



Editorial

A celebration of the life and times of Jean-Claude Tabet

Jean-Claude Tabet was born on 16 June 1943 in Constantine, Algeria. At the age of one, he moved to France. He was named to his first teaching post at the Université de Paris XI. He completed his Thèse de Doctorat d'Etat at the Université de Paris XI (Orsay, France) in 1973, in H.-E. Audier's group at the Fétizon laboratory, where he developed the use of ethylene ketal for locating substituents on cyclic systems. He demonstrated the reversibility of the enlargement and contraction of ring systems. He became a Maître Assistant (Assistant Professor) at the Ecole Polytechnique in Palaiseau, France in 1975. In 1985, Jean-Claude was named Professeur at the Université Pierre et Marie Curie (Paris VI) where he maintains his laboratory today. In 1996 Tabet received the Gramatikakis-Newman prize from the French Academy of Sciences. Jean-Claude has confronted a wide variety of problems in mass spectrometry from many angles. At the end of the 1970s, Jean-Claude embarked on several visits to foreign laboratories to satisfy his curiosities about organic reaction mechanisms in the gas phase using tandem mass spectrometry and emerging desorption methods.

During his time spent in Lausanne, Switzerland at Tino Gäumann's laboratory at EPFL, first, he worked with Daniel Stahl on rearrangement processes using EI, and then upon meeting Helmut Schwarz, he learned about MIKES and collisional activation methods. Later, in 1981, with Raymond Houriet he investigated the gas-phase acidities of diols according to Cooks' kinetic method, and at this period, his interest in charged aggregates was initiated. His knowledge of desorption methods was reinforced during the year passed at Johns Hopkins University in Baltimore, MD. There, working on laser desorption with Robert Cotter, a very fun scientific adventure was underway when the thermal character of the LD process was demonstrated through the measurement of energy spreads. More importantly, they demonstrated that an extraction delay of several μs allowed: (i) improvement of mass resolution and (ii) diminished the presence of prompt fragmentations. Finally, in 1984, he returned to Europe and went back to T. Gäumann's lab in Lausanne to successfully aid in introducing californium desorption (PDMS) using the FT/ICR to produce ionized peptides. This was his last extended period in a foreign country, and this was for him a strong scientific and human experience. He continued to develop collaborations in various laboratories, although with

shorter visits. In particular, he visited R. Graham Cooks' lab at Purdue to show diastereomeric effects on gas-phase acidities.

Jean-Claude Tabet is best known for his work investigating stereochemical effects in the gas phase resulting from unimolecular processes under collisions, and via ion–molecule reactions, from both positive and negative reagent ions. He was among the first to demonstrate the SN_2 process using positive mode chemical ionization to interpret orientation concerning SN_2 versus SN_i competitive processes. In the late 1980s, at the Université Pierre et Marie Curie (Paris VI), with group members Richard Cole and Dominique Despeyroux, nucleophilic substitution reactions induced by ammonia on monofunctional bicyclic systems were reinvestigated. Jean-Claude Tabet developed an experimental approach based upon stereochemical effects which was applied to the distinction of enantiomeric systems by use of chiral gas-phase reagents under CI conditions. This approach has now been supplanted by Cooks' group's use of diastereomeric noncovalent ternary complexes constituted of a chiral partner and a transition metal, prepared under ESI conditions.

