted material was identical to fraction B. This behavior indicated the phenolic nature of the metabolite. The data strongly support the conclusion that the polar metabolite is a hydroxylated derivative of TCDD itself, i.e. 1-hydroxy-2,3,7,8-tetrachlorodibenzo-p-dioxin, provided no rearrangement of the chlorine substituents has occurred. Unfortunately trials to prepare the compound synthetically in order to compare GC retention times have failed so far.

This is the first report of the identification of a microbial metabolite of TCDD. Structure identification of mammalian TCDD-metabolites has been reported[13]. Even if the amount of metabolite formed was low, it shows that TCDD, although highly persistent in the environment, is not totally inert to microbial attack. In the long range, even a low contribution from microbial metabolism may turn out to be important.

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General solution of the pseudo first-order rate equations for consecutive reactions with identical rate constants[1]

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Summary. The integrated rate equations for any number of consecutive pseudo first-order reactions $A \rightarrow B \rightarrow \ldots$ are given for the case in which the rate constants are all identical. The general solution coincides with the description of a Poisson process, and therefore may be more widely applicable to the kinetics of morphological alterations or other cellular processes than previously supposed.

The general solution of the differential rate equations for pseudo first-order series reactions is well-known[2]. However, the integrated equations contain a limitation in that they do not apply in the case where the rate constants are identical[3]. The anomaly arises because of the occurence of rate constant terms of the form $1/(k_i - k_j)$ which are undefined when the differences are zero. Although it is easy to derive the missing equations, it is apparently not generally recognized that the description coincides with the description of a Poisson process. This important class of reactions provides a basis for the analysis of the birth and growth of whole populations, for example, and might be useful in the analysis of other, smaller scale biological processes as well. The integrated equations which complete the pseudo first-order rate theory for any number of consecutive reactions connected by identical rate constants are found as follows.

Consider first the general reaction scheme

$$C_1 \xrightarrow{k_1} C_2 \xrightarrow{k_2} \cdots C_{N-1} \xrightarrow{k_{N-1}} C_N \qquad (1)$$

in which no restrictions are placed on the values of the rate constants k_n. If c_n is the concentration of the n'th species with time derivative dc_n/dt, the general differential rate equations for scheme (1) are

$$dc_n/dt = k_{n-1}c_{n-1} - k_n c_n \qquad 1 \leqslant n \leqslant N-1 \qquad (2)$$

The solution of (2) can be obtained by successive application of l'Hopital's rule or by Laplace transforms, and the result can be expressed in terms of the familiar sum of exponentials as

$$c_n(t) = c_1(0)(k_1 k_2 \ldots k_{n-1}) \sum_{i=1}^{n} A_i e^{-k_i t} \quad (3)$$

The constants A_i are of the form $1/(k_i - k_j)(k_i - k_k)\ldots$ with all permutations $i,j,k,\ldots$ represented, so that if any two or more rate constants are identical the equations are indeterminate.

However, when the rate constants are all identical, the initial description (2) simplifies to

$$dc_n/dt = k(c_{n-1} - c_n) \qquad 1 \leqslant n \leqslant N-1 \quad (4)$$

and integration yields the set of equations

$$c_n(t) = c_1(0)(kt)^{n-1} e^{-kt}/(n-1)! \quad (5)$$

This expression is the desired time-dependent concentration of any species except the last in a system of reactions connected by identical rate constants. The concentration of the final reaction species is most easily found as the difference

$$c_N(t) = c_1(0) - \sum_{N=1}^{N-1} c_n(t) \quad (6)$$

The set of concentrations represented by equations (5) can also be written in terms of the probabilities of occurrence of the individual species $P_n(t) = c_n(t)/c_1(0)$ by dividing through by $c_1(0)$, and the results are recognizable as the so-called backward equations of a Poisson process[4]. Thus it appears that all of the important properties of the Poisson process can be used directly in the analysis of successive kinetic reactions connected by identical rate constants. The more widely known forward equations

$$P_n(t) = (kt)^n e^{-kt}/n! \quad (7)$$

are obtained if the individual species in scheme (1) are numbered starting with $n = 0$ rather than with $n = 1$.

One of the most interesting and important problems in modern biology concerns the mechanism by which living cells are activated to perform a given task, and blood platelets are being increasingly utilized as models in stimulus-response studies designed to help elucidate this process. These important cells are not only responsible for the maintenence of normal hemostasis, but are also implicated in thrombosis and perhaps in other vascular disorders as well. They undergo characteristic changes in shape when activated; at least one intermediate species is present in the classical 'disc to spiny sphere' shape change, and at least two intermediates are present when the reaction is stimulated under conditions which result additionally in the release of cellular material into the external medium. Preliminary evidence obtained in our laboratory supports the conclusion that the morphological species resulting from stimulation of platelets with (saturating levels of) adenosine diphosphate are formed consecutively and with identical velocities[5]. The Poisson model is clearly applicable to this system, and while there is no evidence to suggest that this finding applies to other stimuli or to other cellular systems, it would be interesting indeed if this were the case.

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Naturally occurring translocation dicentric chromosomes and somatic reduction in *Lathyrus sativus* L.

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Summary. A naturally-occurring case of terminal translocation resulting into end-to-end association of somatic chromosomes, and mitotic anaphase movement without chromatid separation in a variety of *Lathyrus sativus* is reported.

Variability in chromosome number and morphology in somatic cells cultivated in vitro is a general fact[1-3]. The translocation of a whole chromosome or chromosome arms have been reported in both normal and abnormal liveborns[4]. In the plants reproducing either principally or obligatorily through vegetative means, the somatic tissues represent a mosaic of chromosome complements wherein the normal chromosomal complement occurs in maximum frequency. In some such cases the variation in chromosome number and/or morphology is caused by reciprocal translocation[5].

In a normal looking diploid *Lathyrus sativus* (2n = 14) var. LSD-1 (obtained from IARI, New Delhi), polymorphism for pollen grain size and shape was noticed. On cytological examination, this variety exhibited intraindividual chromosomal instability in root- and shoot-tip mitoses, representing a wide range of chromosome numbers, between 14 and 3. The analysis of somatic chromosome behaviour in this variety for 2 consecutive generations revealed that the intraindividual instability of chromosome behaviour and number in somatic tissues is possibly controlled by genetic factors, which result in spindle abnormalities, chromosome degradation and minute chromosomes. The details are published elsewhere[6].

In this variety, some cells which had a reduced chromosome number also showed terminal translocation resulting in end-to-end fusion and also the anaphase separation of somatic chromosomes without chromatid separation, which resulted in somatic reduction.

The observations were recorded in well-spread chromosome preparations of root tip mitosis obtained after pretreatment in a saturated aqueous solution of para-dichlorobenzene for 3.5 h at 12–14 °C and staining in a 2% aceto-orcein + N · HCl mixture (9:1). The terminal translocation