Returning to his interest in laser desorption, today with his group, Jean-Claude is investigating the MALDI mechanism, working from the model based upon the *lucky survivor ions* developed by Michael Karas which involves formation and desolvation of larger aggregates of charged species. Their belief is that solvated charged species (matrix or solvent) evolve by endothermic desolvation such as that which occurs in the ESI mode for multiply-charged proteins and various singly-charged multimers. From this model emerges a new point of view on the role of the size of aggregates in relaxing desorbed ions. The Tabet group continues to work in the areas of DIOS and AP-MALDI desorption to study internal energy of the produced ions. The influence of gas-phase basicity on the stability of protonated multimers directs him especially toward the determination of the basicity of amino acids; a basicity scale of modified prolines was also established, as well as one for nucleosides, and another for MALDI matrixes. These measurements were performed by ion trap mass spectrometry and the results showed only weak deviation from thermochemical data. Many analytical applications of MALDI and ESI were developed in the

polymer field as well as for biomolecular substrates. This scientific orientation was influenced by both industrial collaborations, and by chemists and biologists of the CNRS research unit in which his group is included. In particular, he has developed several applications employing cationization of peptides, saccharides, lipids and liposaccharides for structural determinations.

Jean-Claude Tabet's interest in the development of mass spectrometry instrumentation began with the tandem tetra-quadrupole allowing CID processes subsequent to SID to study stereochemical effects. With Richard Cole, the production of inconvertible isomeric protonated molecules from survivor ammonium adduct ions was demonstrated, which presented different specific decomposition pathways relative to the protonated molecule produced directly in the CI source. At the same period, Olivier Lapr votte embarked into the field of mass spectrometry in Tabet's laboratory. During the last 10 years, Tabet's attraction to the ion trap mass spectrometer presented a new adventure for him which was initiated by his collaboration with Raymond March. Early on, he worked to rationalize ion relaxation (both the internal and kinetic energies) and self-ionization using QISMS. With Gianluca Giorgy, he applied this latter ionization mode toward enhancing stereochemical effects in modified carbohydrates. He built different tandem instruments such as a quadrupole filter coupled orthogonally to the ion trap for studying: (i) black canyons and non-linear resonances, and (ii) ion–molecule reactions. He continues investigations into the possibility to build orthogonal injection of ions from the ion trap into a TOF/MS. In addition, his concept of the external source for negative ion injection into the ion trap was shown to be especially useful for selective anion reactions to generate ions from organophosphorous and nitrated compounds directly introduced through GC into the ion trap for in situ ionization. Now, after studying ghost peaks and their potentialities for analytical purposes, he is developing with his students, investigations into improving resolution and accurate mass measurements via the use of a reverse scan technique. Other instrumentation was also introduced in his lab, such as MAB (collaboration with Michel Bertrand) and MIMS.

The Tabet group has produced a large number of Ph.D. students (more than fifty) who have contributed greatly to the development of the mass spectrometry community in France. At this stage in his career, he claims that the many reports appearing from his group are essentially due to the hard work of his thesis students and permanent research collaborators. That is, he is only the conductor of the orchestra, a group that is nothing without its band members and soloists.

1. On the road

As a youngster, Jean-Claude was an amateur racecar driver, and those who have ever ridden with him in his car know that many of his driving habits, including his

tendency to use a heavy foot, were formulated during his racing period. Richard Cole relates that “On one occasion upon speedily leaving the Parisian p ripherique (beltway) to enter onto the highway leading South to the Tabet home in Morangis, I was startled when, gazing through the front windshield on the passenger's side, my eyes perceived a distinctly blue hue to the French scenery. I quickly leaned over to glance into the side mirror to check my suspicions about the breathtaking speed of Jean-Claude's motoring: could it be true that the objects in the rearview mirror were tinged with red?!!”

Helmut Schwarz recalled that “After a night of merry-making on the First of August to celebrate the Swiss national holiday, Jean-Claude, was at the wheel of a 2 CV fully packed with five people. The car was zooming downhill on a narrow path in the Jura Alps. We were all very close to suffering from heart attacks except for Jean-Claude. It felt as though we had taken a wrong turn somewhere and mistakenly entered onto a bobsled course!!”

Prior to an extended visit to the United States in 1983, Jean-Claude had obtained an International Driver's license in France that, in order to satisfy all French administrative requirements, needed to be at least six pages in length in its unfolded state. He had rented a car and was speeding on the Kennedy turnpike to get to a “roast” honoring Burnaby Munson in Delaware. A state trooper pulled him over to the side of the road, and upon rolling down his window, Jean-Claude unfurled the multi-page French license, draping it on the side of the car. He confronted the trooper with the declaration



Fig. 1. Understanding nucleophilic substitution.

Table 1
Tabet expressions of emotion

Sentiment (French/English)	In French	In English
Mauvais moment/moment of despair	Pas possible!	Eets eempossibol!
Joie/glee	Oh! Fantastique!	Oh! Fontasteeque!
Travail difficile/tough time in the lab	Quelle galère! Qu'est-ce qu'on a ramé!	What a day!
Une tonne de problèmes/accumulated troubles	Quelle vie de chien!	What a life!
Succès après avoir galéré/success after struggling	Qu'est-ce que j'ai travaillé comme une bourrique! Ouf!	What a sacré job! Oof!
Perplexité/bewilderment	Je me sens comme une poule devant une brosse à dent! (voir Fig. 2)	Eets krazy! (see Fig. 2)

“I am French!!” It is not clear whether the incident led the trooper to believe that Jean-Claude was a rare kind of diplomat (arguably a correct statement), or whether the sheer size of the French document made finding the information necessary to write up the violation just too complicated. In any event, after a reminder from the policeman that he was not driving in Paris, Jean-Claude drove off without a citation!!

2. Raconteur

In August 1997, at the 14th International Mass Spectrometry Conference at Tampere, Finland, Jean-Claude was scheduled to give a plenary lecture entitled “Stereochemistry and Mass Spectrometry: Ion Molecule and Dissociative Reactions”. The weather was quite stormy and windy that day, and the umbrella that Jean-Claude had brought along on the trip took quite a beating on the way to the conference center. In the course of his lecture, which addressed reactions in the mass spectrometer that led to nucleophilic substitution, Jean-Claude told the audience that he wanted to give them an example of Walden inversion during an $\text{S}_{\text{N}}2$ reaction. He reached under the podium for his damaged umbrella, popped it open, and held it up for all to see. Then, with only a slight push, the cloth covering expanded and flipped direction to turn inside out (Fig. 1) ... the room exploded in laughter.

3. Language

Jean-Claude is well known for his very enthusiastic lecture style, and for his blurring of the lines between the French and English languages. We have assembled a short list (those fit for print!) of a few of his most frequently voiced expressions in both French and English (Fig. 2, Table 1).

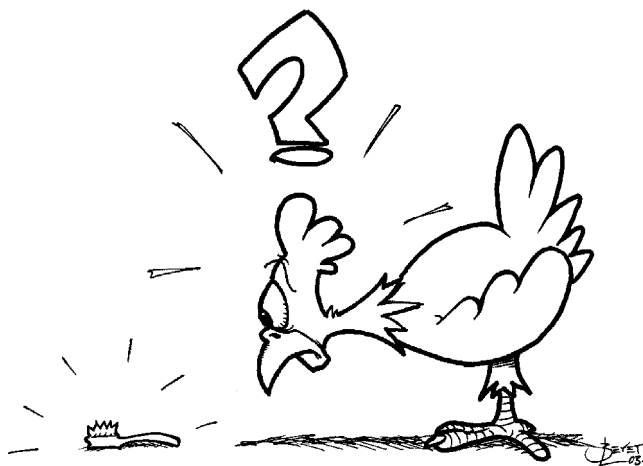


Fig. 2. Etre comme une poule devant un brosse à dent; to be like a chicken in front of a toothbrush.

As Bob Cotter reports “It seems that Jean-Claude has never mastered the differences in English versus French for the usages of ‘to be’ and ‘to have’ as auxiliary verbs. One time, during his visit, he arrived at the lab very late one morning and declared to the group “I am a flat tire”. We all knew that he did not look like one, but on so many occasions, when puzzled by something, he would say ‘I am a problem’. We always assured him that he was not.”

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